

**In re: UNITED STATES PATENT  
AND TRADEMARK OFFICE**

***YAMAHA CORPORATION OF AMERICA***

*v.*

***BLACK HILLS MEDIA, LLC***

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***V. MICHAEL BOVE, JR., PH.D.***

***May 29, 2014***

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**MERRILL LAD**

1325 G Street NW, Suite 200, Washington, DC  
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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD  
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YAMAHA CORPORATION OF AMERICA

Petitioner

v.

BLACK HILLS MEDIA LLC

Patent Owner

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Case IPR2013-00597, Patent 8,230,099 B2

Case IPR2013-00598, Patent 8,214,873 B2.  
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VIDEO DEPOSITION OF V. MICHAEL BOVE, JR., Ph.D.

Thursday, May 29, 2014 - 9:57 a.m.

Pepper Hamilton LLP

125 High Street

Boston, Massachusetts

- - - Reporter: Jill K. Ruggieri, RPR/RMR/CRR - - -

Job No.: 0124-249160

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2

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25

1 Also present: Dr. Gareth Loy

2

3 Videographer: Gayle Ashton, Merrill Legal Solutions

4

5

6 I N D E X

7

8 WITNESS:

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10 V. MICHAEL BOVE, JR., Ph.D.

11 Examination by Ms. Gladstein 8

12 Examination by Mr. Fehrman 278

13

14 E X H I B I T S

15

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17 Bove in IPR2013-00598

18 Exhibit 2 Notice of Deposition of Michael 7  
19 Bove, Jr., in case IPR2013-00597

20 Exhibit 3 Declaration of Michael Bove, Jr., 8  
21 for Patent No. 8,214,873

22 Exhibit 4 Declaration of Michael V. Bove for 9  
23 Patent No. 8,230,099

24 Exhibit 5 US Patent No. 8,214,873 109

25 Exhibit 6 US Patent No. 8,230,099 109



1	Exhibit 8	US Patent No. 6,622,018	173
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5		No. 2003/0045955 A1	
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10	Exhibit 7	US Patent Application Publication	167
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1 PROCEEDINGS

2 THE VIDEOGRAPHER: This is the  
3 video operator speaking, Gayle Ashton, with  
4 Merrill Legal Solutions.

5 Today's date is May 29, 2014,  
6 and the time is 9:57 a.m. We are here at the  
7 offices of Pepper Hamilton, located at 125  
8 High Street, Boston, Massachusetts to take  
9 the videotaped deposition of V. Michael Bove,  
10 Jr.

11 This is a proceeding in the  
12 United States Patent and Trademark Office,  
13 before the Patent Trial and Appeal Board,  
14 Yamaha Corporation of America, Petitioner,  
15 versus Black Hills Media, LLC, Patent Owner,  
16 Case IPR2013-00597, Patent 8,230,099 B2; and  
17 Case IPR2013-00598, Patent 8,214,873 B2.

18 Will counsel please state  
19 their appearances.

20 MS. GLADSTEIN: Lana Gladstein  
21 of Pepper Hamilton on behalf of patentee,  
22 Black Hills Media.

23 MR. MOLLAAGHABABA: Reza  
24 Mollaaghababa of Pepper Hamilton on behalf of  
25 patentee, Black Hills Media.

1 MR. ENGELLENER: Tom  
2 Engellenner, also Pepper Hamilton, on behalf  
3 of Black Hills Media.

4 MS. GLADSTEIN: We have also  
5 Dr. Gareth Loy with us on behalf of Black  
6 Hills Media.

7 MR. YAP: Alex Yap of Morrison  
8 & Foerster for petitioner, Yamaha Corporation  
9 of America.

10 MR. FEHRMAN: David Fehrman,  
11 Morrison & Foerster, for petitioner Yamaha  
12 Corporation of America.

13 THE VIDEOGRAPHER: Will the  
14 court reporter please swear in the witness.

15  
16 VICTOR MICHAEL BOVE, JR.,  
17 Ph.D., a witness having been duly sworn, on  
18 oath deposes and says as follows:

19  
20 MS. GLADSTEIN: Shall we just  
21 put on the record the discussion that we had  
22 prior to the deposition about the  
23 applicability of this deposition to both  
24 proceedings, that's IPR598 and IPR597?

25 MR. YAP: Sure.

1 MS. GLADSTEIN: All right.

2 And we will use exhibits  
3 consecutively, and to the extent that they're  
4 applicable to either proceeding, they will so  
5 apply.

6 MR. YAP: Sure.

7 MS. GLADSTEIN: All right.

8 (Exhibit 1 marked for  
9 identification.)

10 EXAMINATION

11 BY MS. GLADSTEIN:

12 Q Dr. Bove, I am handing you what has  
13 been marked as Bove Exhibit 1.

14 It's a document titled Notice  
15 of Deposition of V. Michael Bove in  
16 IPR2013-00598.

17 Have you seen this document  
18 before?

19 A I believe I was emailed a copy of  
20 this document by Yamaha's counsel.

21 Q Thank you.

22 (Exhibit 2 marked for  
23 identification.)

24 THE DEPONENT: Thank you.

25 BY MS. GLADSTEIN:

1           Q     Dr. Bove, I'm handing you what's  
2           been marked as Exhibit 2.  It's a document  
3           titled Notice of Deposition of you, Michael  
4           Bove, Jr. in case IPR2013-00597.

5                     Have you seen this document  
6           before?

7           A     I have.

8           Q     And could you state your full name  
9           and address for the record.

10          A     Victor Michael Bove, Jr., and my  
11          address is 57 Ray, R-A-Y, Road in Wrentham,  
12          Massachusetts.

13          Q     Thank you.

14                     (Exhibit 3 marked for  
15          identification.)

16          BY MS. GLADSTEIN:

17          Q     Dr. Bove, I'm handing you a  
18          document marked Exhibit 3 that bears a title  
19          of Declaration of me, Michael Bove, Jr., for  
20          Patent No. 8,214,873, and I will represent  
21          that it's in the proceeding IPR203-00598.

22                     Are you familiar with this  
23          document?

24          A     I am.

25          Q     And what is this document?

1           A     This document is a declaration in  
2           which I give my opinion on certain points  
3           that Yamaha's counsel has asked me to address  
4           with respect to the IPR of the '873 patent.

5           Q     And that's a document you prepared?

6           A     It is.

7           Q     And it bears your signature?

8           A     It does.

9           Q     On page 15?

10          A     Well, it's -- there are two sets of  
11          page numbers on here, just for clarity.

12          Q     Oh.

13                         Let's refer to this document  
14          is also marked as Yamaha Corporation of  
15          America, Exhibit 1002, page 16.

16          A     Yes.

17          Q     Does that page bear your signature?

18          A     It does.

19          Q     Thank you.

20                         (Exhibit 4 marked for  
21          identification.)

22          BY MS. GLADSTEIN:

23          Q     Dr. Bove --

24          A     Thank you.

25          Q     -- I'm handing you what has been

1 marked as Exhibit 4.

2 It's a document titled  
3 Declaration of Michael V. Bove for Patent  
4 No. 8,230,099. I will represent it's an  
5 inter partes review proceeding No.  
6 IPR2013-00597, and that also there's a Yamaha  
7 Corporation of America Exhibit 1002.

8 Are you familiar with this  
9 document?

10 A I am.

11 Q And is this a declaration that you  
12 prepared?

13 A It is.

14 Q And does the Bates stamp page 9  
15 bear your signature?

16 A It does.

17 Q Dr. Bove, have you been deposed  
18 before?

19 A I have.

20 Q On how many occasions?

21 A Quite a few going back to the  
22 1990s, so I don't have an exact number.

23 Q Approximately?

24 A Maybe two.

25 Q So you are familiar with the

1 process?

2 A I think so, yes.

3 Q Deposition process.

4 If at any time you need to  
5 take a break, so long as there is no question  
6 pending, just let me know, and we'll go off  
7 the record.

8 A Thank you.

9 Q That's really about it.

10 Is there anything that may  
11 impede your ability to answer questions here  
12 today?

13 A Not that I'm aware of.

14 Q Great, thank you.

15 Can you please tell me about  
16 your education post high school.

17 A I have a bachelor's degree in  
18 electrical engineering from the Department of  
19 Electrical Engineering and Computer Science  
20 at MIT.

21 I have a master of science in  
22 visual studies from the Department of  
23 Architecture at MIT, and I have a Ph.D. in  
24 media technology from the program in Media  
25 Arts and Sciences at MIT.



1           Q     Focusing on your undergraduate  
2     studies, how would you characterize the work  
3     that you did in pursuit of your undergraduate  
4     degree?

5           A     Well, it was a fairly standard  
6     electrical engineering program at MIT.

7                     My bachelor's thesis was on  
8     the subject of digital television and  
9     interactive television.

10          Q     And could you tell me about the  
11     thesis and the focus of your master's  
12     studies?

13          A     My master's thesis was on what you  
14     might think of as -- nowadays you would call  
15     it an intelligent personal video recorder.

16                     So imagine a TiVo-like device  
17     that has a user profile for a user that reads  
18     the closed captioning as well as schedules of  
19     upcoming television programs and actually  
20     records personalized recordings based upon  
21     what it understands a user profile to be and  
22     how that corresponds to the subject matter of  
23     the programming.

24                     The particular area that I  
25     concentrated on was television news, and so

1 the system could record news broadcasts and  
2 play them back in a non-linear fashion based  
3 upon what it felt the user's interests were.

4 Q So would it be fair to say that the  
5 focus of your master's studies was on video  
6 recordings?

7 MR. YAP: Objection.

8 A No, I wouldn't say it was on video  
9 recordings per se. I think it was on what  
10 you might think of as personalized  
11 television.

12 Q Then how does personalized  
13 television differ from video recordings?

14 A A video recording is a technical  
15 element that might be a part of a  
16 personalized television system, but it's not  
17 all of it.

18 Q What are other parts of the system?

19 A So there would be analysis of the  
20 content. There would be a profile of the  
21 user. It would be potentially a graphical  
22 user interface.

23 There would be databases.  
24 There would be an overall control system for  
25 managing the storage and the processing of

1 the video and audio.

2 There would be playback  
3 mechanisms and probably a lot of what a  
4 computer scientist would call "glue" holding  
5 it all together.

6 Q Thank you.

7 And with respect to your Ph.D.  
8 studies, what was the focus of those studies?

9 A The focus of my doctoral  
10 dissertation was what nowadays is called  
11 computational photography, although that term  
12 wasn't in common use at the time, but it was  
13 the idea that if one had a camera that could  
14 capture three dimensions instead of just  
15 two-dimensional images, so actually the  
16 distance to each pixel, which is what a  
17 connect camera does now, one could enable a  
18 variety of applications ranging from  
19 interactivity to artistic or technical  
20 modification of the imagery, because it's a  
21 computer graphics database of real scenes to  
22 very efficient encoding of video based upon a  
23 three-dimensional model.

24 Q Would it be fair to say in general  
25 terms that the focus of your Ph.D. studies

1 was on video?

2 MR. YAP: Objection to form.

3 A I would say video was a piece of  
4 it, but probably not the main focus.

5 Q What would you characterize as the  
6 main focus?

7 A I think the main focus would have  
8 been acquisition of computer graphics, models  
9 of real scenes.

10 Q So if you had to sum up your  
11 education starting with what you did in  
12 college and graduate school in pursuing your  
13 master's degree and then pursuing your Ph.D.,  
14 how would you characterize the main focus  
15 area of your studies from undergraduate to  
16 graduate?

17 A Well, there were many different  
18 aspects to it, but I would say that digital  
19 video was a consistent thread that was part  
20 of all of my work.

21 Q What is your current job title?

22 A Principal research scientist at the  
23 Media Laboratory and head of the Object-Based  
24 Media Group at the Media Laboratory at MIT.

25 Q And as part of your job, what are

1 your duties and responsibilities?

2 A I head a research group which  
3 conducts research in a variety of areas.

4 As part of that, I supervise a  
5 number of graduate students, typically about  
6 seven or eight. I also have visiting  
7 researchers working in my group as well.

8 Additionally, I am the chair  
9 of the Media Laboratory's intellectual  
10 property committee. Additionally, I am  
11 undergraduate officer for our academic  
12 program.

13 Additionally, I am head of  
14 what's called the MAS Freshman Program, which  
15 is a specialized program for first-year  
16 undergraduates at MIT, and I have a variety  
17 of other duties as well.

18 Q What is object-based media?

19 A Well, object-based media is a  
20 phrase whose meaning has changed over the  
21 years.

22 In the beginning it was really  
23 an outgrowth of my work in building scene  
24 models of real scenes, so representing video  
25 and later audio in terms of an underlying

1 model of what was actually out there in the  
2 world rather than just pixels or waveforms.

3 And we continue to do work of  
4 that sort; but over the years, we've added to  
5 it an emphasis on making tangible objects as  
6 intelligent, responsive and interactive as  
7 virtual objects are, so that's an extension  
8 of it, so putting sensing intelligence and  
9 interactivity into physical things.

10 We have also over the years  
11 taken on work in advanced displays, such as  
12 holographic television displays.

13 Q You referred to in the beginning of  
14 the work in the object-based media.

15 Approximately when did you  
16 begin working with object-based media?

17 A Well, I think it could be said that  
18 my doctoral dissertation was on the subject  
19 of object-based media, and I continued  
20 working on that after I turned in my  
21 dissertation.

22 Q And that would be at or around June  
23 of 1989?

24 A Yes.

25 Q But you would have began work with

1       respect to the dissertation sometime before  
2       that?

3             A       1986.

4             Q       1986.

5                     You also mentioned that the  
6       meaning of object-based media has evolved  
7       over time.

8                     What was the meaning of  
9       object-based media say around 2004?

10                    MR. YAP:  Objection, form.

11             A       In about 2004, it was probably  
12       about as broad as it is now.

13             Q       And what was the meaning of it when  
14       you started in that area?

15             A       Well, so when I started, when I was  
16       working on my doctoral dissertation,  
17       object-based media related to the capture of  
18       models of the real world through advanced  
19       cameras and microphones and other sensors and  
20       then enabling efficient compression, enabling  
21       personalization of content and enabling  
22       interactivity and other applications by means  
23       of those models of the world.

24             Q       As a principal research scientist,  
25       would you see your work as academically

1 focused?

2 A Well, it has an academic aspect,  
3 and we also work fairly closely with a number  
4 of industrial sponsors and collaborators as  
5 well, and so it has both an academic focus  
6 and an applied focus.

7 Q And who are the industrial sponsors  
8 that you're working with currently?

9 A Well, there are approximately 80 of  
10 them, and they are on the Media Laboratory  
11 website.

12 So if you were to go there,  
13 you could get the list.

14 Q Is Yamaha Corporation of America  
15 one of the sponsors?

16 A I don't believe they currently are.  
17 They have been in the past, although I didn't  
18 work very closely with them at the time.

19 Q How about Samsung?

20 A Samsung is, yes.

21 Q And have you worked with Samsung  
22 as -- at MIT as part of your duties and  
23 responsibilities?

24 A Yes.

25 Q And what was the nature of the work



1 that you had done with Samsung?

2 A Samsung is a member of a research  
3 consortium, and as part of that work, we tell  
4 them about what they're doing. They tell us  
5 about what they're interested in.

6 We -- they've attended  
7 workshops that I've run on consumer  
8 electronics and on other topics, and we've  
9 just had a variety of contacts with people  
10 throughout the organizations -- the  
11 organization, rather.

12 Q Do you meet with Samsung  
13 representatives on a periodic basis?

14 MR. YAP: Objection.  
15 Objection, relevance.

16 A I do meet with them, yes.

17 Q And say this year, how many times  
18 have you met with them?

19 MR. YAP: Same objection.

20 A That's actually a rather difficult  
21 question to answer, because one of my  
22 colleagues is going on leave from MIT this  
23 year to help Samsung launch a new laboratory  
24 on the West Coast, and I met with him almost  
25 daily for a good portion of this year.

1                   But it was never entirely  
2           clear whether I was meeting with him in his  
3           capacity as an MIT person or as a Samsung  
4           person.

5           Q       How about with Samsung personnel  
6           who are not within MIT?

7                   MR. YAP:  Objection,  
8           relevance.

9           A       Possibly about once a month.

10          Q       Once a month.

11                   And how frequently were you  
12          meeting with Samsung in 2013?

13                   MR. YAP:  Same objection.

14          A       Probably about the same.

15          Q       Okay.

16                   And typically what are your  
17          meetings about?

18                   MR. YAP:  Objection,  
19          relevance.

20          A       Well, some of the meetings relate  
21          to intellectual property that hasn't been  
22          disclosed publicly yet, and so I'm hesitant  
23          to go into details of that.

24                   I will say that we have had  
25          quite a few meetings on the subject of

1 three-dimensional television displays.

2 Q Have you had meetings with Samsung  
3 on the subject of networked media?

4 MR. YAP: Objection,  
5 relevance.

6 A To the degree that networked media  
7 might involve smart televisions, yes.

8 Q How about music players?

9 MR. YAP: Same objection.

10 A Not that I can recall.

11 Q Okay.

12 Is Pioneer a sponsor?

13 A They have been in the past.

14 MR. YAP: Objection,  
15 relevance.

16 A I am not certain if they are  
17 currently.

18 Q What would help you ascertain  
19 whether or not Pioneer is currently a  
20 sponsor?

21 A I'd have to look up the dates of  
22 their consortium membership and see if it was  
23 current or not.

24 Q And where would you look that up?

25 A That's actually publicly available.

1 So if one were to go to the Media Lab's main  
2 website, there's a link from there that gives  
3 a list of all the current sponsors.

4 Q And that would list past sponsors  
5 as well?

6 A No.

7 Q Okay.

8 So if Pioneer isn't listed --

9 A If Pi --

10 Q And where would you go to figure  
11 out whether Pioneer has ever been a sponsor?

12 A I have access to a contract  
13 database that has all of the contracts that  
14 any member of the laboratory has ever signed,  
15 and so I would be able to look up any past  
16 research contracts or consortium memberships  
17 that Pioneer might have had with the lab.

18 Q And how far back does that list go?

19 MR. YAP: Objection,  
20 relevance.

21 A At least to the 1990s. Possibly  
22 before.

23 Q And what does it take for a company  
24 to become a consortium member?

25 A The company has to agree to the

1 terms and conditions of membership. The  
2 company has to pay an annual membership fee.

3 And typically, a company has  
4 to agree to sign up for a minimum of three  
5 years.

6 Q All right.

7 And what is the annual fee of  
8 membership in 2014?

9 A It's currently \$250,000.

10 Q And what was it last year in 2013?

11 A In 2013, it went from 200,000 to  
12 250,000.

13 Q And what about 2012?

14 A The same, \$200,000.

15 Q And besides a three-year commitment  
16 and the annual fee, what are some of the  
17 other terms and conditions in the membership  
18 contract?

19 A There's a secondary document which  
20 is called the Member Benefits Document, and  
21 that spells out the rights and the benefits  
22 that accrue to members of the research  
23 consortia at the Media Lab.

24 Q And what are some of the major  
25 benefits that would typically attract

1 somebody to sponsor --

2 A Well, we have a set of annual  
3 events, both large meetings and smaller  
4 workshops, and they will receive invitations  
5 to those. They have the right to visit us.

6 Additionally, we have a single  
7 IP pool for the entire lab and all consortia  
8 members have rights to the entire IP pool.

9 Further, we have a portal on  
10 the web, which is only accessible to current  
11 members of the lab, which includes things  
12 like videos of events at the lab. It  
13 includes things like publications that have  
14 not been publicly released yet.

15 It includes information about  
16 licensable software that may not be subject  
17 to patent but may be available for licensing.

18 It includes information about  
19 patent applications that have been filed and  
20 a variety of other useful things.

21 Q What is the IP pool that you're  
22 referring to?

23 A So all intellectual property  
24 generated as a result of research at the  
25 Media Laboratory goes into a single pool, and

1 all corporate members of the laboratory,  
2 consortium members, have royalty-free rights  
3 to all the patents and other IP in that pool.

4 Q So the patents in the pool are  
5 solely the patents that are generated as a  
6 result of the Media Lab's work?

7 A Yes.

8 Q What about IP generated as a result  
9 of the Media Lab's collaboration with any one  
10 of the sponsor members?

11 A In general, we arrange things such  
12 that there is no such IP.

13 On one or two occasions that  
14 I'm aware of when such IP was generated, the  
15 arrangement is that the IP goes into the  
16 pool, but the member who is part of the  
17 collaboration also is an assignee of the IP  
18 and has the right to license it as well,  
19 license it out as well.

20 Q Are you currently doing any work  
21 for Samsung?

22 MR. YAP: Objection,  
23 relevance.

24 A Could I ask for clarification?

25 Are you asking expert witness

1 work or any work at all?

2 Q Any kind of work.

3 A I served as a proposal reviewer for  
4 a research-funding mechanism that Samsung  
5 runs in Korea.

6 Q Anything else?

7 A That's the only thing at this  
8 point.

9 Q And have you ever served as an  
10 expert witness on behalf of Samsung?

11 A I don't believe I've been retained  
12 directly by Samsung. I may have been  
13 involved in cases in which Samsung was  
14 involved but not working directly for them.

15 Q Not on behalf of Samsung?

16 A Not on behalf of them.

17 Q And besides serving as an expert  
18 witness on behalf of Yamaha, have you done  
19 any other work on behalf of Yamaha?

20 And let me clarify. Besides  
21 serving as an expert witness on behalf of  
22 Yamaha in the proceedings subject of this  
23 deposition, the IPR2013-597 and 598.

24 A I believe this is the first  
25 compensated work I've done for Yamaha.



1 Q And have you worked with the law  
2 firm of Morrison & Foerster before?

3 A Yes.

4 Q And when was that?

5 A Quite a few times going back to the  
6 1990s.

7 Q When was the last time before  
8 the -- before your work on behalf of Yamaha  
9 in connection with these inter partes review  
10 proceedings?

11 A I believe I was involved in another  
12 matter with Morrison & Foerster in 2012.

13 I believe prior to that I was  
14 involved in a matter before the ITC with  
15 Morrison & Foerster in 2009 and 2010.

16 Q And which matters were those?

17 A So the first one was the -- was a  
18 case involving Funai at the ITC. I believe I  
19 also did work in a case involving mobile  
20 devices where I was retained on behalf of  
21 Kyocera Sanyo Telecom and Palm Incorporated  
22 through Morrison & Foerster in 2010.

23 And I've probably done  
24 something else in the intervening period as  
25 well, but I don't have my notes in front of

1 me on that right now.

2 Q Looking at the list of your  
3 consulting engagements, on pages 2 and 3 in  
4 the Bates-stamp markings on those pages, can  
5 you identify any other engagements where  
6 Morrison & Foerster was the law firm?

7 A Well, again, I'm having to do this  
8 from memory, but I believe the Cirrus Logic  
9 matter in 1998 may have been through Morrison  
10 & Foerster.

11 I know that several cases  
12 before the ITC, Morrison & Foerster was one  
13 of the firms that I worked with, but I may  
14 not have been retained through them because  
15 there were several firms and several parties  
16 involved. Let's see.

17 And I think the EchoStar  
18 matter in 2007 may have been through Morrison  
19 & Foerster. At least they were involved.

20 And that one, I think one of  
21 the Thompson matters may have involved  
22 Morrison & Foerster as well.

23 And I think also the 20th  
24 Century Fox Home Entertainment matter may  
25 have involved Morrison & Foerster.

1                   But again, I'm doing this from  
2                   memory. I don't have my notes in front of me  
3                   on those. As you can see, I've done quite a  
4                   few cases, and in many of them there were  
5                   multiple parties involved and multiple law  
6                   firms involved, and I may have worked with  
7                   firms other than the firm that originally  
8                   retained me in the matter.

9                   Q       And who at Morrison & Foerster have  
10                  you worked with with respect to the 20th  
11                  Century Fox case?

12                 A       I'm not sure which of the Morrison  
13                  & Foerster offices. That may have been the  
14                  Silicon Valley office.

15                         I've worked with the Silicon  
16                  Valley office, the LA office, the Tokyo  
17                  office, the Washington, DC office and some  
18                  people from other locations as well over the  
19                  years.

20                 Q       Have you worked with counsel  
21                  present here today from Morrison & Foerster?

22                 A       Yes.

23                 Q       Prior to your work on this inter  
24                  partes review?

25                 A       I have.

1           Q     When was the last time that you  
2           worked with them prior to your engagement  
3           with respect to these inter partes review  
4           proceedings?

5           A     I worked with Mr. Yap on the Funai  
6           case in 2010; and Mr. Fehrman has been  
7           involved in matters I've worked on in the  
8           past as well, I believe.

9           Q     And that's going back to when?

10          A     I don't know precisely the dates.

11          Q     Approximately? Going back ten  
12         years, more than ten years?

13          A     Less than ten years.

14          Q     Less than ten years, okay.

15                     So you've -- it appears from  
16         your CV that you have been consulting since  
17         1996, is that right, consulting on patent  
18         cases since 1996?

19                     MR. YAP: Objection, form.

20          A     I believe that's correct.

21          Q     As part of your consulting on  
22         patent cases, what types of activities are  
23         you typically engaged in?

24          A     It really varies. It's a function  
25         of the case. And so in the past, I have

1 analyzed hardware. I've analyzed software.  
2 I've conducted experiments. I've analyzed  
3 design of chips.

4 I have reviewed references.  
5 I've done prior art searches, and I've also  
6 evaluated prior art that was searched for by  
7 others.

8 I've written declarations.  
9 I've written reports. I've assisted in the  
10 preparation of tutorial materials.

11 I've simply acted as a  
12 consultant in some matters where just my  
13 opinion was sought but there was no written  
14 work product.

15 And I've traveled to various  
16 locations to see particular technological  
17 setups as they're actually deployed, so a  
18 broad range of activities.

19 Q How much time, approximately, do  
20 you think was devoted to work on validity or  
21 invalidity aspect of patents?

22 MR. YAP: Objection to the  
23 extent it calls for privileged information.

24 A Might I ask for a clarification?  
25 In this case or overall, across all of the

1 consulting?

2 Q Across all of your consultants --  
3 consultancies, can you estimate how much --  
4 what percentage was devoted to analysis of  
5 validity or invalidity of patents versus, for  
6 example, infringement or non-infringement  
7 analysis?

8 A I would say it's probably about a  
9 50-50 split.

10 Q Okay.

11 Have you provided testimony in  
12 court before?

13 A Yes.

14 Q On how many occasions?

15 A I don't recall the precise number  
16 of occasions, but several occasions.

17 Q Less than five, more than five?

18 A More than five.

19 Q More than ten?

20 A Probably not.

21 Q Okay.

22 Would you say that the  
23 majority of your consulting engagements are  
24 on behalf of the patentee or a party accused  
25 of infringement?

1           A     I think probably 50-50.

2           Q     So would you consider yourself a  
3 professional expert witness?

4                     MR. YAP:  Objection to form.

5           A     Well, I would not say that it's my  
6 primary profession.  It's one of the things I  
7 do as part of my consulting practice.

8           Q     Okay.

9                     What is your hourly rate in  
10 the proceedings at issue here?

11          A     My hourly rate went up toward the  
12 end of last year.  I believe I signed a  
13 contract at my previous rate, which would  
14 have been \$600 an hour.

15          Q     And what is your rate today?

16          A     650.

17          Q     Okay.

18                     And when were you first  
19 contacted in connection with the IPRs at  
20 issue here, the 597 and 598?

21                     And let me just take a step  
22 back.  I will refer to the proceedings here  
23 as IPR597, that's with respect to the Weel  
24 '099 patent that we will make of record in a  
25 moment, and IPR598 with respect to the '873

1 patent that we will make a record in a moment  
2 as well.

3 So as not to confuse you,  
4 would that be understandable and clear to  
5 you, when I say IPR597, that would be in  
6 reference to the '099 patent and 598 in  
7 reference to the '873?

8 A Yes.

9 Q Great.

10 So when were you first  
11 contacted with respect to the 597 and 598?

12 MR. YAP: Objection,  
13 privileged.

14 You may answer to the extent  
15 it doesn't reveal any attorney-client  
16 privilege.

17 MS. GLADSTEIN: Counsel, there  
18 is no attorney-client privilege with respect  
19 to an expert witness.

20 MR. YAP: I'm sorry, I  
21 meant -- I misspoke. To the extent it would  
22 reveal any privileged information or work  
23 product information.

24 MS. GLADSTEIN: Okay, again --

25 MR. YAP: Under the rules.



1 MS. GLADSTEIN: -- there  
2 should not be any privileged information but  
3 there may be work product information.

4 MR. YAP: There would be work  
5 product information, yes.

6 MS. GLADSTEIN: Right, but not  
7 privileged information with respect to the  
8 expert witness.

9 MR. YAP: It depends. Ask  
10 your questions, and I'll make my objections.

11 MS. GLADSTEIN: Very well.

12 BY MS. GLADSTEIN:

13 Q So when were you first contacted in  
14 connection with IPR597 and 598?

15 A I believe it was either late spring  
16 or early summer of 2013.

17 Q And how were you first contacted?

18 A It was either telephone or email.  
19 I don't recall which.

20 Q Do you recall from whom you may  
21 have received a telephone or received an  
22 email?

23 A I believe I was talking with both  
24 gentlemen who are here today, Mr. Fehrman and  
25 Mr. Yap, about that time, but I don't know

1           which one contacted me first.

2           Q       And when did you sign a retention  
3           agreement in connection with these matters?

4           A       I don't recall the precise date.

5           Q       Was it shortly after communication  
6           with counsel?

7                       I'm just trying to establish  
8           how soon after the initial contact.

9           A       It was within a few weeks, I think.

10          Q       Okay.

11                       Do you have an understanding  
12          of how it is that counsel reached out to you,  
13          why they reached out to you?

14                       MR. YAP:  Objection, form.

15          A       Well, I think in part it was  
16          because I had worked with the firm in the  
17          past and because they told me they felt I had  
18          appropriate knowledge to be able to  
19          contribute to this matter.

20          Q       Do you -- do you have an  
21          understanding of the tasks with which you  
22          were charged?

23          A       What I was initially asked to do,  
24          apart from simply reviewing the large number  
25          of references, was to give my opinion on

1 certain areas relating to claim construction  
2 and certain areas relating to specific  
3 elements of claims in these matters.

4 Q Do you recall what those certain  
5 areas relating to claim construction were?

6 A Those are the areas that are  
7 covered in the declarations that are before  
8 me.

9 Q And what are certain elements that  
10 you referred to in your answer before last  
11 answer?

12 A That would be the --

13 MR. YAP: Objection, form.

14 A -- claim elements that are  
15 discussed in my declarations.

16 Q How did you go about preparing your  
17 declarations?

18 A I reviewed all of the references  
19 that are listed in the declarations.

20 I considered what one of  
21 ordinary skill in the art -- first of all,  
22 what ordinary skill in art would be; and  
23 second, what such a person would think about  
24 particular aspects with respect to claims and  
25 with respect to combinations of references.

1 I reviewed a variety of  
2 references. I had many conversations with  
3 counsel, and then I started writing.

4 Q With respect to the '873 patent,  
5 subject of the IPR598, how many hours did you  
6 approximately spend working on that case that  
7 led up to your declaration?

8 A I have not been billing these  
9 matters separately, so I have -- because all  
10 of them are on behalf of Yamaha, I've been  
11 aggregating the hours, so I couldn't tell you  
12 how much time went into any one of the two  
13 declarations today or the two tomorrow, for  
14 that matter.

15 Q Can you tell us approximately how  
16 much time you have spent on both the '873 and  
17 '099 patents, meaning how much time you've  
18 devoted to analyzing the prior art and claim  
19 construction and person of ordinary skill in  
20 the art that led up to your declarations that  
21 were marked as Exhibits 3 and 4 here today.

22 A Well, again, as I was preparing  
23 more than two declarations at roughly the  
24 same time period, I couldn't just separate  
25 out two of them and say how many hours went

1 into those.

2 Q How many declarations were you  
3 preparing?

4 A Last fall, that would have been  
5 four.

6 Q Okay.

7 And do you recall what the  
8 other two declarations were about?

9 A Those are the other two patents  
10 that we're going to be discussing tomorrow,  
11 as I understand it.

12 Q So if I were to say IPR ending in  
13 593 and 594, would that sound familiar to  
14 you?

15 A Yes.

16 Q Okay.

17 So with respect to all four  
18 proceedings, how much time have you billed  
19 Yamaha up to the point of your filing --  
20 finalizing your declarations?

21 A I don't have those records in front  
22 of me now, so I did not look at the invoices  
23 in preparing for this, so I haven't seen  
24 those since last fall.

25 Q Okay.

1                   So you started working with  
2           respect to all four of these proceedings  
3           sometime late spring, early summer?

4                   Would that be fair to say?

5           A       Well, I don't know precisely when I  
6           started working, but I definitely was working  
7           on it during the summer last year.

8           Q       Okay, so during the summer 2013.

9                   And you've signed these  
10          declarations on or around September 19th,  
11          give or take a few days between the four  
12          cases.

13                   So from summer of 2013 through  
14          September -- mid-September of 2013, how many  
15          hours, approximately, did you accumulate?

16          A       I would have --

17                   MR. YAP:  Objection, asked and  
18          answered.

19          A       I would have to review my billing  
20          records.  I don't have that information with  
21          me right now.

22                   MS. GLADSTEIN:  We would like  
23          to request a copy of the billing record.

24                   MR. YAP:  We'll take that  
25          under advisement.

1 MS. GLADSTEIN: The witness is  
2 not remembering the amount of time that he  
3 has spent working on these cases, and this  
4 information is relevant to these proceedings,  
5 so we request that a copy be produced.

6 MR. YAP: We'll take it under  
7 advisement.

8 BY MS. GLADSTEIN:

9 Q Do you recall how much in fees you  
10 received from the time that you started work  
11 on the four cases, including the two cases  
12 subject of today's deposition, through  
13 September of 2013, approximately, ballpark?

14 A Well, I'm not sure when my first  
15 invoice was even submitted to Morrison &  
16 Foerster.

17 It may have been after these  
18 were signed, but my answer would be analogous  
19 to my answer to the previous line of  
20 questioning, which is without the records in  
21 front of me, I don't wish to speculate about  
22 the numbers.

23 Q Do you have an understanding of how  
24 much you charged Yamaha for the work that you  
25 have done in connection with cases, subject

1 of today's deposition and tomorrow's  
2 deposition?

3 A Well, what I --

4 Q Approximately. I'm not looking for  
5 a precise number. Just a ballpark.

6 A Well, since we know what my hourly  
7 rate is, but I've already said I haven't a  
8 precise sense of how many hours, then as a  
9 consequence, I also haven't a precise sense  
10 of how many dollars, since that would just be  
11 the number of hours times the rate.

12 Q Besides consulting for Yamaha, are  
13 you consulting for any other party  
14 concurrent -- simultaneously, concurrently?

15 A In this party?

16 Q No, no, no.

17 Besides having a consulting  
18 engagement on behalf of Yamaha, are you  
19 engaged in other consulting assignments on  
20 behalf of other parties?

21 A Legal and other sources of  
22 consulting?

23 Q Let's start with legal consulting  
24 engagements.

25 A Yes, I am.



1 Q How many of those do you have?

2 A As counsel may be aware, it's  
3 sometimes difficult to determine which cases  
4 are still active since there are things that  
5 have been stayed and things that have  
6 temporarily vanished, but there is at least  
7 one case that I'm actively involved in at  
8 this point.

9 Q And which case is that?

10 A This -- well, I believe I provided  
11 a list of all of my legal engagements to  
12 counsel for Yamaha, and I thought they had  
13 provided that to your firm.

14 Q I'm not aware of that list, but I  
15 am aware of your CV that's attached to the  
16 declarations.

17 A Right, right.

18 So the issue is that this CV  
19 is approximately a year old at this point,  
20 because this CV was last edited beginning of  
21 summer 2013.

22 Q Right.

23 I see --

24 A That was the most up-to-date  
25 version that I had as of September.

1 Q Okay.

2 If I could ask you to look at  
3 Exhibit 3, which is your declaration in the  
4 IPR598, and look at the first page of your  
5 CV.

6 It bears a header on the  
7 left-hand side in small font that says "last  
8 updated June 2013."

9 A Yes.

10 Q And if we turn to page 2, under the  
11 heading of Consulting Record, which goes on  
12 to page 3, there are at least two entries  
13 that I see on page 3 that state as of June of  
14 2013, that those are ongoing assignments, and  
15 those are Research in Motion and HTC.

16 A And --

17 Q Do you see those?

18 A And just to be precise, there is  
19 also one for Motorola, Inc., farther up.

20 Q Oh, I see that.

21 There are a couple more,  
22 actually.

23 A And there's also technical advisor  
24 to One Laptop Per Child.

25 Q Okay.

1                   So today, are any of these  
2                   five engagements still pending?

3                   A       No, as far as I'm aware.

4                   Q       So all of these have been closed at  
5                   some time in the past?

6                   A       I believe that's correct.

7                   Q       And with respect to Motorola, when  
8                   do you -- do you have recollection as to when  
9                   that engagement concluded?

10                  A       I'm not certain of the precise  
11                  date, but my understanding was that the  
12                  matter in which I was involved settled at  
13                  some point after 2011.

14                  Q       But it's fair to assume that as of  
15                  June 2013, the Motorola matter was still  
16                  pending; and as far as you are concerned, you  
17                  were still engaged as a consultant in that  
18                  case?

19                  A       Well, I would say that as of that  
20                  point in time, I had not been notified that  
21                  it had concluded.

22                  Q       So the case would have concluded  
23                  after June of 2013?

24                  A       Or at least I would have been  
25                  notified after June of 2013 of such

1 conclusion.

2 Q But you don't recall when after  
3 June of 2013 you would have been notified?

4 A No.

5 Q Okay.

6 How about the next case,  
7 technical advisor, One Laptop Per Child?

8 A One Laptop Per Child closed their  
9 Boston office toward the beginning of this  
10 year, and I stopped having significant  
11 involvement with OLPC at that time.

12 Q Was that a patent case?

13 A No.

14 Q What type of a case was it?

15 A That wasn't a case. That was -- I  
16 was technical advisor to the One Laptop Per  
17 Child Foundation.

18 Q And what about the TDVision  
19 Systems, was that a patent case?

20 A No, that's being a member of their  
21 board of advisors.

22 Q And when did this engagement  
23 conclude for you?

24 A I haven't had any involvement with  
25 TDVision in the past year, so I'm assuming

1           they don't need me to do anything else, but  
2           they did not formally notify me that it had  
3           terminated.

4           Q       Okay.

5                       And what about Research in  
6           Motion, when were you notified that your  
7           services were no longer needed in that case?

8           A       I don't recall.

9           Q       Was it this year?

10          A       It was probably last year, but I  
11          don't know for certain.

12          Q       And what about HTC?

13          A       That would be the same answer.

14          Q       So you believe that your engagement  
15          terminated sometime last year?

16          A       Yes.

17          Q       Late last year?

18          A       I don't know.

19          Q       Do you recall working on behalf of  
20          HTC while you were preparing the Yamaha  
21          declarations?

22          A       I was not doing any work on behalf  
23          of HTC during that period.

24          Q       Do you recall doing any work on  
25          behalf of research in motion while you were

1 preparing Yamaha declarations?

2 A I don't recall producing any work  
3 product during that time. I may have had  
4 contact with their counsel during that  
5 period.

6 Q How about with respect to Motorola,  
7 do you recall doing any work on behalf of  
8 Motorola while you were preparing Yamaha  
9 declarations?

10 A I do not recall doing any work on  
11 behalf of Motorola during that period of  
12 time.

13 Q And do you recall doing work on  
14 behalf of One Laptop Per Child?

15 A Yes.

16 Q At the time that you were preparing  
17 Yamaha declarations?

18 A Yes.

19 Q And do you recall the amount of  
20 time that you were spending on behalf of One  
21 Laptop Per Child?

22 A Only a few hours.

23 Q Do you recall doing work for  
24 TDVision Systems at the time that you were  
25 preparing the Yamaha declarations?

1           A     I do not.

2           Q     Would it be fair to say that when  
3     you were preparing declarations on behalf of  
4     Yamaha, that was the predominant consulting  
5     engagement that you had --

6           A     At that time --

7           Q     -- during that period of time?

8           A     At that period of time, yes.

9           Q     And now that we have gone through  
10    and attempted to reconstruct the history  
11    between June of 2013 and when these  
12    declarations were filed, sitting here today,  
13    you have no recollection as to the amount of  
14    time or the fees that you charged Yamaha in  
15    connection with your work on the four  
16    declarations?

17                   MR. YAP:  Objection, asked and  
18    answered.

19           A     Inasmuch as we are talking about an  
20    invoice that I submitted to them probably  
21    more than six months ago, I do not recall the  
22    numbers on the invoice.

23           Q     So the last invoice that you  
24    submitted to Yamaha was about six months ago?

25           A     No, I believe I've submitted

1 invoices to them since then, but those may  
2 have involved work beyond the completion of  
3 these declarations.

4 Q Can you tell me the approximate --  
5 I don't need exact numbers, approximately  
6 amount of the invoices that you have  
7 submitted to Yamaha?

8 A In total?

9 Q In total.

10 A I think my answer would again be  
11 the same.

12 If I don't know the amount of  
13 the initial one, I don't know the amount of  
14 any cumulative totals beyond that.

15 Q Have there -- apologize.

16 How about the amount of the  
17 last invoice that you submitted to Yamaha?

18 A I don't recall.

19 MS. GLADSTEIN: Counsel, we  
20 would like to know the amount of time that  
21 the expert witness has spent working on the  
22 four declarations.

23 MR. YAP: We'll take it  
24 advisement.

25 THE DEPONENT: Would this be a



1 time for a break, by the way?

2 MS. GLADSTEIN: Sure.

3 THE DEPONENT: I'm sorry, did  
4 I stop you from saying something on the  
5 record?

6 MR. YAP: No, that's fine.

7 THE VIDEOGRAPHER: The time is  
8 10:57 a.m. We're going off the record.

9 (Recess.)

10 THE VIDEOGRAPHER: We are back  
11 on the record. The time is 11:16 a.m.

12 BY MS. GLADSTEIN:

13 Q Dr. Bove, welcome back.

14 A Thank you.

15 Q During the break did you have any  
16 substantive discussions with counsel about  
17 this deposition?

18 A No.

19 Q So before the break, we talked  
20 about your work on behalf of Yamaha with  
21 respect to the petitions at issue here, the  
22 597, 598, as well as the other two petitions  
23 on which you will be deposed tomorrow, that's  
24 the 593 and 594.

25 Are you doing any additional

1 work on behalf of Yamaha that is not with  
2 respect to the four petitions that I just  
3 listed?

4 A Yes.

5 Q And what is that additional work?

6 A That is preparing and signing  
7 additional declarations.

8 Q Which patent or patents are those  
9 declarations for?

10 A That relates to additional claim  
11 elements in two patents that I did not treat  
12 in my earlier declarations.

13 Q Do you recall the last three digits  
14 of those patent numbers?

15 A Let's see, one -- I'm not going to  
16 speculate on that, no. That -- I know that  
17 your firm should have access to those  
18 declarations, inasmuch as they have been  
19 filed.

20 Q Besides -- so now we're talking  
21 about six different petitions on behalf of  
22 Yamaha; is that correct?

23 A I believe that's correct.

24 Q Are you doing any other work on  
25 behalf of Yamaha?

1           A     As of right now, no.

2           Q     Do you anticipate doing any  
3           additional work on behalf of Yamaha in the  
4           near future?

5           A     If I am asked and if I have the  
6           time, I may.

7           Q     But there is nothing specific that  
8           you're aware of at the moment besides the  
9           work that you're doing?

10          A     Not at this time.

11          Q     Okay.

12                     So do you have a sense of how  
13           much time you have devoted on the work for  
14           Yamaha with respect to all of the petitions  
15           that you have been working on?

16                     MR. YAP:  Objection, asked and  
17           answered.

18          A     I think my answer would be the same  
19           answer that I had given before, that inasmuch  
20           as I don't have the records before me, and  
21           further inasmuch as I haven't invoiced them  
22           recently, so I don't even have a total  
23           calculated for work I've done in the past  
24           month or two, I'm not in a position to answer  
25           that right now.

1 Q Okay.

2 MS. GLADSTEIN: We reiterate  
3 the request for the time sheets submitted by  
4 Dr. Bove in connection with the four  
5 proceedings that are at issue here at the  
6 moment, so 593, 594, 597, 598.

7 MR. YAP: To be clear,  
8 counsel, after we went off the record -- as  
9 long as we can make a representation of the  
10 amount of hours or the amount billed, we can  
11 do that, too.

12 MS. GLADSTEIN: We can start  
13 there.

14 MR. YAP: That will be  
15 fastest.

16 MS. GLADSTEIN: That will be  
17 faster? Can you represent on the record?

18 MR. YAP: We are trying to get  
19 a number; so if we can, we will represent on  
20 the record.

21 MS. GLADSTEIN: Okay. Great.

22 BY MS. GLADSTEIN:

23 Q So let's move on.

24 Did you discuss the 597, 598,  
25 593 and 594 IPRs with anybody other than

1 counsel for Morrison & Foerster?

2 A No.

3 Q Did you bring any documents with  
4 you today?

5 A I have copies of my -- these two  
6 exhibits, 3 and 4, in my briefcase, as well  
7 as copies of the related petitions that  
8 Yamaha submitted in those two matters and the  
9 decisions in those two matters.

10 Q And by "related" petitions, you're  
11 talking about the 593 and 594?

12 A The '873 and '099 patents, yes.

13 Q And aside from your declarations  
14 and petitions, are there any other documents  
15 that you brought with you?

16 A The decisions in those two matters  
17 as well.

18 Q Apologies.

19 So the declarations, petitions  
20 and decisions in all four IPRs --

21 A Only on the two --

22 Q Only on the two?

23 A -- that we're discussing today.

24 Q Okay.

25 Anything else that you have

1 with you?

2 A I have my address book, but I think  
3 that's it.

4 Q And what is -- why do you have the  
5 declarations, petitions and decisions with  
6 respect to the two proceedings subject of  
7 this deposition here with you today?

8 A Because if I arrived early, I  
9 thought I might flip through them again in  
10 advance of the deposition, but that didn't  
11 happen.

12 Q And do you keep a file of materials  
13 in connection with the work that you have  
14 done in the two cases subject of the  
15 deposition today?

16 A I have copies of all of the  
17 materials that have been provided to me by  
18 counsel, as well as final copies of each of  
19 my declarations.

20 Q And where do you store copies of  
21 materials provided to you by counsel?

22 A On a disk drive that's not on a  
23 network.

24 Q Do you have a physical file of  
25 documents that you review, mark up or prepare

1 in connection with work?

2 A No, everything is electronic.

3 Q Do you take any notes about the  
4 case that you're working on?

5 A Generally, no.

6 Q No notes whatsoever?

7 A No.

8 Q So how do you remember what it is  
9 that you were asked to do, to look into?

10 A So how do I remember, for example,  
11 what claim elements?

12 Q That's a good example, sure.

13 A Well, I think in the case of these  
14 declarations, I probably started typing a  
15 skeleton of the declaration while I was on  
16 the phone speaking to counsel.

17 Q Did you prepare the declaration  
18 yourself?

19 A Yes.

20 Q You typed it up yourself?

21 A Yes.

22 Counsel did formatting and  
23 counsel provided the front matter.

24 Q The case caption?

25 A (Nods.)

1           Q     Did you prepare for today's  
2     depositions?

3           A     Yes.

4           Q     And how did you go about preparing  
5     for the depositions?

6           A     I reviewed the two declarations  
7     that have already been produced as exhibits.

8                     I reviewed the references that  
9     are cited in these. I also reviewed several  
10    documents that were not available at the time  
11    that I filed these, such as the decision --  
12    the board decisions in these two cases and  
13    the patent holders' preliminary responses in  
14    these two cases.

15          Q     Did you review anything else?

16          A     I don't believe so, no.

17                     Actually, I will amend that,  
18    because Yamaha's counsel informed me that  
19    there was a Windows Media Player manual  
20    document as well as two patents from  
21    WatchPoint Media, my startup, that they had  
22    been notified might come up today or  
23    tomorrow, and so I did look at those.

24          Q     Did you review the 598 and the '099  
25    patents at issue of your declarations?



1           A     The '873 and the '099.

2           Q     I'm so sorry.

3           A     Yes.

4           Q     The '873 and the '099.

5           A     So just to be clear, in each of  
6           these declarations there's a section called  
7           "Materials Considered," and so I reviewed  
8           everything in there with the possible  
9           exception of prior art references that may no  
10          longer be relevant.

11                         So there's a list in these  
12          two, so those plus the two decisions, plus  
13          the two responses, plus the three documents  
14          that I just referred to.

15                         I think that covers  
16          everything. At least if we say that in  
17          noting that I reviewed a petition, I'm also  
18          noting that I reviewed the -- the appendices  
19          to said petition.

20          Q     The references cited in the  
21          petition?

22          A     Yes.

23          Q     Okay.

24                         Did you meet with counsel in  
25          preparation for your deposition?

1           A     I did.

2           Q     And who is the counsel that you met  
3     with?

4           A     I met with both the gentlemen who  
5     are present here today.

6           Q     And how many occasions did you meet  
7     with them?

8           A     I met with Mr. Yap on Tuesday, and  
9     I met with both gentlemen on Wednesday.

10          Q     And approximately how long were you  
11     meeting on Tuesday?

12          A     Probably about five hours,  
13     including lunch.

14          Q     And the length of your meeting or  
15     meetings on Wednesday?

16          A     That was probably about seven  
17     hours, including lunch.

18          Q     And is Tuesday the first day that  
19     you started preparing for the -- for the  
20     deposition?

21          A     No.

22          Q     When did you personally start  
23     preparing for the deposition?

24          A     I think over the past several weeks  
25     I've been looking through these materials,

1 but I couldn't say a precise date when I had  
2 started.

3 Q Did you have teleconferences with  
4 counsel in connection with preparation for  
5 preparing for the deposition?

6 A Yes.

7 Q Approximately how much?

8 A Somewhere between two and five.  
9 I've had a number of conversations with them  
10 on the phone recently, not all necessarily  
11 directly related to preparing for the  
12 deposition.

13 Q Aside from the three documents that  
14 you mentioned of which you were -- about  
15 which you were recently told which is the  
16 Microsoft Media Player document and the two  
17 patents in which you are one of the named  
18 inventors, did counsel provide you with any  
19 additional documents relevant to the 597 and  
20 598 proceedings?

21 A Not that I recall.

22 Q And did you on your own review any  
23 documents that you would consider relevant to  
24 the declarations that you prepared that are  
25 not referenced as part of the materials

1 reviewed in your declarations?

2 A Not that I recall.

3 Q You mentioned earlier this morning  
4 that Yamaha may have been a member of a  
5 consortium of the Media Lab.

6 A Yamaha was a research sponsor of  
7 the Media Laboratory at one point. I don't  
8 recall the precise dates. I don't believe  
9 they currently are.

10 Q Do you remember how long ago were  
11 they a member? Approximately five years ago,  
12 ten years, less than that?

13 A I think they've been a member more  
14 recently than five years, and their  
15 membership probably went back quite a few  
16 years before that, but I don't remember the  
17 precise dates.

18 Q Where would you look to -- to find  
19 out as to the status of their membership?

20 A Well, I could give you the present  
21 status by looking at the current sponsor list  
22 on the web, which is a publicly accessible  
23 document. That was the one referred to  
24 earlier this morning.

25 That would simply tell me yes

1 or no were they currently on the list. I  
2 could then go look at our private contracts  
3 database and determine the exact dates of  
4 their membership.

5 Q We would like to request that you  
6 determine the exact dates of Yamaha's  
7 membership.

8 A I may not be able to do that here  
9 today.

10 Q That would be difficult, so at some  
11 point after your deposition is over and  
12 possibly prior to tomorrow's deposition, if  
13 you could verify as to the dates of the  
14 membership, that would be great.

15 A Okay.

16 I will have a conversation  
17 with counsel about that later today.

18 MS. GLADSTEIN: So we make an  
19 official request to let us know --

20 MR. YAP: We'll take that  
21 under advisement.

22 MS. GLADSTEIN: -- the dates  
23 of Yamaha's membership. Okay.

24 BY MS. GLADSTEIN:

25 Q Looking at -- I'm looking at

1 Exhibit 3, which is your declaration in the  
2 '873 patent; and more particularly, I am  
3 looking at page 5 of your CV under the header  
4 of "Current Organization Membership."

5 A Yes.

6 Q I just would like to ask you a few  
7 questions about these organizations.

8 So the American Institute of  
9 Physics, approximately how long have you been  
10 a member of that organization?

11 A Between 10 and 20 years.

12 Q And what is American Institute of  
13 Physics?

14 A It's a professional organization of  
15 people who are involved in research or  
16 education or other areas relating to the  
17 study of physics.

18 Q And are you a member of any  
19 particular interest group?

20 A Of AIP? No.

21 Q Does AIP have digital audio  
22 interest group?

23 A I'm not aware that they do.

24 Q All right.

25 Next organization on the list

1 is the Association for Computing Machinery.

2 What is ACM?

3 A ACM, you'll note by the fact that  
4 it's called "Computing Machinery" is they're  
5 a very old and established organization  
6 relating to computer science and allied  
7 areas.

8 Q And do you have a particular focus,  
9 interest in ACM?

10 A I was chair of the ACM multimedia  
11 conference some years ago. In fact, I think  
12 that's cited here somewhere.

13 (Deponent read document.)

14 A That may not actually be listed  
15 here.

16 Q Do you recall when that was?

17 A That was in I think 1996 or so.

18 Q Does ACM have a digital audio  
19 interest group?

20 A I don't think they have something  
21 that's called "digital audio" specifically.  
22 I believe they have a multimedia interest  
23 group, and network digital audio would fall  
24 under that.

25 Q Were you part of the multimedia

1 network group?

2 A I believe -- I'm not sure I'm  
3 currently a member, but I believe I was a  
4 member some years ago.

5 Q How -- approximately how long ago?

6 A I don't recall. I think I was a  
7 member at the time I chaired the conference,  
8 because that's the special interest group  
9 that's associated with the conference that I  
10 chaired.

11 Q Okay.

12 Next organization on the list,  
13 the IEEE, Institute of Electrical and  
14 Electronic Engineers.

15 How long have you been a  
16 member of that organization?

17 A More than 20 years, I believe.

18 Q Do you belong to any particular  
19 focus group or interest group?

20 A There is a communications  
21 organization that's part of the IEEE.

22 Q And when is that communications  
23 organization?

24 A They're really interested in all  
25 aspects of transmission of information,



1           whether digital or analogue.

2           Q     Do they meet regularly?

3           A     They have conferences -- a number  
4           of conferences associated with the  
5           communication society.

6                     One of them is the Consumer  
7           Communications and Networking Conference, of  
8           which I was general chair ten years ago, I  
9           believe. More recently than ten years ago.  
10          Within the past ten years as chair of that  
11          conference.

12          Q     How frequently does the  
13          organization meet on an annual basis?

14          A     They have quite a few events that  
15          they either run or cosponsor with the another  
16          one of the societies, so I'm sure they have  
17          an event every month somewhere.

18          Q     Do you attend their events monthly?

19          A     No.

20          Q     How frequently do you attend those  
21          events?

22          A     Probably once a year.

23          Q     And that would be at an annual  
24          meeting?

25          A     There's a particular conference

1       that I attend, because it's adjacent to the  
2       CCNC conference, the one that I chaired, I'm  
3       not on the advisory board for that  
4       conference.

5                       And they have a meeting of the  
6       advisory board, which always lands at the  
7       tail end of the Consumer Electronics Show in  
8       Las Vegas, which I always attend, so I go to  
9       that meeting at CES.

10               Q       And what does the "CCNC" stand for?

11               A       Consumer Communications and  
12       Networking Conference.

13               Q       Okay.

14                       And does IEEE have a digital  
15       audio interest group?

16               A       I think they have several different  
17       groups that address digital audio. I'm not  
18       sure there's one that's focused precisely on  
19       digital audio.

20               Q       Are you part of those groups?

21               A       Certainly CCNC, of which I'm a  
22       current member, digital audio, to the extent  
23       that it's transmitted over networks or  
24       wirelessly is part of that conference and  
25       that society.

1 Q So CCNC is --

2 A The conference, the Consumer  
3 Communications and Networking Conference.

4 Q And you attend the CCNC  
5 conferences?

6 A Yes.

7 Q And they take place annually?

8 A Yes.

9 Q Do you attend any meetings dating  
10 up to the conferences, to the CCNC  
11 conferences?

12 A We have regular conference calls  
13 with the committee throughout the year.

14 Q And do you participate in those  
15 regular conference calls?

16 A When I'm available.

17 Q And on an annual basis, how many  
18 conference calls are there that proceed the  
19 CCNC conference?

20 A At least six or seven. It really  
21 depends on who is chairing that year and how  
22 often he or she wants to convene the  
23 committee.

24 Q And so how many times,  
25 approximately, would you participate in one

1 of those teleconferences?

2 A Maybe every two months.

3 Q Sorry.

4 You said there are six or  
5 seven teleconferences leading up to the CCNC  
6 conference?

7 A So these --

8 Q Of the six to seven, how many  
9 teleconferences would you participate in?

10 A Oh, it varies from year to year.  
11 It depends on when they're scheduled. I  
12 might have some other event that occurs at  
13 the time during the week when they've decided  
14 to do it, but I try to get on as many as I'm  
15 available for.

16 Q Aside from CCNC, do you belong to a  
17 digital audio interest group that is part of  
18 the IEEE?

19 A I was formerly -- formerly, I  
20 believe a member of the -- I don't know if it  
21 was called the Multimedia Society, but there  
22 was another group that dealt with multimedia  
23 that was part of the IEEE that I used to be a  
24 member of.

25 Q How long ago?

1           A     Probably -- each one of those  
2           societies has an additional annual fee, and  
3           so a few years ago I cut back on how many of  
4           them I was a member of, so I'd say probably  
5           not in the past five years.

6           Q     And how long were you a member  
7           of -- of that multimedia society?

8           A     Probably about ten years.

9           Q     So would it be fair to say that you  
10          were a member of the multimedia society from  
11          1999 to 2009?

12          A     I would hesitate to pick precise  
13          dates. I really don't recall.

14          Q     Approximately the time range, does  
15          it sound right to you?

16                   MR. YAP: Objection, asked and  
17          answered.

18          A     I would hesitate to predict the  
19          precise date or to speculate on the precise  
20          dates today.

21          Q     Aside from the multimedia society,  
22          are you part of any other groups that focus  
23          on digital audio?

24          A     Within the IEEE?

25          Q     Within the IEEE.

1 A No.

2 Q Okay.

3 Optical Society of America.

4 What is that organization?

5 A That is a society of people  
6 involved in research, education and  
7 commercial applications of optics.

8 Q Do you have a particular focus of  
9 interest there?

10 A Mostly cameras and displays.

11 Q Is there a digital audio interest  
12 group that's part of OSA?

13 A No.

14 Q Next organization, Society of Photo  
15 Instrumentation Engineers, or SPIE.

16 How long have you been a  
17 member of that society?

18 A Since about 1986 or 1987, since I  
19 was a graduate student.

20 Q So what is SPIE?

21 A Most generally, it's like the OSA,  
22 an organization that is interested in optics,  
23 in light, things like optical networks and  
24 microscopy and use of light in medical  
25 applications.

1                   However, their interests are  
2                   fairly broad, and so they also run  
3                   conferences in areas like multimedia.

4                   And indeed I was cochair of  
5                   their multimedia networks and applications  
6                   conferences for four years from 1997 to 2000.

7                   Q     And is digital audio part of the  
8                   multimedia conferences --

9                   A     Yes.

10                  Q     -- that you have chaired?

11                  A     Yes.

12                  Q     And what aspect of digital audio  
13                  would be presented at those multimedia  
14                  conferences?

15                  A     Pretty much any aspect that the  
16                  presenter convinced the committee was  
17                  interesting to the audience.

18                  Q     Could you give an example?

19                  A     So there was a great deal of  
20                  discussion in the 1990s about multimedia  
21                  where multimedia means you have some  
22                  combination of video, audio and possibly  
23                  other kinds of media, like text and graphics,  
24                  and especially on user interactions with that  
25                  transmission of it and realtime with high

1 quality of service over a network and the  
2 processing for it.

3 There was another conference  
4 called Conference on Media Processors, which  
5 was particularly aimed at hardware and  
6 software for processing video and audio in  
7 realtime.

8 I was cochair of that from  
9 1999 to 2005. And actually, those two  
10 conferences met at the same time in the same  
11 place so there was a great deal of  
12 cross-pollination between the two.

13 So it's -- you know, it's a  
14 very inclusive group. If somebody proposes  
15 to give a talk or present a paper on an area  
16 relating to some aspect of multimedia, it's  
17 largely a function of the quality of  
18 presentation and whether -- quality of the  
19 proposed presentation and whether the  
20 committee thinks it would be of interest to  
21 the audience.

22 There isn't a firm dividing  
23 line.

24 Q With respect to the conference on  
25 media processors, can you describe what were



1 some of the themes addressed at the  
2 conference, or trends?

3 A Certainly. There were really two  
4 trends, and there are two trends that  
5 continue to this date.

6 The question is, do you  
7 optimize a general purpose processor for  
8 processing video and audio in realtime, let's  
9 say for compression and decompression or for  
10 playing back audio or video from a file or  
11 from a stream over a network, or do you build  
12 dedicated hardware.

13 And papers on both those areas  
14 were presented and the debate was often quite  
15 lively.

16 Q What were some of the issues that  
17 were addressed at these conferences in the  
18 2000 to 2005 timeframe?

19 And more specifically focusing  
20 on the 2004 timeframe.

21 A Well, without having the conference  
22 proceedings in front of me, I can't recall  
23 precisely what would have been presented in  
24 2004 versus 2003 or 2002; but in general,  
25 that was a period of time during which it was

1 clear that it was practical to deal with  
2 digital video and digital audio on general  
3 purpose computing devices as well as on  
4 inexpensive special purpose devices.

5           And is he thinking about the  
6 whole ecosystem of wired, wireless and  
7 optical networks, thinking about storage for  
8 this content, thinking about efficient but  
9 low-overhead compression and decompression,  
10 thinking to some degree about the kinds of  
11 interactions and the kinds of user  
12 experiences people might have with that  
13 information and how that might influence the  
14 requirements for processing and storage and  
15 networking.

16           So all of those areas were  
17 discussed around that period of time.

18           Q     You -- your CV states that you're  
19 an associate editor of -- of Optical  
20 Engineering.

21           A     I was associate editor from 2004 to  
22 2011.

23           Q     Okay.

24                     And is that a journal?

25           A     Yes.

1           Q     And what types of subject matter  
2     does the journal publish on?

3           A     Generally things relating to  
4     optics, to light, to interaction of light  
5     with matter, to -- which could include  
6     anything from optical networking to cameras  
7     to displays to interesting optical materials  
8     to use of optics or light in medicine.

9                     So again, it's a very broad  
10    journal, but it's all applied rather than  
11    theoretical.

12          Q     Would digital audio be a subject  
13    matter that you typically encounter in the  
14    publications of the journal?

15          A     Not generally.

16          Q     With respect to the Society of  
17    Motion Picture and Television Engineers, you  
18    have been, it looks like, a member since  
19    1993?

20          A     No, actually, I've been a member  
21    since 1983. I joined when I was a student.

22          Q     And you're still a member today?

23          A     Yes.

24          Q     And what is the Society of Motion  
25    Picture and Television Engineers?

1           A     That's a society that deals with,  
2     well, less so nowadays, film and analogue  
3     recording of pictures and sound, as well as  
4     digital recording and transmission of  
5     pictures and sound, whether to the home or to  
6     the theater.

7           Q     And do you have a particular  
8     interest or focus in the society, subject  
9     matter interest?

10          A     Well, I -- the papers I've  
11     published in the journal are all in the area  
12     of video; but in terms of the area of  
13     interest, I'm interested in all of them.

14          Q     All of them being --

15          A     All of subject areas, so the board  
16     of editors discusses all the topics that come  
17     under the heading of the "society."

18                     I just haven't published  
19     papers outside of video.

20          Q     Does the SMPTE society have a  
21     digital audio interest group?

22          A     They certainly have a digital audio  
23     standards group. I'm not sure if they have a  
24     digital audio interest group.

25          Q     Are you part of the standards

1 group?

2 A No.

3 Q And what does the standards group  
4 do?

5 A So one of things that SMPTE does is  
6 working with industry. They create standards  
7 for a variety of things ranging from back in  
8 the old days where the -- the perforations  
9 were in theatrical film to issues today like  
10 formatting for audio and video that are  
11 captured as part of a theatrical -- captured  
12 as part of Hollywood production that  
13 ultimately would be shown in a theater.

14 So a very broad range of  
15 standards.

16 Q Are you aware of any digital audio  
17 standards specifically?

18 A SMPTE has created quite a few  
19 digital audio standards, either standalone or  
20 as part of a standard for television that  
21 would involve both video and audio.

22 Q How about for simply audio  
23 transmission, like song transmission, without  
24 the video component, what would be some of  
25 the standards that SMPTE was involved in?

1           A     Well, I believe they have standards  
2           that are used in capture and post-production  
3           of audio.

4                     They're not responsible for,  
5           say, mp3, although SMPTE and mpeg work  
6           together, so there is overlap between the  
7           organizations.

8           Q     Okay.

9                     So would you say that SMPTE's  
10          focuses with respect to audio would be, you  
11          know, its interplay with video?

12          A     Well, SMPTE, being focused on  
13          motion pictures and television, they would be  
14          generally working with video and audio  
15          together rather than in isolation from one  
16          another.

17          Q     Okay.

18                     Now, looking at your CV, there  
19          is an extensive list of patents there.

20                     Do any of your patents deal  
21          with digital audio?

22                     (Deponent read document.)

23          A     Let's see. Several of the  
24          hyperlinked television patents have an audio  
25          component inasmuch as the interactive

1 television program involves packets of --  
2 video packets of audio, packets of controlled  
3 information and packets of interactive  
4 information.

5                   Additionally, I believe the  
6 7,636,365 patent on smart digital modules  
7 involved both -- involved capture, processing  
8 and playback of digital audio as part of  
9 those modules.

10                   Although as I sit here right  
11 now, I don't recall how much that spec talks  
12 about that piece of functionality.

13           Q       Now, in the '365 patent that you  
14 just referenced, is digital audio part of the  
15 video stream or is -- well, let's just start  
16 there.

17                   Is digital audio part of the  
18 video stream?

19           A       It can be or it can be separate.

20           Q       Do you have research experience  
21 with digital audio?

22           A       Yes.

23           Q       Can you give examples of that  
24 research experience?

25           A       Certainly. I'll refer to the

1 publication list that starts on page 11.

2 So in no particular order,  
3 several of the papers on parallel media  
4 processing, such as Item 11 on page 11, those  
5 are addressing streams of video as well as  
6 streams of audio, so that was work on  
7 hardware and software systems for processing  
8 video and audio in realtime.

9 Q Simultaneous streaming?

10 A Or separately. It's really just  
11 about an architecture for processing in  
12 realtime.

13 I additionally -- let's see.

14 (Deponent read document.)

15 A On page 7 -- I'm sorry, page 13,  
16 Item 7, Television Sound and Viewer  
17 Preference, that was a study I was involved  
18 in relating to audio for high-definition  
19 television.

20 And then, let's see, page 15,  
21 Item 34, this was about a paper that we  
22 presented at the Audio Engineering Society  
23 Convention in 1999 on capturing audio with  
24 multiple microphones and being able to do  
25 processing on the outputs of multiple



1 microphones together in order to enhance the  
2 digital audio quality.

3 Then on page 16, Item  
4 No. 51 -- and this was work that was done  
5 partly in connection with the project that  
6 related to the patent on smart modules we  
7 discussed earlier and partly done with mobile  
8 devices.

9 This was research, again, that  
10 we presented at the Audio Engineering Society  
11 Conference in 19 -- 2005 relating to the  
12 ability to use a number of mobile devices  
13 together to act as if they were a single  
14 microphone.

15 So instead of having one of  
16 those expensive conference phones in the  
17 center of the table, we all turn on our  
18 cellphones and communicate with one another  
19 by Bluetooth, and they become a conference  
20 phone in a peer-to-peer network.

21 And we also have the ability  
22 in a system like that to process the audio in  
23 realtime so as to create a steerable  
24 microphone so we can concentrate on the  
25 person who's speaking and reject the sound

1 coming from the fan on the PC on the other  
2 side of the room or the air conditioning  
3 system or something.

4 So again, the notion of  
5 processing a group of audio inputs together  
6 in order to create better audio.

7 There certainly are audio  
8 aspects in many of these other pieces of  
9 work. Those were the ones that were most  
10 focused on audio specifically.

11 Q Any other examples from -- from the  
12 list of your publications?

13 (Deponent read document.)

14 A Well, if we go to the theses I've  
15 supervised, there are a number of theses I've  
16 supervised that had a digital audio  
17 component.

18 And again, this is -- this may  
19 not be complete because I'm doing this on the  
20 fly, but if we go to page 24, you notice that  
21 there is a third item from the top of the  
22 page, it's a master's thesis in EECS,  
23 Electrical Engineering Computer Science, by  
24 Chad Nicholson, where the subject of the  
25 thesis was implementing the mpeg-2 audio

1 decoding specification on a DSP chip, and I  
2 supervised that project.

3 Q And by supervising, what did that  
4 entail?

5 A That entailed working with the  
6 student to define the -- to define the scope  
7 of the work and establishing what would be  
8 sufficient work to qualify for a master's,  
9 and then being in regular contact with the  
10 student as you actually did the  
11 implementation of the algorithm, evaluating  
12 the performance and the audio results, and  
13 then ultimately signing the thesis.

14 And then again on the same  
15 page, the second to the last item, Westner,  
16 Object-Based Audio Capture, that's a master's  
17 thesis on digital audio processing which  
18 relates to the first of the two Audio  
19 Engineering Society Publications that I  
20 mentioned earlier.

21 We also did work in speech  
22 interfaces which do involve digital audio.

23 So on item -- page 25, sixth  
24 item down, a thesis by Yi Li -- Y-I, L-I -- a  
25 voice link -- a speech interface for

1 responsive media.

2 Then the same page about -- a  
3 little past halfway down, the Dalton thesis  
4 on audio-based localization. That's a  
5 master's thesis that's related to the second  
6 of the two Audio Engineering Society papers  
7 that we've discussed.

8 Actually, the item above that  
9 the master's thesis by Pilpre, P-I-L-P-R-E, I  
10 believe digital audio was one of the kinds of  
11 information that he was processing in the  
12 sensor networks that he built as part of that  
13 work.

14 And again, there are other --  
15 other pieces of this work that had an audio  
16 component, but I think those are the primary  
17 ones.

18 Q Have you done any work on media  
19 databases or audio databases specifically?

20 A Yes.

21 Q Could you give examples?

22 A So one particular example -- excuse  
23 me, adjusting my chair here -- we created in  
24 about the 2000 to 2005 timeframe what we  
25 called the Demo Box, and what it really was

1 was a touchscreen for playing back media  
2 files representing research that was going on  
3 in my laboratory so that visitors could come  
4 to the laboratory and touch the touchscreen  
5 and receive a presentation of one of the  
6 demonstrations.

7                   And so what it had was it had  
8 a touchscreen. It had a list of media items  
9 and a brief description and maybe a little  
10 picture, and then one could click on them,  
11 and it would play a video, play an audio, run  
12 a computer program. But the kiosk was  
13 actually fetching that from the network.

14                   So there was a database that  
15 involved the menu on the screen, which you  
16 might think of as a playlist, if you will,  
17 and then how to access those resources from  
18 other machines over the network and then  
19 bring them back and play them.

20                   And after we put that system  
21 together, the next thing we did was we  
22 created a personalized version of it so that  
23 a user could input preferences on the  
24 touchscreen.

25                   Or we could also get a profile

1 of a user from somewhere else, and then it  
2 would pick particular pieces of media in a  
3 particular order and play them for that user  
4 so we could have someone visit us and the  
5 person would walk up to the screen and get a  
6 set of personalized set of presentations  
7 associated with that work.

8 So that involved a database of  
9 all the available media as well as accessing  
10 them across the network, user interaction by  
11 selection or by personalization, depending  
12 upon which version of the system we had  
13 running, and then playing back a video and/or  
14 audio.

15 Q And so the database would be  
16 containing both audio and video or was there  
17 a separate video database and a separate  
18 audio database?

19 A The database actually just  
20 referenced media objects of whatever sort,  
21 and then what the media object arrived, the  
22 player knew what to do with it.

23 Q And how would the player play the  
24 object?

25 A The player is simply what you might

1 think of as a renderer.

2 It would take a stream of bits  
3 and the stream, of bits might be video with  
4 audio, and it would reconstruct the video  
5 packets as images, and it would reconstruct  
6 the audio packages as sound through the  
7 speakers on the other side of the screen or  
8 if it were just images or just audio, it  
9 would just play it back as appropriate.

10 Q So if you had a -- what you called  
11 a "playlist," how would the device actually  
12 go about playing the playlist?

13 A Well, so what would happen was a  
14 touch, so the user would touch the screen,  
15 and the touch interface would recognize --  
16 would determine the X-Y coordinate where the  
17 viewer user had touched the screen.

18 It would then have a  
19 representation of the graphical user  
20 interface that said what is the menu item or  
21 media item, if any, corresponding to that X-Y  
22 position. So I'd select something by  
23 touching it.

24 It would then take that media  
25 item and evaluate the reference, which would

1 say where do you go, actually get the file or  
2 stream or whatever corresponding to that  
3 media item, and then it would either fetch it  
4 from local storage or fetch it across the  
5 network.

6 So there would be a -- not  
7 quite a URL, but there was an address from  
8 which it could get each of these items.

9 Then that information would  
10 either be playing from local storage who are  
11 playing across the network for remote storage  
12 to a piece of player software associated with  
13 this touchscreen.

14 Q And what is your understanding of  
15 the term "playlist"?

16 A Well, playlist --

17 Q Generally.

18 A Playlist generally is a term that  
19 originated probably back in the golden days  
20 of top-40 radio, and the way that it was used  
21 in that context was --

22 I did a little bit of DJ'ing  
23 back in the time there was top-40 radio that  
24 anybody listened to. My understanding was  
25 that the playlist was the list of records



1 that generally the station management had  
2 decided were the records that the DJs were  
3 allowed to play, except in very special  
4 circumstances, and the DJs could then select  
5 items from that playlist and play them.

6 Now, there's -- there were  
7 also and continue to be automated radio  
8 stations where the playlist is really just a  
9 list of files, and it's -- there's no DJ, and  
10 an automated system just starts playing from  
11 the beginning and plays through the entire  
12 list without any human intervention,  
13 typically.

14 But my understanding of  
15 "playlist" is that it is just a list of media  
16 that may be selected.

17 THE VIDEOGRAPHER: Excuse me.

18 MS. GLADSTEIN: We're going to  
19 go off the record to change the tape.

20 THE VIDEOGRAPHER: The time is  
21 12:09 p.m. We are going off the record.

22 This will be the end of Disk 1  
23 in the deposition of V. Michael Bove, Jr.

24 (Recess.)

25 THE VIDEOGRAPHER: This is

1 Disk No. 2 in the deposition of V. Michael  
2 Bove, Jr.

3 We are back on the record.

4 The time is 12:14 p.m.

5 BY MS. GLADSTEIN:

6 Q Dr. Bove, during the break, counsel  
7 for Yamaha informed me that they were able to  
8 locate one invoice dated from August 6th to  
9 September 30th of 2013.

10 Would seeing your invoice help  
11 you refresh your recollection with respect to  
12 the work that you have done on behalf of  
13 Yamaha?

14 A Well, I may or may not need to see  
15 that invoice. There are really only two  
16 pieces of information from it that seem to be  
17 needed at this point. One of them is the  
18 number of hours that I put in during that  
19 period, because that period would have  
20 covered the preparation of the four  
21 declarations we've been discussing, including  
22 the two that are specifically relevant today,  
23 and secondly, the rate.

24 And I have been informed by  
25 counsel that I -- that indeed the agreement

1 that was signed in this case was at \$650 an  
2 hour, so I just want to make the record  
3 reflect that.

4 Q So we will wait to hear from  
5 counsel if there are any additional invoices  
6 and ask you additional questions --

7 A Okay.

8 Q -- later on during this deposition.

9 Before we went on the break we  
10 were talking about your general understanding  
11 of a playlist, and I just wanted to follow up  
12 on that.

13 Is it your understanding that  
14 a playlist has an inherent order to it?

15 MR. YAP: Objection,  
16 mischaracterizing witness testimony.

17 A Well, my understanding is that by  
18 virtue of being a list, the items on the list  
19 appear in an order.

20 Q Now, in the context of a DJ setup,  
21 the playlist that a DJ would play would also  
22 have an order to it; is that right?

23 A Well, depends on the DJ. The best  
24 DJs would play the records in whatever order  
25 they felt was the appropriate order for the

1           circumstance.

2           Q     Okay.

3                         So typically one would be able  
4           to select an item from a playlist?

5           A     Yes.

6           Q     For playback?

7           A     The playlist was the universe of  
8           records that the station management had  
9           decided the DJ could select among.

10          Q     But it would be inherently a list  
11         of items in an order.

12          A     Certainly, but it could be  
13         alphabetical order. It could be any sort of  
14         order.

15          Q     Okay. All right.

16                         Have you done any work on  
17         wireless remote controls?

18          A     Yes.

19          Q     Could you describe that work?

20          A     Certainly.

21                         I think probably the first  
22         relevant work goes back to when I was doing  
23         my master's thesis, because lacking the  
24         ability to store the video on disk drives at  
25         the time, we made our intelligent personal

1 video recorder out of consumer VCRs, and the  
2 communication -- the communication method for  
3 consumer VCR is a wireless infrared remote  
4 control.

5 And so I had to build a system  
6 that was able to control this group of VCRs  
7 from a PC or from a workstation by means of  
8 the infrared interface.

9 Q And approximately when was that?

10 A That would have been in 1983  
11 through 1985.

12 Q And that is when you were a  
13 graduate student?

14 A When I was doing my master's.

15 Q Any other experience with wireless  
16 remote controls?

17 A Well, we've certainly as part of  
18 various projects used handheld devices or  
19 mobile devices or other sorts of devices with  
20 Wi-Fi or Bluetooth to control other things.

21 Q Have you worked on portable  
22 devices?

23 A Yes.

24 Q Portable mobile devices?

25 A Yes.

1 Q What were those devices?

2 A Well, the one that I had the most  
3 involvement with was the OLPC XO laptop. I  
4 was one of the designers of that.

5 Q And what kind of laptop was that?

6 A So it was a compact, inexpensive  
7 laptop specifically for children and even  
8 more so specifically for children in  
9 developing countries, so there were  
10 particular environmental considerations.

11 For example, the fact that in  
12 equatorial Africa, school is outdoors, so the  
13 laptop display has to be able to deal with  
14 the ultraviolet radiation in equatorial  
15 Africa, which a typical netbook can't survive  
16 very long.

17 It had to deal with unusual  
18 sources of power. It had to deal with the  
19 ability to do what we called "mesh"  
20 networking, so that if there was no Wi-Fi  
21 access point, a laptop could talk directly to  
22 another laptop without going through a Wi-Fi  
23 access point, although using the Wi-Fi radio,  
24 but it could also go multiple hops.

25 So if, for example, if there

1 was a server or Internet access at the school  
2 or at a community center, the laptop could  
3 talk to a second laptop which would talk to  
4 a third laptop which was within range of the  
5 Wi-Fi access point.

6 And so one would have if not  
7 what we would regard as great Internet  
8 access, one would still have some degree of  
9 Internet access without being within direct  
10 range of the Wi-Fi access point contacted to  
11 the Internet.

12 The laptop had for the time a  
13 couple of unusual features. It was a very  
14 inexpensive laptop, but it had totally  
15 solid-state storage for robustness and for  
16 power efficiency.

17 It had a novel display which  
18 works differently from other LCD displays,  
19 and later had a novel touchscreen that uses  
20 very different principles from the touch  
21 screens on our phones and tablets.

22 It had some interesting  
23 abilities with respect to capturing audio and  
24 playing back audio that one typically does  
25 not find on laptops.

1                   And so among other things, it  
2                   could be used as an oscilloscope either using  
3                   the internal microphone or using something  
4                   plugged into the jack on the side.

5                   So it was -- in everything  
6                   from appearance to low-level engineering, it  
7                   was a very different kind of machine from the  
8                   laptops that are used now.

9                   Q        Could you tell me the timeframe of  
10                   your work on this OLPC XL laptop?

11                   A        I think my involvement probably  
12                   started in about 2004. The first units were  
13                   manufactured in the 2007 to 2000 --  
14                   manufactured and shipped in quantity in the  
15                   2007 to 2008 time period and continue to be  
16                   shipped to this date, although they've been  
17                   through three additional generations, two of  
18                   which I've been involved in the engineering  
19                   and design of.

20                   Q        And which are the two that you are  
21                   involved in the engineering and design of?

22                   A        So there were -- the numbering  
23                   scheme is a little bit strange, but -- so the  
24                   first laptop was the X01, and then we  
25                   redesigned it to use a better microprocessor



1 and to make a couple of improvements, and  
2 that was called the X01.5.

3 And then we further improved  
4 that to use an ARM system-on-a-chip instead  
5 of an 86 processor to make it even more  
6 power-efficient and cheaper, and that was the  
7 X01.75.

8 We were sort of using the  
9 Zeno's paradox approach there where you never  
10 actually got to X02. You just kept getting  
11 halfway through the remaining distance  
12 because X02 was this mythical thing that was  
13 going to be completely different and not  
14 evolutionary.

15 So we felt if you were doing  
16 something evolutionary, you couldn't call it  
17 X02.

18 So I was involved in 1.5 and  
19 1.75. There was a tablet which was developed  
20 which wasn't shipped, which I had a little  
21 bit of involvement in, so I don't quite count  
22 that.

23 There is another tablet made  
24 by a third party which is being shipped that  
25 I had no involvement with. And then there is

1 an interesting machine called the X04, for  
2 reasons I still don't understand, which is  
3 like the 1.75 but with a special touchscreen,  
4 and I had a small amount of involvement with  
5 that one before the Boston office --  
6 Cambridge office of OLPC closed.

7 But I was primarily involved  
8 in the 1, the 1.5 and the 1.75.

9 Q And when was the X01.5 developed?

10 A The primary design work was done  
11 between I believe 2004 and 2007.

12 Q And when was the X01.75 developed?

13 A The 1.75 I think was developed in  
14 around 2010 to 2011, maybe into 2012. That  
15 project was around for a while.

16 Q The X01. -- 1.5, did that device  
17 have the capability to select a player  
18 device?

19 A You mean to cause media to play  
20 someplace else?

21 Q Well, first select a device on  
22 which you would want to hear an audio  
23 rendering.

24 A Well, one could play audio on the  
25 internal speakers. One could plug in a

1 speaker to a jack. If one had the  
2 appropriate drivers, one could plug in a USB  
3 audio device and play back through that.

4 I don't recall that we ever  
5 wrote code for playing audio over Wi-Fi, as  
6 Apple does with AirPlay, although the  
7 hardware and the operating system would  
8 certainly be capable of doing that, given an  
9 external device.

10 Q But there was no feature in the  
11 X01.5 model to select a separate device in  
12 which the X0 1.5 would direct that separate  
13 device to play a song, for example?

14 A That's not strictly true, because  
15 as part of the peer-to-peer networking, there  
16 was a sharing feature, so that if one were  
17 composing sound collaboratively with someone  
18 else, so there were two or three different  
19 pieces of software that allowed children --  
20 or it turned out grownups really liked it,  
21 too -- to experiment with instruments and  
22 with orchestration, and it was possible to  
23 invite another user over the network to work  
24 with the person who had started the program,  
25 and the audio would then play.

1                   And so when I hit "play," the  
2                   sound will also come out of the other user's  
3                   speaker over the network.

4                   So that was really just a  
5                   feature of the operating system. That was  
6                   only a user basis -- well, we could argue if  
7                   we equate the user with the device, that I  
8                   was inherently selecting the user's device by  
9                   inviting that user into my session.

10                  There was some work done which  
11                  did not result on a -- in a product of  
12                  creating a classroom projector which had the  
13                  ability to project and play sound so that any  
14                  student in the classroom would use basically  
15                  that same mechanism.

16                  If a student has done a  
17                  drawing or composed a sound, the teacher  
18                  could say why don't you play that, and then  
19                  the student could cause the projector to show  
20                  the image from the screen or to play the  
21                  sound without any wiring between them.

22                  And the way that we were  
23                  planning to do that was essentially putting  
24                  another XO motherboard inside the projector  
25                  so that it just looked like another member of

1 the mesh network.

2 My recollection is that that  
3 was never actually shipped as a product but  
4 that there was work done on using that same  
5 sharing mechanism to allow any child in the  
6 classroom to share something with the whole  
7 classroom.

8 Q Okay.

9 Have you done any work on  
10 media databases in commercial settings?

11 A Yes.

12 Q Could you tell us about that work?

13 A Certainly.

14 I think it's probably fairer  
15 to say that I supervised work in that area  
16 than implemented it myself, and as part of  
17 WatchPoint --

18 So I should probably step back  
19 and say that in about 2000, right around the  
20 beginning of 2000, end of 1999, beginning of  
21 2000, I cofounded with my student, John Dax,  
22 and another student, Josh Walkman, a company  
23 called WatchPoint Media, which was an  
24 interactive television products and services  
25 company that was looking to offer interactive

1 and personalized television on existing cable  
2 and satellite set-top boxes as well as on  
3 existing software, like QuickTime, on  
4 laptops.

5 And as part of being able to  
6 deploy this, we built internally our own play  
7 app server so that we could take television  
8 programming and interactive elements and then  
9 stream them through cable or satellite  
10 set-top boxes or to PCs on a wireless or  
11 wired network.

12 And I did not actually  
13 implement that system, but I was present at  
14 the code reviews, so we had a code review  
15 about every week for the creation of that,  
16 and I was also present at the specification  
17 of how that system worked.

18 That eventually resulted in a  
19 somewhat more interesting and, as it turned  
20 out, novel system that was the subject of  
21 several patent applications. And the two  
22 Erekson patents that we talked about briefly  
23 earlier today were outcomes of that.

24 Q Okay.

25 And with respect to that code

1 review, did you have any input into the code  
2 itself?

3 A Well, certainly at an architectural  
4 level, at a level of specifying the features  
5 that needed to be supported, I believe I had  
6 input.

7 Q Okay.

8 A Not necessarily on the very, very  
9 low-level strategies of each individual  
10 function in the system, but we knew -- we  
11 knew -- we defined what was the thing that  
12 had to be built, what kinds of formats it had  
13 to operate under, what features it had to  
14 support, how much capacity it had to have,  
15 what the user interface looked like for  
16 whoever was managing it, and then programmers  
17 went off and implemented something.

18 Q And so would it be fair to say that  
19 you had input with respect to the media  
20 databases that -- or media database that was  
21 part of the system that you were building,  
22 your company was building?

23 A I think that would be correct, yes.

24 Q Okay.

25 Why don't we take a lunch

1 break.

2 THE VIDEOGRAPHER: The time is  
3 12:32 p.m. We are going off the record.

4 (Luncheon recess.)

5 THE VIDEOGRAPHER: We are back  
6 on the record. The time is 1:27 p.m.

7 BY MS. GLADSTEIN:

8 Q Dr. Bove, during the break did you  
9 have any discussions with counsel regarding  
10 the substance of this deposition?

11 A No.

12 Q Thank you.

13 And just before we went on  
14 break, counsel confirmed that they have only  
15 received a single invoice from you me dated  
16 September 30, 2013 for the period of time  
17 from August 6th to September 30th of 2013 for  
18 29.25 hours.

19 Would it be fair to say that  
20 you spent about seven or so hours per  
21 proceeding based on this invoice?

22 A Well, I think it would be fair to  
23 say that that total amount represents the  
24 amount of time I spent on all the  
25 proceedings.



1                   These different declarations  
2           have larger or smaller numbers of references  
3           associated with them, and I may have spent  
4           more or less time on any individual one.

5           Q     Okay.

6                   And this amount of time would  
7           have also included your drafting of the four  
8           petitions, one per each proceeding?

9           A     I wasn't involved in the drafting  
10          of the petitions, but the four declarations.

11          Q     I apologize. I misspoke.

12                   That amount of time would have  
13          included the time for you to draft the  
14          declarations that were submitted in each of  
15          the proceedings?

16          A     Yes.

17          Q     Did you have any input into the  
18          petitions that were filed along with your  
19          declarations?

20          A     I don't believe so.

21          Q     You didn't review any draft  
22          petitions before they were filed?

23          A     Oh, I reviewed the draft petitions.

24          Q     Okay.

25                   And did you provide any input

1 into the substance of the draft petitions?

2 A I recall having discussions about  
3 the substance of them. I don't recall  
4 specific instances in which I suggested  
5 changes.

6 Q To your best recollection, is this  
7 the entire amount of time that you spent  
8 drafting -- working on your declarations in  
9 each of these four IPR proceedings leading up  
10 to the declarations that were filed?

11 A Just to clarify, we're talking  
12 about the 29.25 hours?

13 Q Yes.

14 A Then the answer is yes.

15 Q Okay.

16 MS. GLADSTEIN: Let me mark a  
17 couple of exhibits.

18 THE DEPONENT: Thank you.

19 (Exhibit 5 marked for  
20 identification.)

21 (Exhibit 6 marked for  
22 identification.)

23 BY MS. GLADSTEIN:

24 Q Dr. Bove, I marked as Exhibit 5 US  
25 Patent No. 8,214,873 to inventor Martin Weel.

1                           Have you seen this document  
2       before?

3           A       Yes.

4           Q       And when was the last time you saw  
5       this document?

6           A       During breakfast this morning, I  
7       think.

8           Q       Great.

9                           I marked as Exhibit 6 US  
10       Patent No. 8,230,099 to inventor Martin Weel.

11                          Have you seen this document  
12       before?

13          A       Yes.

14          Q       And when did you see it?

15          A       Either this morning or late last  
16       night.

17          Q       Great.

18                          Do you -- with respect to the  
19       '873 patent, Exhibit 5, do you have an  
20       understanding of the field of the invention  
21       to which the patent pertains?

22          A       Yes.

23          Q       And what is your understanding?

24          A       It's a system and a method by which  
25       one can use a handheld remote control for

1 identifying a media player or a destination  
2 for playout of audio.

3 The remote control can receive  
4 a playlist, and the user can select music  
5 from the playlist and cause playback on the  
6 media player without actually interacting  
7 directly with the media player, rather only  
8 by means of the remote control.

9 Q Now, how does the -- the handheld  
10 device receive a playlist in the '873 patent?

11 A Are we talking about a particular  
12 claim or are we talking about the  
13 specification?

14 Q No.

15 Generally, the -- the handheld  
16 remote that you referred to of the '873  
17 patent, where does it get its playlist from,  
18 its content from?

19 MR. YAP: Objection, form.

20 A Well, I'd have to answer this in  
21 two different ways, one with respect to  
22 specific claims and one with respect to what  
23 the specification discusses.

24 Q Sure, please.

25 A There is a server which is called

1 the playlist server, and that is the  
2 origination point or at least the immediate  
3 origination point, not the ultimate  
4 origination point, of the playlist that  
5 arrives on the remote control.

6           Although I will say that not  
7 all of the claims specify a playlist server,  
8 so that's why you see the specification talks  
9 of a playlist server but the claims don't use  
10 that phrase, necessarily.

11           Q     And how does the handheld remote  
12 get the playlist from a server?

13           A     Well, in, for instance, Figure 1,  
14 it's shown that the connection between the  
15 playlist server and the remote control, which  
16 is shown here as first device, is by means of  
17 the Internet.

18           Q     What is the relevant timeframe for  
19 assessing whether or not the claims of the  
20 '873 patent are obvious?

21           A     My understanding is that this  
22 patent resulted from a continuation of an  
23 application filed in May 2004 and that I  
24 should refer to May 2004 as the relevant  
25 timeframe.

1           Q     Do you have an understanding of the  
2     state of the art in 2004?

3                     MR. YAP:  Objection, form.

4           A     I would have to ask which  
5     particular art.

6           Q     The art -- state of the prior art  
7     that pertains to the invention disclosed in  
8     the '873 patent that you just described.

9           A     Yes, I believe I do.

10          Q     And what is -- what is your  
11     understanding of the state of the prior art?

12          A     That's an extremely broad question.

13                     I don't know if you want to  
14     break it up into pieces or if you just want  
15     to have me recite everything I know about the  
16     state of the art in 2004.

17          Q     Sure.

18                     Why don't we do this.  What  
19     prior art did you review to inform yourself  
20     as to what was the state of the art in 2004?  
21     In May of 2004, to be precise.

22          A     Well, besides my recollections,  
23     what I also did was I reviewed a variety of  
24     references, some of which are cited in here  
25     and others of which may have been cited in

1 other declarations associated with related  
2 matters which were descriptive of what was  
3 generally understood about network music  
4 playing, serving of playlists across the  
5 Internet and things of that sort.

6 Q Could you give me examples of the  
7 references that you reviewed to gain an  
8 understanding of the state of the prior art?

9 A Well, I would say at the very  
10 least, all of the references that are  
11 specifically cited in paragraph 25 of this  
12 declaration, but more broadly I would list at  
13 least all of the references that are appended  
14 to all four of the petitions, and which is a  
15 superset of the ones I've listed here.

16 And I may have looked at some  
17 additional references at the time which I  
18 didn't rely on in forming these opinions, but  
19 I may have seen other references as part of  
20 the process.

21 Q Do you recall what those other  
22 references were?

23 A I recall, among other things,  
24 looking up information on the website --  
25 about the website mp3.com.

1                   I recall just looking back at  
2           some information about music servers that we  
3           had installed in my laboratory in the early  
4           2000s for use by students at the Media Lab,  
5           and I don't recall what else I might have  
6           looked at.

7           Q       And why did you look at the website  
8           mp3.com?

9           A       I was just really interested in  
10          relevant dates of when mP3.com launched and  
11          what happened, what eventually happened to  
12          it, because I didn't recall the precise  
13          dates.

14          Q       And did the information from the  
15          mp3.com website help you in reaching the  
16          opinions that you set out in your  
17          declaration?

18          A       I think I would regard it more as  
19          jogging one's memory than something I relied  
20          upon specifically in forming these opinions.

21          Q       What specifically did mp3.com  
22          website jog in your memory?

23          A       Among other things, the dates by  
24          which it would have been generally known that  
25          digital audio could be served on the web?



1 Q And what were those dates?

2 A I don't have those numbers in my  
3 head right now. I think they may have -- I  
4 might have referred to mp3.com in one of  
5 these declarations.

6 I'm not certain. Just in  
7 passing, not as a reference that I  
8 specifically relied on. Or I might not have.  
9 I'm not sure. Perhaps I didn't provide a  
10 reference to that in any of these.

11 Q So were the dates by which digital  
12 audio could be surfed on the web relevant to  
13 May 2004?

14 A First of all, I'd just like to note  
15 for the record that I don't see a reference  
16 to the actual website mp3.com in either of  
17 the two declarations before me right now.

18 Q You're referring to Exhibits 3 and  
19 4?

20 A Exhibits 3 and 4, yes.

21 Q Thank you.

22 Just so that the record is  
23 clear, if you could mention which exhibit  
24 you're looking at.

25 A Certainly, I'm sorry.

1                   I'm sorry, could you read back  
2                   the question that you were asking me when I  
3                   had interrupted you?

4                   Q     The question was, so were the dates  
5                   by which digital audio could be surfed on the  
6                   web relevant to May 2004?

7                   A     They were relevant to the degree  
8                   that digital audio, in particular mp3 files,  
9                   were available from web servers significantly  
10                  prior to 2004.

11                  Q     Can you be more specific as to when  
12                  they were available?

13                  A     I, again, don't have the reference  
14                  in front of me, but it was significantly  
15                  before 2004, which is consistent with  
16                  language in both -- some of the references as  
17                  well as in the Weel patents, that it was well  
18                  known.

19                  Q     Okay.

20                                 And you also mention that you  
21                                 look -- looked at the work you have done with  
22                                 music servers.

23                  A     We -- the students in my laboratory  
24                  set up a central mp3 server that was remotely  
25                  controllable, and I just wanted to see the

1 dates around which that happened.

2 Q And when were those dates?

3 A That was in the late 1990s.

4 Q And why was that information  
5 relevant to you?

6 A It was really just curiosity, just  
7 wanted to see when they've done it, and I  
8 found some emails that referred to it.

9 Q So aside from the art that is --  
10 the references that are listed in paragraph 5  
11 of your declaration and Exhibit 3 and the  
12 mp3.com website, as well as work that your  
13 students have done with music servers in the  
14 late '90s, was there any additional sources  
15 of information that you looked to to form an  
16 understanding as to the state of the prior  
17 art?

18 A Well, again, with my previous note  
19 that I was -- it was not -- since I was  
20 reviewing material for four declarations at  
21 about the same time, I would probably say the  
22 Materials Considered section of all four  
23 declarations taken together.

24 I can't at this point say that  
25 a particular reference that may appear in one

1 of these and not in the other only affected  
2 my opinion about the relevant issues in that  
3 declaration, because I did review multiple  
4 references for each of these, which may not  
5 overlap 100 percent.

6 Q So besides the references that are  
7 cited in the Materials Considered sections of  
8 your declarations -- and at the moment we're  
9 talking about your declarations in the 597  
10 proceeding and the 598 proceeding -- were --

11 I'm just trying to learn  
12 whether there was any other information or  
13 materials that you considered in addition to  
14 what is listed in your declarations and the  
15 mp3.com website and your own students' work  
16 on music servers.

17 A Well, of course, there is also my  
18 general knowledge from having been in the  
19 field at the time.

20 And again, just to clarify,  
21 some of the references that I may have looked  
22 at in preparation of the two declarations  
23 that do not yet have exhibit numbers --  
24 because they will be discussed at tomorrow's  
25 deposition -- may have impacted my

1 understanding of the state of the art with  
2 respect to the patent in front of me right  
3 now.

4 Q Okay, thank you.

5 All right. So what was the  
6 primary mode of consumer digital media  
7 distribution in 2004?

8 A When we say "digital media  
9 distribution," are we referring just to  
10 music?

11 Q Music or video in 2004, audio or  
12 video.

13 A By 2004, there was a significant  
14 amount of digital video and audio being  
15 provided by satellite and by digital cable  
16 systems.

17 If we're talking about audio  
18 distribution, there was audio distribution  
19 over satellite and cable systems, and the CD  
20 was still a very robust product at the time.

21 And of course there was  
22 digital audio distribution over the Internet,  
23 but that was still on an upward trajectory at  
24 the time.

25 Q So with respect to the digital

1 audio media, would you say that CDs were the  
2 primary mode of consumer digital media  
3 distribution in 2004?

4 A I think it's probably fair to say  
5 that in 2004, they were still a primary means  
6 of consumer digital music distribution.

7 Q And for video, would you say that  
8 DVDs were the primary mode of video --  
9 digital video distribution?

10 A They may or may not have been,  
11 because there were enough digital cable and  
12 satellite systems that I think one might have  
13 to figure out how many hours per day a  
14 typical consumer would be watching a DVD  
15 versus watching, say, DirectTV or Dish or  
16 digital cable in order to make that judgment.

17 Because we're not talking  
18 about OnDemand here. We're simply talking  
19 about distribution.

20 Q Aside from your looking on the  
21 mp3.com website, how familiar are you with  
22 the mp3 technology around the 2004 timeframe?

23 A By "technology," are we talking  
24 about encoding and decoding? Are we talking  
25 about transmission? Are we talking about

1 storage?

2 Because there are many pieces  
3 of the puzzle.

4 Q We're talking about the use of mp3  
5 technology, the storage of mp3 files and  
6 transmission of mp3 files.

7 A I believe I'm familiar with it.

8 Q So if you wanted to copy music from  
9 a CD onto a computer, how would you do it  
10 around 2004?

11 A Well, I know how we did do it,  
12 which was that we put the CD into the  
13 computer drive and either we imaged the CD  
14 directly onto the computer's storage or we  
15 imaged the CD directly onto a remote storage  
16 device over the network.

17 Or while reading the data off  
18 the CD, we re-encoded it, because the CD  
19 format is not compressed. And so for more  
20 efficient storage or transmission, we'd want  
21 to compress it, and we might do that either  
22 by doing it as the data are read directly  
23 from the disk or we might do it from the  
24 image that was stored on the computer. And  
25 then at that point, we would have one or more

1 compressed audio files.

2 And there were a variety, as  
3 there still are, of compression algorithms  
4 that were in common use at the time -- mp3  
5 was not the only game -- but the result of it  
6 would be that we would eventually have one or  
7 more compressed audio files in one of a  
8 variety of formats which could be stored,  
9 transmitted or potentially streamed.

10 Q Besides mp3s, what other formats  
11 were used to compress audio files?

12 A There were a whole variety of  
13 proprietary techniques. There were Windows  
14 Media formats. There were -- you know, there  
15 was the audio compression that was associated  
16 with, say, mpeg-1, which was not identical to  
17 mp3.

18 There were just taking the CD  
19 file directly and applying compression  
20 algorithms to it, like Lempel-Ziv or other  
21 statistical compression methods directly to  
22 the raw data to make it smaller, but without  
23 actually doing what's called perceptual  
24 encoding.

25 So there is -- there are two



1       ways to encode digital audio. The less  
2       efficient way, but the one that the audio  
3       files would demand, is the one that can  
4       perfectly reconstruct the data. So that's  
5       taking something like the data off the CD and  
6       applying a statistical compression method to  
7       it to make it occupy less space, but that can  
8       be perfectly undone.

9                       That's in opposition to  
10       something like mp3, which starts with a  
11       perceptual model of the human and then does  
12       compression where the goal is to make  
13       something that -- to the extent possible --  
14       sounds identical but is not mathematically  
15       equivalent to the original audio file.

16                      And that's both  
17       computationally more demanding to compress  
18       and decompress, as well as at least to some  
19       audio files, morally objectionable, because  
20       they can claim they can hear the difference.

21                      Of course these are the people  
22       who can also hear the difference between a CD  
23       and an LP, so we can take that with however  
24       much weight we want to apply.

25                      But in any event, there are a

1 whole lot of ways to compress digital audio;  
2 and the question is, what are the  
3 circumstances under which it's going to be  
4 consumed?

5                   Is it going to be played back  
6 in a movie theater on high-quality audio  
7 system or is it going to be played back  
8 through \$1 earphones while someone is jogging  
9 through traffic.

10                   That might allow us to do a  
11 lot more compression to the audio, because it  
12 doesn't need to be nearly as high-quality in  
13 the latter circumstance.

14           Q       Okay.

15                   So in 2004, were you aware of  
16 any mobile devices that were able to directly  
17 download content from the Internet?

18           A       Directly download content without  
19 having a connection to some other device?

20                   Are we talking about  
21 wirelessly or by any means?

22           Q       Let's start with by any means.  
23 Mobile devices.

24           A       Let's see. At the time there  
25 certainly were pocket PCs that were able to

1 connect to the Internet, and whether they did  
2 it wirelessly or whether they did it while  
3 docked, they were able directly to access  
4 files across the Internet without being  
5 attached to another computing device. So I'm  
6 aware of at least those.

7 If we consider laptops as  
8 mobile devices, which they seem to be  
9 categorized as nowadays, they certainly were  
10 capable of doing that at the time.

11 Q Were mp3 players capable of  
12 directly downloading music from the Internet  
13 around 2004?

14 A I think we need to clarify what you  
15 mean by an "mp3 player."

16 If you mean a dedicated device  
17 specifically for playing mP3s and doing  
18 nothing else, which is to say not being a  
19 telephone or a PDA or a pocket PC or a laptop  
20 or a tablet, my recollection is at the time  
21 the downloading would generally be done by  
22 means of connecting the mp3 player to  
23 something else, like a computer, in order to  
24 download the music.

25 Q Now, would a PDA be able to

1 directly download content from the Internet?

2 A I believe some of them could, yes.

3 Q Now, in 2004, were mobile devices  
4 able to control networked player devices to  
5 play a media item from a content server?

6 MR. YAP: Objection to form.

7 A That's a fairly compound statement,  
8 and we might need to define a number of the  
9 terms in it before I can give a definitive  
10 answer to that.

11 I know, for example, that  
12 people had programmed PDAs to act as remote  
13 controls for various consumer electronic  
14 products by that point in time.

15 Q Are you -- do you know in 2004  
16 timeframe of any mobile device that was able  
17 to communicate with and direct a player  
18 device to play a media item --

19 MR. YAP: Objection, form.

20 Q -- that was available on a content  
21 server, that wasn't locally available?

22 MR. YAP: Objection to form.

23 A I believe there were, yes.

24 Q Can you explain what you mean?

25 A Certainly.

1                   So one of the things that we  
2                   did at the time was we were running -- and  
3                   many people did this.

4                   We were running the XWindows  
5                   system and -- on PCs, on servers, on all  
6                   kinds of things, and it's possible with  
7                   XWindows to get a window on a remote machine.

8                   And so therefore, anything one  
9                   can do on the machine directly, which might  
10                  include playing a piece of stored digital  
11                  music, one could do on a remote device across  
12                  XWindows. This was true of other Windows  
13                  systems as well.

14                  And there were certainly  
15                  mobile devices that were capable of  
16                  communicating, things like pocket PCs that  
17                  were capable of communicating with other  
18                  devices that -- such as a laptop or desktop  
19                  computer that could play mP3s.

20                  So in a situation like that, I  
21                  would imagine it would be relatively simple  
22                  to send the command from the window on the  
23                  handheld device to the media player computer  
24                  and have it play.

25                  Q       So you're referring to a situation

1 where the mobile device is a pocket PC?

2 A Or an equivalent type of device. I  
3 mean, there were tablets at the time. There  
4 were a variety of things at the time.

5 So it could be a PDA that had  
6 a similar functionality.

7 Q So you are aware that in 2004, a  
8 PDA would be able to control a player device,  
9 another device, to play a media item obtained  
10 from a content server in 2004.

11 A Well, I suppose the process would  
12 consist of -- I mean, it would not be  
13 something that a typical consumer would  
14 necessarily find comfortable to use.

15 But the ability to use one  
16 computing device to issue commands -- one  
17 computing device being a mobile device to  
18 issue commands to another computing device,  
19 whose functionality might include playing  
20 digital media from whatever source, certainly  
21 existed in 2004.

22 Q It existed theoretically,  
23 conceptually, or did it exist for consumer  
24 consumption?

25 A I'm not aware of anyone selling it

1 as a product at the time.

2 Q But theoretically?

3 A As a practical matter, it could be  
4 done using existing software --

5 Q Could be done?

6 A -- and existing hardware.

7 Q Are you aware of any infrared  
8 remote controls in 2004 that had  
9 bidirectional communication with player  
10 devices?

11 A I don't recall such a remote  
12 control in 2004.

13 Q How about Wi-Fi remote controls,  
14 are you aware of any Wi-Fi remote controls in  
15 2004 that had bidirectional communication  
16 with player devices?

17 A If the player device were, for  
18 instance, a desktop or laptop PC and if the  
19 thing we're calling a Wi-Fi remote control  
20 was something akin to a pocket PC or a  
21 radio-equipped PDA, then yes.

22 Q Can you think of any other  
23 situations?

24 A Well, certainly using a tablet as a  
25 remote control. There was

1 wirelessly-equipped tablets at the time.

2 Not sure whether or not there  
3 were phones that would have used Wi-Fi in  
4 that way at the time, but a phone would have  
5 been able to communicate wirelessly  
6 ultimately to a computer.

7 Q Do you know when phones were able  
8 to communicate via Wi-Fi?

9 A Wi-Fi and phones started in that  
10 general timeframe, but I can't give a precise  
11 date.

12 Q Are you aware of any Bluetooth  
13 controls in 2004 that had bidirectional  
14 communication with player devices?

15 A I need to clarify. Are we talking  
16 about commercial products? Are we talking  
17 about patents that had been applied for?

18 What precisely are we talking  
19 about when you ask am I aware of?

20 Q Commercial products?

21 A Again, I think my statement about  
22 things like pocket PCs or tablets would apply  
23 there, that if that were programmed and used  
24 as a remote control, it certainly had the  
25 bidirectional communication capability.



1                   Indeed, anything running a  
2           Windows system has to have bidirectional  
3           conductivity so it can receive the display  
4           updates from the device to which its  
5           connected.

6                   So a Bluetooth-equipped pocket  
7           PC in that case could function in the same  
8           way as the Wi-Fi-equipped pocket PC to  
9           communicate with something else.

10           Q       What's something else that is an  
11           equivalent of a pocket PC?

12           A       No, with a -- let's say a PC that's  
13           on a network or that has locally stored  
14           music.

15           Q       So a pocket PC that has -- that is  
16           Wi-Fi-enabled to communicate with what other  
17           device where the other device would need to  
18           communicate back with the PC?

19           A       Basically with any other Wi-Fi  
20           device.

21                   And the exemplar I'm using is  
22           a desktop or a laptop computer, but it  
23           needn't be just that. It could be any  
24           Wi-Fi-equipped device.

25           Q       Okay.

1                   And in 2004, it is your  
2                   opinion that there would have been such  
3                   capability, bidirectional communication  
4                   ability via Wi-Fi network?

5                   A        Wi-Fi or Bluetooth or other  
6                   wireless communication techniques at the  
7                   time.

8                   Q        Okay.

9                                So going now to the '873  
10                   patent, which was marked as Exhibit 5, what  
11                   type of a remote control is disclosed in the  
12                   '873?

13                                (Deponent read document.)

14                   A        In column 2, starting at line 59,  
15                   we're told that it could be -- that it  
16                   preferably comprises a handheld portable  
17                   device.

18                                And some examples are given  
19                   here, such as a palmtop computer, an mp3  
20                   player or a remote control.

21                                There's some other language  
22                   elsewhere in the patent that gives some  
23                   additional detail about that possible device,  
24                   and I can go through all of it if you'd like,  
25                   but --

1           Q     Actually, the focus -- my question  
2     was with respect to that type remote control  
3     that is disclosed in the '873 patent.

4                     For example, is it an optical  
5     remote? Is it a radiofrequency-based remote?

6           A     Oh, I'm sorry, you're asking about  
7     the communication means of the remote?

8           Q     Yes.

9                     (Deponent read document.)

10          A     In column 5 at line 28, there's a  
11     discussion -- and this is in one aspect of  
12     the invention.

13                     It says, "The remote control  
14     is preferably in wireless communication with  
15     the set-top box when the remote control is  
16     not docked."

17                     That suggests that there are  
18     at least two communication means, one of them  
19     being wired and one of them being wireless.

20                     There's additional detail  
21     given elsewhere about the communication. And  
22     again, if you'd like me to bring up  
23     additional language in the spec, I can do  
24     that.

25          Q     What type of the wireless remote is

1 being disclosed in the '873?

2 (Deponent read document.)

3 A The language in column 9 starting  
4 at line 50 is discussing a portion of the  
5 device which is called a network transceiver.

6 And I believe this is  
7 referring to Figure 2 of the '873 patent.

8 So this is the dotted  
9 rectangle at the bottom of Figure 2 that's  
10 labeled "transceiver" and called out as  
11 element 24.

12 And in column 9, it says, "The  
13 network transceiver 24 preferably comprises a  
14 wireless network transceiver, such network  
15 transceiver conforming to the Bluetooth  
16 (trademark of Bluetooth SIG, Inc.) standard  
17 and/or conforming to the Wi-Fi (a trademark  
18 of the Wi-Fi Alliance) standard."

19 So we are taught that at least  
20 it could be Bluetooth or Wi-Fi.

21 Q So it's a cellular remote?

22 A No, cellular would be a different  
23 communication technician.

24 Q Could you elaborate?

25 A Certainly.

1                   So Bluetooth and Wi-Fi are  
2                   used for device communications, whereas a  
3                   cellular phone often will have more than one  
4                   radio in it.

5                   So we're used to having our  
6                   cellular phones able to talk Bluetooth to our  
7                   car and Wi-Fi to our computers, but that you  
8                   is not the radio that the phone uses to talk  
9                   to the tower.

10                  And so when you've heard of  
11                  standards like 3G, 4G and LTE and so forth,  
12                  those are the wireless communication  
13                  techniques that would be used for a phone to  
14                  speak to a cell tower.

15                  Q        Okay.

16                  So does the '873 disclose a  
17                  cellular remote, a remote that can  
18                  communicate cellularly?

19                  (Deponent read document.)

20                  A        Yes, it could be.

21                  Inasmuch as in the same  
22                  column, column 9, we are -- we're starting at  
23                  line 8, and it says, "The first device 13 may  
24                  comprise any of a plurality of different  
25                  types of devices. For example, the first

1 device 13 may comprise a handheld portable  
2 device such as a personal digital assistant  
3 (PDA), a palmtop computer, an MP3 player, a  
4 telephone or remote control for a  
5 music-rendering device. The first device may  
6 alternatively comprise a non-portable device,  
7 such as a desktop computer, a television or a  
8 stereo."

9 So this suggests that the  
10 inventors are envisioning -- inventor, I'm  
11 sorry, is envisioning a rather broad range of  
12 possible devices that 13 could be.

13 I will also refer to column  
14 14. Column 14 has a discussion starting at  
15 line 29 describing a cellphone 84 being used  
16 as a remote device.

17 And what's interesting about  
18 this is that this is describing that the  
19 cellphone shown here is a cellphone that does  
20 not have a radio that allows it to  
21 communicate directly with the second device,  
22 but rather the cellphone talks to the server  
23 apparently by means of a wireless data  
24 connection, and the player device talks to  
25 the same server.

1                   And so the communication is  
2           accomplished indirectly, but the same control  
3           functionality is provided.

4                   And there's a discussion  
5           starting at line 36 of column 14 about the  
6           network architecture that would enable a  
7           cellphone that was only talking to a tower to  
8           control the player device.

9           Q        So the remote control in Weel is  
10          able to directly connect to the Internet; is  
11          that right?

12                   MR. YAP:  Objection, form.

13                   (Deponent read document.)

14          A        It appears that the remote control  
15          is able to directly connect or to indirectly  
16          connect, but it has some means of connecting  
17          to the Internet.

18          Q        And by indirectly, what do you mean  
19          by that?

20                   (Deponent read document.)

21          A        Well, in the embodiment illustrated  
22          in Figure 1 of the '873 patent, the pathway  
23          16 shows a direct connection between the  
24          first device, which is the remote control,  
25          and the Internet.

1                   However, the spec talks about  
2                   the connection to the -- to the Internet  
3                   being preferably direct, but it also has some  
4                   other discussion that suggests that the  
5                   important point is that it somehow or other  
6                   be able to get to the Internet.

7                   Q       So by --

8                   A       For example, typically a device  
9                   that only has Bluetooth can't get directly on  
10                  to the Internet. It has to talk to something  
11                  else, which then has Internet conductivity,  
12                  because the Bluetooth communication in a  
13                  situation like that would be paired with  
14                  another device, like a computer or something  
15                  else, which would in turn have Internet  
16                  conductivity.

17                  And the functionality called  
18                  out in the spec in the claims would still be  
19                  available even if the connection involved  
20                  more than one hop.

21                  Q       Okay.

22                  And is there a reference to  
23                  this indirect connection to the Internet for  
24                  the remote control and the '873 patent?

25                  A       Well, what I would say is that the



1 discussion that the network transceiver could  
2 be Bluetooth instead of Wi-Fi, which I  
3 previously referred to in column 9, would  
4 suggest a mode of operation in which the  
5 connection was not directly to the Internet  
6 but was to some other device that was in turn  
7 connected to the Internet.

8 Q And are you assuming that the  
9 Bluetooth transceiver is the only  
10 communications chip in the device?

11 A Well, we're told that at least it  
12 has a network transceiver, and the network  
13 transceiver is described as Bluetooth and/or  
14 Wi-Fi, so that suggests that the inventor was  
15 considering the case where it was just  
16 Bluetooth, just Wi-Fi, or both.

17 Q Could I direct your attention to  
18 Figure 8 of the '873 patent.

19 A I have it.

20 Q Does -- what do you see being  
21 represented in Figure 8?

22 A In Figure 8, I see a discussion of  
23 being able to control -- being able to  
24 provide the functionality described in the  
25 spec by means of both what is called a local

1 device, which is the PDA in this figure,  
2 where the PDA is able to talk to the Internet  
3 and is also able to talk to the stereo, so it  
4 can exchange information with the remote  
5 server as well as exchanging information with  
6 the stereo, but the cellphone 84 is able to  
7 provide the control and other functionality  
8 even though it's not directly able to talk to  
9 the stereo.

10 And so those two abbreviations  
11 or acronyms, "WAN" and "LAN" -- WAN, W-A-N,  
12 is wide area network and LAN, L-A-N, is local  
13 area network. And so we can regard what is  
14 below that line as being the devices that  
15 either would be located in close proximity to  
16 one another in the consumer's home, for  
17 example, and we would regard the devices  
18 above the line as being the devices that  
19 don't necessarily have to be in close  
20 physical proximity but still have network  
21 conductivity.

22 And there's discussion in at  
23 least columns 13 and 14 of the topology  
24 that's illustrated in Figure 8.

25 Q Okay.

1 Does the remote control  
2 described in the '873 request playlists?

3 MR. YAP: Objection, form.

4 A We see discussion in column 15,  
5 starting at line 32, where it's discussing --

6 This is in the case of a cable  
7 television version of the system, but there  
8 is language here that says the remote  
9 control --

10 I'm sorry. It says "Playlists  
11 can be requested by the remote control 62 and  
12 can downloaded from the playlist server 10 by  
13 the via Internet 11," and there are other  
14 discussions in the spec that are similar to  
15 that.

16 Now, the claim, using claim 1  
17 as an exemplar, the claim does not actually  
18 say "requesting."

19 The claim 1 says "receiving on  
20 the first device a playlist."

21 Q And how does the receiving on the  
22 first device a playlist occur in the Weel  
23 '873 patent?

24 A That would be by whatever means of  
25 communication that that first device has to

1 the server, so the kinds of radios we've been  
2 talking about, potentially other means as  
3 well.

4 Q So the device would receive a  
5 playlist by the means of communications that  
6 we've been discussing, which is cellular  
7 means or Wi-Fi means, for example, right?

8 A Or Bluetooth.

9 Q Or Bluetooth?

10 A Or possibly other means as well.

11 Q Right.

12 But how would it get the list  
13 in the first place? Would not the remote  
14 control itself need to request the list in  
15 order to receive it?

16 A The spec speaks of requesting. But  
17 if we are just looking at the language in the  
18 claim, and this is perhaps a legal question  
19 as much as it is an engineering question, but  
20 if I am simply given the language of the  
21 claim, of claim 1, for instance, what that  
22 would suggest is that any means by which the  
23 playlist server would provide that playlist  
24 to the device, which could be, request, it  
25 could be streamed, it could be simply a

1 remote file system where the file appears --

2 If it's a pocket PC, they can  
3 talk to a remote file server where there's no  
4 real request. The file just appears as if  
5 it's a local file.

6 All of these would work across  
7 those kinds of radios if we configure the  
8 system correctly.

9 Q But the file or the playlist  
10 wouldn't magically appear on its own.

11 There has to have been an  
12 initiating step, a requesting step that I  
13 want that file or that playlist or that song,  
14 right?

15 A Well, if --

16 Q The --

17 A The song -- I'm sorry.

18 Let's make a distinction  
19 between how we get a song and how we get a  
20 playlist, because playing a song is  
21 presumably in response to the user ultimately  
22 doing something, indicating that the user  
23 would like to hear that song. So there is  
24 some agency with respect to that.

25 With respect to receiving a

1 playlist, which is the language of the claim  
2 as opposed to requesting a playlist, which  
3 certainly is one way of receiving, we could,  
4 if we are engineers or computer scientists,  
5 imagine a variety of communication protocols  
6 which would result in a playlist arriving at  
7 the remote control that might or might not  
8 require something that we would identify as a  
9 request going to the server.

10 I mean, the server could  
11 simply broadcast it on a particular network  
12 port.

13 There could be a variety of  
14 communication protocols that would result in  
15 the receipt of the playlist.

16 You know, if it's a phone, we  
17 could use SMS to send the playlist to that  
18 particular phone, and it would indeed receive  
19 the playlist by that means, and there is no  
20 request associated with that.

21 Q In the context of the '873, is  
22 there a request for a playlist by the remote?

23 A The specification describes a --  
24 one or more instantiations of the claimed  
25 invention which do make a request.

1                   The claim -- and again, I'm  
2                   referring to claim 1. The word "request"  
3                   does not appear in the context of receipt of  
4                   the playlist in the claim.

5                   MR. YAP: Sorry to interrupt.  
6                   It's been about an hour, so if you think  
7                   there's a good natural point to take a break.

8                   Q     Do you need to take a break now or  
9                   can we --

10                  A     I wouldn't mind stretching if we  
11                  could take five minutes.

12                  MR. YAP: That would be good.

13                  MS. GLADSTEIN: Why don't we  
14                  take a break.

15                  THE VIDEOGRAPHER: The time is  
16                  2:27 p.m. We're going off the record. This  
17                  will be the end of Disk 2 in the deposition  
18                  of V. Michael Bove, Jr.

19                  (Recess.)

20                  THE VIDEOGRAPHER: This is  
21                  Disk No. 3 in the deposition of V. Michael  
22                  pro, Jr.

23                  We are back on the record.

24                  The time is 2:46 p.m.

25                  Q     Dr. Bove, during the break did you

1 have any substantive discussions about the  
2 subject matter of this deposition with  
3 counsel?

4 A No.

5 Q Before the break, you said that in  
6 2004 there was no commercially available  
7 mobile device that was directing a network  
8 player device to play a media item from  
9 Quantum server.

10 Do you recall that?

11 A I think what I said is there were  
12 commercial devices that could be used in that  
13 way.

14 Q And are you aware of there being  
15 such usage of those devices?

16 A Well, I am aware that things like  
17 PDAs and pocket PCs were used as remote  
18 controls.

19 Q But specifically as remote controls  
20 to direct a networked other device to play,  
21 say, music downloaded from a server, were you  
22 aware of any such usage?

23 A I'm not aware of a commercial  
24 product that was marketed specifically with  
25 that usage as part of the marketing.



1           Q     Are you aware of anyone suggesting  
2           that a PDA enabled to communicate with  
3           another networked to make that network device  
4           play media obtained from the Internet?

5                     MR. YAP:  Objection, form.

6           A     Well, I am aware of a project that  
7           wasn't mine at MIT called the Media Bank  
8           which was a centralized --

9                     Actually, it was a distributed  
10          set of centralized servers for media,  
11          including video and mp3 files and things of  
12          that sort, digital music files, that other  
13          devices could talk to the media bank and  
14          cause the playout of the media.

15                    And that project was not mine.  
16          It was run by Henry Holtzman and Andrew  
17          Lippman, L-I-P-P-M-A-N, who are my colleagues  
18          at the Media Lab.  And there definitely were  
19          applications of that in which one would  
20          access the Media Bank through one device but  
21          cause content to play elsewhere.

22                    That was not a commercial  
23          product.

24          Q     And what was the timeframe of that  
25          Media Bank project?

1           A     I believe that was the late 1990s.

2           Q     But that project wasn't with  
3     respect to a portable device, remote device?

4           A     My recollection was that that  
5     product was really agnostic as to -- that  
6     system was agnostic as to the form of the  
7     product that was being used to access it.

8           Q     So it was just a bunch of code?

9           A     It was a bunch of code.

10          Q     And do you know why the project was  
11     terminated?

12          A     I think all of the grad students  
13     working on it got their doctorates and got  
14     jobs.

15          Q     Thank you.

16                     Going back -- strike that. So  
17     the record is clear, you said that the Media  
18     Bank project was agnostic as to the types of  
19     devices that would be able to direct one  
20     another to obtain media from a server and  
21     direct another device to play the media.

22          A     Right.

23                     It was simply a matter of  
24     being able to make a network connection by  
25     whatever means, wired or wireless, to the

1 system running the Media Bank software.

2 Q So would it be fair to say that the  
3 Media Bank project did not involve the use of  
4 a portable device directing a player device  
5 to obtain media from a server?

6 MR. YAP: Objection, asked and  
7 answered.

8 A I don't think it would be fair to  
9 say that.

10 Q It would not be?

11 A No.

12 Q Could you correct that statement?

13 A Well, I would say that the Media  
14 Bank was capable of being controlled with  
15 portable devices as well as hardwired devices  
16 on a wired network, and it was capable  
17 causing media to play out in one or another  
18 destination.

19 But the form of the device was  
20 really irrelevant as long as the device was  
21 capable of making an Internet connection to  
22 the Media Bank servers.

23 Q So to your knowledge, did the Media  
24 Bank project involve the use of a portable  
25 device directing a player device to obtain a

1 media item from a server?

2 MR. YAP: Objection, asked and  
3 answered.

4 A I'm fairly certain people connected  
5 to it all the time with laptops. I don't  
6 know if we're going to call that a mobile  
7 device or not.

8 Q With respect to the researchers who  
9 participated in the Media Bank project, what  
10 was the level of their experience and  
11 education?

12 A They ranged from MIT undergraduates  
13 who were maybe sophomores or juniors who were  
14 writing code to Ph.D. students to the  
15 associate director of the Media Lab, who had  
16 been there since before the founding of the  
17 lab.

18 So a very broad range of  
19 expertise.

20 Q Who is the associate of the Media  
21 Bank at the time?

22 A Of the --

23 Q The associate dean of the media --

24 A It would actually be the associate  
25 director of the Media Lab.

1 Q Director.

2 A Was Andrew Lippman, L-I-P-P-M-A-N,  
3 and it was primarily his project, although  
4 another researcher, Henry Holtzman, ended up  
5 both doing and directing a significant  
6 portion of the technical work behind it.

7 And there were several  
8 bachelor's, master's and doctoral students  
9 who did pieces of the system as well,  
10 resulted in a number of theses and a number  
11 of publications.

12 Q Is Andrew Lippman still at MIT?

13 A Yes.

14 Q And Henry Holtzman, is he still at  
15 MIT?

16 A Yes, although he's the gentleman I  
17 referred to earlier as being on leave at  
18 Samsung this semester.

19 Q Okay.

20 What, in your opinion, is  
21 the -- strike that.

22 What are the qualifications of  
23 a person of ordinary skill in the art with  
24 respect to the '873 patent?

25 A I'd say -- and this is identical to

1        what I discussed in section Roman IV of my  
2        declaration, how one would have at least a  
3        bachelor's degree in computer science or  
4        electrical engineering and at least a year of  
5        practical experience with networked  
6        multimedia.

7            Q        And why do you say at least a year?  
8        Do you need more than a year?

9            A        Well, I think that's probably the  
10       minimal experience. We can argue about a  
11       month or weeks, but generally about a year of  
12       practical experience would enable both --  
13       would enable one to understand the technology  
14       and also to understand the general technical  
15       landscape of the field.

16                    And further experience  
17       probably wouldn't change one's opinion about  
18       the relevant issues.

19            Q        So would a person of ordinary skill  
20       in the art need more than one year of  
21       practical experience or would one year  
22       suffice?

23            A        I think one year would suffice, but  
24       I would not say that one year plus one day  
25       would suddenly make someone not a person of

1 ordinary skill in the art anymore.

2 Q In order for a person to be  
3 considered of having ordinary skill in the  
4 art of the '873 patent, would it be fair to  
5 say that that person would need to have at  
6 least a bachelor's degree in computer science  
7 and one year of practical experience?

8 A At least a bachelor's degree in  
9 computer science or electrical engineering.

10 Q In computer science or electrical  
11 engineering, sorry.

12 A And if we think of it as a  
13 threshold, one would cross that threshold at  
14 about one year. One would have enough  
15 practical experience that I would consider  
16 such a person of ordinary skill in the art.

17 Q Let's take this in two parts.

18 Would you agree that the  
19 minimum educational level that a person of  
20 ordinary skill in the art would be required  
21 to have is a bachelor's degree in computer  
22 science?

23 A The minimum --

24 Q Or electrical engineering.

25 A To be of ordinary skill in the art,

1       yes.

2               Q     And that person should have one  
3     year of practical experience with networked  
4     multimedia?

5               A     At minimum, yes.

6               Q     So a person who has a Ph.D. in  
7     computer science or electrical engineering  
8     and say ten years of practical experience of  
9     network multimedia, would that person be of  
10    ordinary skill in the art?

11              A     With respect to the skill in the  
12    art pertaining to the '873 patent, my belief  
13    is that there is a certain level of education  
14    and experience beyond which one would  
15    continue to have the same general  
16    understanding.

17                        So I'm looking at this as a  
18    threshold, that it would not be the case that  
19    if one received a master's degree, one  
20    suddenly would understand the world  
21    completely differently and would disagree  
22    with one who had only a bachelor's and one  
23    year of experience.

24                                So that's why I used the words  
25    "at least."



1           Q     So it's your opinion that a -- the  
2     hypothetical person of ordinary skill in the  
3     art, whether that person has a bachelor's  
4     degree and one year of practical experience  
5     or that person has a Ph.D. and ten years of  
6     practical experience, that person would have  
7     the same level of understanding that was  
8     disclosed in the '873?

9           A     My --

10                         MR. YAP:  Objection,  
11     mischaracterizing.  Go ahead.

12           A     What I would say is that beyond a  
13     year of experience or at least a bachelor's  
14     degree beyond that point, one would have  
15     sufficient understanding and be considered a  
16     person of ordinary skill in the art.

17           Q     Would you consider yourself to be a  
18     person of ordinary skill in the art?

19           A     I would.

20           Q     Would you consider yourself to be a  
21     person of extraordinary skill in the art?

22           A     I'm not quite sure what the  
23     implications of being of extraordinary skill  
24     in the art --

25                         I mean, the measure is really

1 just does one have sufficient understanding  
2 of the technology and the language and the  
3 landscape to achieve a level of understanding  
4 that other people of this much education and  
5 experience would agree with.

6 And I feel that I have the  
7 same understanding of this at that level of  
8 relevance.

9 Q Do you think that you and a student  
10 of yours would have the same understanding of  
11 the '873 patent, a student of yours was -- an  
12 undergraduate student -- take it back.

13 A student of yours who is  
14 starting a master's program, so a student who  
15 has completed his bachelor's studies.

16 A If that student had also had  
17 practical experience in the relevant area.

18 Q How much practical experience?

19 A At least a year, then I would say  
20 yes.

21 Q So somebody with a bachelor's and  
22 at least one year of practical experience  
23 would have the same understanding of the '873  
24 patent as yourself, who has a Ph.D. and  
25 20-plus years of experience?

1           A     I think with respect to the  
2     relevant issues in this case, yes.

3           Q     What is your understanding of the  
4     concept of determining whether the patent is  
5     obvious over the prior art or not?

6           A     Well, would this be with respect to  
7     a single item of art or combinations of  
8     elements?

9           Q     In general, how do you go about  
10    determining whether the prior art renders  
11    obvious that which is claimed in a patent?

12          A     Well, my understanding is one has  
13    to think about multiple factors, one of them  
14    being the similarities and differences  
15    between the piece of prior art and the  
16    claimed subject matter of the invention we're  
17    considering.

18                   I think one has to understand  
19    really the scope and the content of the piece  
20    of prior art being considered.

21                   I think one has to have a  
22    sense of what it means to be one of  
23    ordinary -- of ordinary skill in the art,  
24    because that's the hypothetical person who is  
25    making these sort of considerations.

1                   And if there is some evidence  
2                   of nonobviousness that's apparent, I think  
3                   one would have to consider that as well.

4                   So if, for example, one -- I  
5                   believe one of ordinary skill in the art  
6                   would look at a claim element in this patent  
7                   and look at something disclosed in some other  
8                   prior art reference and say that what was  
9                   disclosed in the prior art reference was the  
10                  same as that claim element, then that would  
11                  be -- that would make that element obvious to  
12                  one of ordinary in the art.

13                  I think also one could combine  
14                  multiple elements if they were known  
15                  elements, they were combined in known waves  
16                  and the results are predictable, and that  
17                  would be a test as well.

18                  And presumably one has a  
19                  mental model of what one of ordinary skill in  
20                  the art would understand this intention to  
21                  be, what one of ordinary skill in the art  
22                  would understand the pieces of prior art to  
23                  be, and one of ordinary skill in the art  
24                  would have a general understanding in the  
25                  field.

1           Q     When you're looking at a number of  
2     different prior art publications, is it your  
3     understanding that there has to be motivation  
4     to combine these various prior art  
5     publications in order for the collective of  
6     these prior art publications to render  
7     obvious what is claimed in a patent?

8           A     Well, it's -- again, I'm not an  
9     attorney, and so I'm --

10          Q     I'm just looking for your  
11     understanding.

12          A     I'm doing this based upon what I  
13     have been instructed by counsel and what I've  
14     been instructed in past matters.

15                     And so it is certainly  
16     possible to argue that there is no motivation  
17     to combine two pieces of art perhaps because  
18     they're from vastly different fields, and one  
19     of ordinary skill in the art with respect to  
20     '873 might not have any understanding of the  
21     field from which another piece of art  
22     derived.

23                     It may be that -- that they  
24     simply are so different in terms of the scope  
25     of the two pieces of prior art that it

1 wouldn't be apparent to one of ordinary skill  
2 in the art to take those two pieces and  
3 combine them.

4                   It might be the case that  
5 there is something in the reference that  
6 specifically teaches away from combining this  
7 element with that element.

8                   But absent those, the question  
9 is would one of ordinary skill in the art  
10 looking at those two references say if I --

11                   First of all, it makes sense  
12 to take these two pieces and put them  
13 together; and second, that I know in advance  
14 what the outcome would be. It's predictable.

15           Q       Okay.

16                   So back to the '873 patent,  
17 Exhibit 5, before the break we were talking  
18 about whether the portable device has direct  
19 communications with the Internet or with a  
20 server.

21                   I wanted to direct your  
22 attention to Figure 1. Please tell me  
23 whether you agree that the first device in  
24 Figure 1 has direct communications or is able  
25 to directly connect to the Internet.

1 (Deponent read document.)

2 A I'm going to refer to the language  
3 in column 8, starting at line 51, which is  
4 the text that discusses Figure 1.

5 (Deponent read document.)

6 Q So --

7 A So what we are told is that  
8 device -- first device 13 is in  
9 communications with the Internet, and that  
10 conductivity is indicated by the line labeled  
11 16. And indeed we're told it's bidirectional  
12 communication.

13 Now, two comments about that.  
14 One of them is this is described as a  
15 preferred embodiment. This is not described  
16 as the only possible embodiment.

17 The second thing I'll note is  
18 that there is nothing here indicating that 16  
19 is a single wire. And indeed it typically  
20 wouldn't be. There would be routers, there  
21 would be other things as part of arc 16.

22 So an Internet connection,  
23 there is not -- you know, there isn't a wire  
24 going from first device to the Internet, and  
25 there might not even be a direct radio link

1 from it to the Internet, but it is able  
2 bidirectionally to exchange information  
3 across the Internet, so it has a means of  
4 talking to the Internet.

5 Q And the connection need not be  
6 wired connection?

7 A Right. Wired or wireless.

8 Q Wired or wireless.

9 So in fact --

10 A Or optical. It could be anything.

11 Q So going back to Figure 1, would  
12 you agree that the first device is able to  
13 directly communicate with the Internet and  
14 the Internet is able to communicate with the  
15 first device?

16 A The specific language in column 8  
17 is "also in communication with the network of  
18 a first device."

19 So I agree that it is in  
20 communication with the network. I don't see  
21 language that says the communication is of  
22 necessity direct, but it has the ability to  
23 exchange information with the network.

24 Q Do you see any intermediaries in  
25 between the line that connects the box of the



1 first device with the oval of the Internet?

2 A I don't see anything illustrated in  
3 Figure 1 that's an intermediary.

4 Q Looking at Figure 1, do you agree  
5 that the first device can communicate with  
6 the Internet without going through the second  
7 device?

8 A Well, there is -- there are two  
9 separate communication paths. There's the  
10 dotted one in 18 going between the first  
11 device and the second device, and there's the  
12 solid one, 16, going between the first device  
13 and the Internet.

14 So that suggests that there is  
15 the possibility of the first device talking  
16 to the Internet without going through the  
17 second device.

18 Q Okay.

19 Does the remote control of the  
20 '873 patent download playlists?

21 A It receives playlists.

22 Q It doesn't download them?

23 A It can download them, but what we  
24 are told in the claim there is -- claim 1,  
25 for example, is that it receives them.

1                   In other claims, like 17,  
2                   we're told that it obtains them.

3                   Q       Now, if you could -- if you could  
4                   look to column 15 of the '873 at around  
5                   line 32 where it says that "Thus, playlists  
6                   can be requested by the remote control and  
7                   downloaded from the playlist server via the  
8                   Internet thereto.

9                               "Similarly, songs may be  
10                   downloaded to the remote controls -- to the  
11                   remote control 62."

12                   A       Right.

13                               This is language that I,  
14                   myself, cited before the break. And so I  
15                   used this as an example of where the  
16                   specification does say "request." And so  
17                   that means at least the remote control can  
18                   request playlists.

19                               This particular instantiation  
20                   is a somewhat unusual one, because this one  
21                   is a set-top box for a television or stereo.  
22                   So this is one of several embodiments  
23                   discussed here.

24                   Q       In other words, the remote control  
25                   that's described in the '873 is capable of

1 downloading playlists or songs?

2 MR. YAP: Objection,

3 mischaracterizes.

4 A At least in some embodiments.

5 Q Does the remote control of the '873  
6 display playlists?

7 (Deponent read document.)

8 A Well, we're told and shown in, for  
9 example, Figure 2 that the remote control has  
10 a display.

11 We are told in the claims  
12 that -- I'll use the precise word. The media  
13 item -- media item identifier is selected on  
14 the remote control.

15 And so although the claim --  
16 claim 1, for example, does not explicitly  
17 call out that it is displayed, it's  
18 reasonable to understand that in order to be  
19 selectable, items on the display list must  
20 have to be displayed on the remote.

21 Q Thank you.

22 MS. GLADSTEIN: The court  
23 reporter asks that we go off the record for  
24 just one minute. If we could just hold on  
25 that, would be great.

1 THE VIDEOGRAPHER: The time is  
2 3:15 p.m. We are going off the record.

3 (Recess.)

4 (Exhibit 7 marked for  
5 identification.)

6 THE VIDEOGRAPHER: We are back  
7 on the record. The time is 3:24 p.m.

8 BY MS. GLADSTEIN:

9 Q Dr. Bove, before we had to go on a  
10 short break due to technical issues, we were  
11 talking about the '873 patent, and I believe  
12 I asked you whether the remote control  
13 downloads songs according to the '873.

14 A I think you asked me if it  
15 downloads playlists.

16 Q Okay.

17 How about whether the remote  
18 control downloads songs?

19 (Deponent read document.)

20 A Well, one of the modes in operation  
21 and the one illustrated in Figure 3 contains  
22 an element 37, which is the first device  
23 receiving the songs.

24 Q And the first device would be --

25 A Would be the remote control.

1           Q     -- the remote control.

2                     And there is a parallel mode  
3     of operation in Figure 4 which has a block  
4     49, which is the second device receiving the  
5     songs.

6                     Now, again, just to be clear  
7     on the record here, I'm speaking to the  
8     specification and not to any specific claim.

9           Q     Is the remote control capable of  
10    playing songs on -- itself on the remote  
11    control in the '873?

12           A     Yes.

13                     In column 11, the relevant  
14    language appears starting at line 41. And  
15    again, this is an embodiment. This is not of  
16    necessity a property of the remote control in  
17    every embodiment.

18                     But the embodiment being  
19    discussed here says the selected songs are  
20    played by the first device 13, and then in  
21    the next paragraph, it says the songs may be  
22    played via one or more speakers that are part  
23    of the first device 13.

24           Q     And that's not the only section of  
25    the '873 where the remote's ability to play

1 songs on itself is described, correct?

2 And I direct your attention to  
3 column 15 at about line 4 -- 39.

4 (Deponent read document.)

5 A Yes. This language also talks  
6 about his listening to songs on the remote  
7 control.

8 Q Now, is the remote control in  
9 communication with media player?

10 MR. YAP: Objection, form.

11 A Not necessarily at all times. And  
12 in the cellphone example we discussed earlier  
13 today, it's never in direct connection with  
14 the media player. It talks to the server,  
15 and the server communicates with the media  
16 player.

17 Q Let me just make sure that the  
18 record is clear.

19 My question was whether the  
20 remote control is in communication with the  
21 media player. I didn't ask for whether it's  
22 direct or indirect, just it communicates with  
23 a media player.

24 A Yes.

25 MR. YAP: Objection, form.

1           Q     How does it communicate with the  
2     media player?

3           A     Wirelessly.

4           Q     Is the communication --

5           A     Actually, I'd like to append to  
6     that at least wirelessly. It might be a  
7     combination of wired and wirelessly.

8           Q     Okay.

9                     Is the communication  
10    unidirectional or bidirectional?

11          A     Bidirectional.

12          Q     Or both?

13          A     It's my understanding that it's  
14    generally bidirectional.

15          Q     Can it be unidirectional?

16          A     In column 9, starting at line 4, we  
17    learn that the first device may be an either  
18    unidirectional or bidirectional communication  
19    with the second device.

20          Q     Looking at Figure 4, does the  
21    remote control direct a media player device  
22    to play a media item selected at the remote  
23    control?

24                     MR. YAP: Objection, form.

25          A     Simply looking at this figure, the

1 relevant boxes are 49 and 50, and they show  
2 that the second device receives the songs and  
3 they show that the songs are played. This  
4 does not show a direction. Just in this  
5 diagram.

6 Now, the text may describe in  
7 more detail.

8 Q What does box 47 tell you?

9 A It says it sends information  
10 representative of the selected songs from the  
11 first device to the second device, which  
12 means it enables the song to be played on the  
13 second device, but it doesn't actually say  
14 that the song is played as a result of that  
15 step.

16 Q So when we get to box 50 that says  
17 play the selected songs on the second device,  
18 that doesn't tell you that the remote control  
19 directed a media player to play a selected  
20 song.

21 A Well, it's interesting, because  
22 this doesn't ascribe agency. This says that  
23 a song is played on the second device, but it  
24 doesn't say as directed by the first device.

25 And indeed if we go to the



1 discussion in column 12 of this figure, the  
2 language starts on line 33 and it simply says  
3 the selected song is played on the device 14  
4 as shown in block 50 and discussed above.

5 So just the diagram and this  
6 piece of language don't say in exactly so  
7 many words that the first device plays the  
8 song on the second device.

9 Q Would a person of ordinary skill in  
10 the art understand that the first device  
11 directs the second device to play a selected  
12 media item?

13 A Yes, I think one of ordinary skill  
14 in the art would understand that.

15 My objection was simply that  
16 neither the diagram nor this language in  
17 column 12 expressly makes that statement.

18 Q Could a player not play as directed  
19 by the remote?

20 MR. YAP: Objection, form.

21 A Well, if one were practicing  
22 claim 1, for example, claim 1 would upon  
23 completion of all of the steps result in the  
24 second device receiving a media item but not  
25 necessarily playing it.

1 Q Why do you say that?

2 A Because there is not an explicit  
3 element in here that says directing from the  
4 first device to second device to play said  
5 media item.

6 It simply says directing from  
7 the first device the second device to receive  
8 a media item.

9 Q So what would be the reason why a  
10 player device would not play as directed by  
11 the remote?

12 A Perhaps because it's saving the  
13 song to play at some later time.

14 Q Any other reason?

15 A Perhaps because the person building  
16 it had been instructed to follow exactly the  
17 elements of claim 1 and do no more than that.

18 (Exhibit 8 marked for  
19 identification.)

20 BY MS. GLADSTEIN:

21 Q I am handing you what has been  
22 marked as Exhibit 8.

23 MR. YAP: Sorry, counsel, did  
24 I miss Exhibit 7 somewhere?

25 MS. GLADSTEIN: Let me just

1 put it on the record.

2 So Exhibit 8 is US Patent

3 No. 6,622,018 to Erekson.

4 BY MS. GLADSTEIN:

5 Q And now I'm handing you what has  
6 been marked as Exhibit 7, which is a document  
7 bearing Publication No. US2002/0087996 to Bi.

8 Have you seen Exhibit 7  
9 before?

10 A Yes.

11 Q And when was the last time you saw  
12 it?

13 A I believe yesterday.

14 Q Have you seen Exhibit 8?

15 A Yes.

16 Q And when was the last time you saw  
17 Exhibit 8?

18 A I believe yesterday.

19 Q Okay.

20 Now, with respect to  
21 Exhibit 7, which I will also refer to as "Bi"  
22 interchangeably, because the first inventor  
23 is Dapeng Bi, do you understand that the  
24 navigator 260 of Bi is a remote control that  
25 communicates with an audio-video player

1 application 151 running on a computing  
2 platform 100?

3 A We learn in paragraph 18 of the Bi  
4 reference that the interactive remote control  
5 device 260, also referred to as the navigator  
6 260, communicates with an audio or video  
7 player application 151 running on a computing  
8 platform 100 such as a personal computer  
9 set-top box or Internet appliance.

10 Q Does the navigator 260 of Bi  
11 communicate with data server 102?

12 (Deponent read document.)

13 A Navigator 260 does not appear to  
14 communicate directly with data server 102.

15 Q How does navigator 260 communicate  
16 with the data server?

17 A By means of the application running  
18 on element 100.

19 Q Which is the computing platform?

20 A The computing platform.

21 Q So that navigator 260 of Bi does  
22 not directly communicate were the data server  
23 102?

24 MR. YAP: Objection, form.

25 A That is correct, does not directly

1 communicate.

2 Q Does the navigator 260 of Bi  
3 communicate with the Internet 101?

4 A Not directly.

5 Q Does the navigator 260 obtain  
6 content from the data server?

7 A Can we clarify what is meant by  
8 "content" in that question?

9 Q A playlist, a song, a video.  
10 (Deponent read document.)

11 A Navigator 260 receives information  
12 from the computing platforms, at least some  
13 of which originates with data server 102.

14 Q But navigator 260 does not itself  
15 obtain songs or videos from the data server;  
16 is that right?

17 A It directs computing platform 100  
18 to do so.

19 Q But it itself has no ability to go  
20 directly to the data server to obtain a song  
21 or a video item?

22 A As shown in these figures, it has  
23 no ability to communicate directly with data  
24 server 102 to do that.

25 Q Is there any description in the Bi

1 application itself as to whether or not the  
2 navigator has the ability to directly go to  
3 the data server to obtain content?

4 (Deponent read document.)

5 A It has the ability to direct the  
6 software and the computing platform to do so.

7 Q What would the navigator 260 need  
8 to have in order to obtain content from the  
9 data server or the Internet itself directly?

10 A It would need to have the ability  
11 to connect wirelessly to the Internet.

12 Q And does Bi provide such capability  
13 to the navigator?

14 A It illustrates wireless data  
15 communication, but it illustrates only  
16 wireless data communication to computing  
17 platform 100.

18 Q In 2004, would a person of ordinary  
19 skill in the art reading Bi have been  
20 motivated to redesign the navigator 260 to  
21 communicate directly with the data server or  
22 the Internet?

23 A Well, the opinion that I was asked  
24 to give with respect to Bi was not  
25 specifically that so much as whether it would

1 be obvious to one of ordinary skill in the  
2 art effectively to employ a different device  
3 as navigator 260.

4 Q Do you have an opinion on whether a  
5 person of ordinary skill in the art reading  
6 Bi in 2004 would have been motivated to  
7 redesign the navigator 260 to communicate  
8 directly with data server 102 or the Internet  
9 101?

10 MR. YAP: Objection, outside  
11 the scope.

12 A I haven't previously been asked to  
13 give an opinion on redesigning the navigator  
14 as opposed to implementing the navigator on  
15 another device.

16 Q So sitting here today, you have no  
17 opinion whether a person of ordinary skill in  
18 the art would have been motivated to redesign  
19 navigator 260 to get it to communicate with  
20 the Internet or the data server directly?

21 MR. YAP: Objection, outside  
22 the scope.

23 A One of ordinary skill in the art  
24 understanding that the navigator itself is  
25 essentially a computing platform in its own

1 right and has a wireless communication  
2 interface associated with it would understand  
3 that it would certainly be possible for that  
4 device to communicate with the Internet as  
5 opposed to communicating with computing  
6 platform 100.

7 Q My question is a little different.

8 Would a person of ordinary  
9 skill in the art have any motivation to alter  
10 the navigator 260 and give it direct  
11 communication capability with the Internet or  
12 the data server?

13 MR. YAP: Objection, scope.

14 A I can imagine application scenarios  
15 in which it would potentially make sense to  
16 do that.

17 Q But in 2004, the relevant  
18 timeframe, what would have been the  
19 motivation to one of skill in the art to  
20 change the navigator 260 of Bi?

21 A Well, one of ordinary skill in the  
22 art would, first of all, understand that  
23 navigator 260 needn't be a custom-built  
24 device.

25 It could have been implemented



1 as a PDA. It could have been implemented on  
2 the phone. It could have been implemented as  
3 a pocket PC, because each of those contains  
4 all of the necessary elements to perform the  
5 functions of 260.

6 And in implementing 260 as one  
7 of those devices, one would gain the ability  
8 to communicate directly with the Internet.

9 Q Does Bi itself disclose the  
10 motivation to connect the navigator directly  
11 to the Internet or the data server?

12 A I believe the Bi reference is  
13 silent on that point.

14 Q Let's look at Exhibit 8. It's the  
15 patent to Erekson.

16 The remote disclosed by  
17 Erekson does not receive any media content;  
18 is that right?

19 (Deponent read document.)

20 A I don't see any reference in the  
21 Erekson reference -- the Erekson document,  
22 Exhibit 8, to receiving media content on the  
23 remote control device.

24 Q Now, Erekson's remote does not  
25 receive any playlists, does it?

1 (Deponent read document.)

2 A We're simply told that there's a  
3 menu of commands, but it doesn't describe  
4 precisely what they are.

5 Q But there is no description that  
6 there are any playlists that would be  
7 included on the menu?

8 A There's no description in the  
9 reference, although one of ordinary skill in  
10 the art would understand that this remote  
11 could be used to select an item from the  
12 playlist if it had one on the screen.

13 Q Erikson's remote also does not  
14 receive any songs; isn't that right?

15 A The Erikson reference does not  
16 appear to be describing receiving songs in  
17 the remote.

18 Q Does Erikson disclose sharing of  
19 media content between the remote control and  
20 devices being controlled?

21 A It does not appear to describe  
22 that.

23 Q Does Erikson disclose sharing of  
24 media content between the controlled devices?

25 A So just to clarify, is the question

1       whether two devices that are controlled by  
2       this can be commanded to share media content  
3       between them?

4             Q       So the question is whether Erekson  
5       discloses sharing of media content between  
6       the devices that are being controlled by the  
7       remote of Erekson.

8             A       Although it doesn't describe  
9       specifically doing that, one would understand  
10      that if the devices are capable of doing it  
11      and being commanded to do it, this could be  
12      the remote control for initiating that  
13      process?

14            Q       But there is no disclosure in  
15      Erekson that media content can be shared  
16      between the controlled devices?

17            A       Well, it does describe controlling  
18      groups of devices that need to communicate  
19      with one another, such as a television and a  
20      VCR or a stereo and a CD player, so this  
21      command -- the command for the CD player to  
22      play through the stereo could be issued as a  
23      result of using this remote.

24                        So that's described in  
25      column 1.

1 Q Where in column 1?

2 A In the background art where it's  
3 describing the kinds of problems that  
4 then-existing remote controls have to  
5 address, it lists examples of groups of  
6 devices, such as televisions and VCRs and  
7 stereos, tape players, compact disk players.

8 Q Sorry, could you point me to the  
9 line --

10 A This is the discussion -- the first  
11 paragraph of Background Art.

12 Q So this is where the -- where  
13 Erikson describes problems in the art that  
14 Erikson is trying to solve?

15 A Yes.

16 Q Okay.

17 And Erikson says, Consider,  
18 for example, the number of devices and  
19 appliances in the typical living room or  
20 family room of a residential dwelling," and  
21 it lists those devices: Lamps, light  
22 switches, a thermostat and consumer  
23 electronic devices such as televisions,  
24 videocassette recorders and stereos, some of  
25 these devices themselves comprising multiple

1 devices, such as compact disk players, tape  
2 players, et cetera.

3 So where do you read the  
4 sharing of content between multiple devices?

5 A Well, what I'm saying is that this  
6 discussion implies that an application that a  
7 user might want performed will require  
8 multiple devices to work together, and this  
9 remote control is addressed to being able to  
10 control all of the devices required in that  
11 desired scenario with a single remote.

12 Q You would agree with me that the  
13 paragraph that you're pointing to has no  
14 discussion of sharing of media content  
15 between these devices?

16 A Well, except --

17 MR. YAP: Objection. Asked  
18 and answered.

19 A I was about to say, except to the  
20 degree that, for example, the compact disk  
21 player or the tape player could be said to be  
22 sharing content with the stereo or the VCR  
23 can be said to be sharing content with the  
24 television.

25 Q Could you explain to me how a

1 compact disk player or a tape player would be  
2 sharing content with each other or --

3 A Well --

4 Q Let's take a step back.

5 What is it that a compact disk  
6 player or a tape player would be sharing  
7 content with -- content with?

8 A The reproducing device. So  
9 they're -- these are players -- or in some  
10 cases receivers -- which themselves cannot  
11 reproduce sounds or pictures for a viewer or  
12 listener.

13 And so in order to provide the  
14 functionality that a user would want, it  
15 would be necessary to control the destination  
16 device to select the input connected to the  
17 source device, and then to command the source  
18 device to play through the destination  
19 device.

20 Admittedly, that's not the  
21 same kind of content-sharing that we've been  
22 talking about up till now. I'm merely  
23 illustrating that it's clear that the  
24 inventor understands applications in which a  
25 user -- a desired user scenario will involve

1 commanding multiple devices to work together.

2 Q Dr. Bove, the sentence that I read  
3 into the record where Erekson says, The  
4 number of devices and appliances in the  
5 typical living room or family room of a  
6 residential dwelling: Lamps, light switches,  
7 a thermostat and consumer electronic devices,  
8 such as televisions, videocassette recorders  
9 and stereos, some of these devices themselves  
10 comprising multiple devices such as compact  
11 disk players, tape players, et cetera, merely  
12 recites a number of devices that are  
13 typically -- can be found in a residential  
14 living room and notes that some devices  
15 comprise multiple devices.

16 So if we look back to the  
17 timeframe of Erekson, which was filed in  
18 April of 2000, if I recall correctly, compact  
19 disk players and tape players were sometimes  
20 integrated devices where you would have both  
21 a tape deck and a CD player in the same  
22 device.

23 How -- how do you read  
24 anything into this with respect to these  
25 devices being able to communicate media

1 content?

2 A Well, again --

3 MR. YAP: Objection, form.

4 A Again, what we are discussing here  
5 is really my original point from several  
6 minutes ago, that this is not the sort of  
7 media sharing that we have been discussing  
8 with respect to, let's say, the '873 patent.

9 But rather, this is simply  
10 saying that it's clear that the inventor  
11 understands that multiple devices can be  
12 controlled and indeed potentially controlled  
13 to work together by means of the remote  
14 control in Erekson.

15 So that was the main point  
16 that I was trying to make here.

17 Q Okay.

18 A This was not simply controlling a  
19 single device, but it was allowing the user  
20 to select one or more devices and command  
21 them to work together.

22 And ultimately, this is in  
23 response to your question, which really  
24 seemed to address the point of could this  
25 remote control cause multiple devices to do



1 something.

2 The particular example you  
3 used was media sharing, and I said, well,  
4 it's not quite media sharing, but it is -- it  
5 is clear that one could command multiple  
6 devices to do something using this remote.

7 Q But Erekson is not describing  
8 communication between the controlled devices  
9 themselves, correct?

10 A That appears to be correct.

11 Q Okay.

12 A Except in terms of sending analogue  
13 signals back and forth, potentially, say  
14 between a VCR and a TV.

15 Q Does Erekson disclose that the  
16 controlled device can control another  
17 controlled device?

18 (Deponent read document.)

19 MR. YAP: Objection, form.

20 (Deponent read document.)

21 A To some degree a function of the  
22 way that Bluetooth networking operates  
23 implies a master-slave relationship among  
24 groups of devices, and this is -- this is an  
25 illustration of this in Figure 1, and it also

1 has a discussion at column 5, starting at  
2 line 5.

3 So it talks about a piconet,  
4 and within a piconet, one of the devices in  
5 the piconet is the master and the other are  
6 the slaves.

7 That's really just a  
8 discussion of how Bluetooth communication  
9 works.

10 With respect to the user  
11 controlling multiple devices, the relevant  
12 illustration is Figure 6.

13 And in Figure 6, the portable  
14 computer system 100 communicates with the  
15 devices individually, but it does not show  
16 communication between the devices.

17 So -- which is not to say that  
18 it couldn't happen.

19 If they're all on a Bluetooth  
20 network, they do as shown in Figure 1 have  
21 the ability to talk to one another, just as a  
22 consequence of being on a Bluetooth network.

23 But Figure 6 does not show  
24 such a dataflow.

25 Q So you would agree that Erikson

1 does not disclose that a controlled device  
2 can control another controlled device?

3 MR. YAP: Objection,  
4 mischaracterizes.

5 A I would say that it does not  
6 disclose that a controlled device does  
7 control another controlled device.

8 Q Okay.

9 A But it does not teach that it  
10 can't.

11 Q But it also doesn't teach that it  
12 can, by the same token?

13 A Well, it shows in Figure 1, and  
14 also one of ordinary skill in the art  
15 familiar with Bluetooth network topology  
16 would understand, that all of these devices  
17 are in communication with one another, so  
18 they could.

19 The scenario illustrated for  
20 using that network here does not make use of  
21 that inherent capability of Bluetooth  
22 networks.

23 Q Okay.

24 So looking at Figure 6, does  
25 Erekson describe a remote control that can

1 control another device via an intermediary  
2 device?

3 (Deponent read document.)

4 A Not in Figure 6.

5 Q Does Erekson anywhere describe a  
6 remote control that can control another  
7 device via an intermediary device?

8 A Well, again, the discussion in  
9 column 5 of the architecture of or topology  
10 of Bluetooth networks shows that these  
11 linkages are multi-hop, can be multi-hop or  
12 can be synchronized so that one --

13 In fact, there's an explicit  
14 discussion of what is called point-to-point  
15 and point-to-multipoint Bluetooth connections  
16 in lines 15 and 16 of column 5, and what that  
17 means is that a device can send commands to  
18 multiple Bluetooth devices.

19 Q Dr. Bove, would you agree that  
20 Figure 1 only shows pairing information  
21 through a network and not a cascade of  
22 control from a device to a device?

23 A Figure 1 is showing a coupling  
24 arrangement both between two piconets and the  
25 individual devices within each piconet.

1           Q     But it does not show control from  
2     one device to another device.

3                     It merely shows a multipoint  
4     broadcast of the same command to multiple  
5     devices; does it not?

6           A     Well, it shows conductivity among a  
7     group, among the uses of which could be  
8     sending a command to multiple devices.

9           Q     You agree that there's nothing in  
10    Erekson that describes a remote control that  
11    controls another device via intermediary  
12    device?

13                     MR. YAP:  Objection,  
14    mischaracterizes.  Asked and answered.

15           A     I think we've been over this  
16    before; but just to reiterate the example  
17    illustrated in, for instance, Figure 6, does  
18    not show a multi-hop connection or a  
19    connection between, say, remote device A and  
20    remote device B.

21           Q     And would you consider Blue -- what  
22    is Bluetooth to you?  What does it mean to  
23    you?

24           A     Bluetooth is a short-range digital  
25    wireless communication means.

1 Q Would you call Bluetooth a device?

2 A A Bluetooth radio would be a  
3 device, which would be part of a bigger  
4 device.

5 But a Bluetooth itself is  
6 really a protocol.

7 Q Okay.

8 Would you agree that Erekson's  
9 remote controls directly the device to which  
10 it has connected, consistent with what's  
11 shown in Figure 6?

12 A Yes.

13 Q Now, in your declaration with  
14 respect to the '873 patent marked as Exhibit  
15 3, you in paragraph 26 state that you've been  
16 asked -- I'm paraphrasing it a little bit.

17 You've been asked for your  
18 opinion as to whether it would have been  
19 obvious to one of ordinary skill in the art  
20 to combine the portable (palmtop or handheld  
21 computer) of the Erekson reference with the  
22 system disclosed in the Bi reference.

23 That's in paragraph 26 of your  
24 declaration.

25 A Yes.

1 Q How did you go about selecting the  
2 combination of Bi and Erekson?

3 A The particular element that I am  
4 looking for here --

5 Q Well, I apologize.

6 Let me take a step back.

7 A Okay.

8 Q Did you select the combination of  
9 Bi and Erekson in connection with preparing  
10 your opinion set out in the declaration?

11 A Well, the selection of this  
12 particular combination arose out of  
13 conversations I had with Yamaha's counsel, so  
14 multiple possible combinations were  
15 discussed.

16 Q And who came up with the specific  
17 Bi and Erekson combination?

18 MR. YAP: Objection. You're  
19 getting close to work product here.

20 Q Let me ask you this question with a  
21 yes or no answer.

22 Did you come up with the Bi  
23 and Erekson combination for purposes of  
24 arguing obviousness of the '873 patent?

25 A I'm not certain at this point who

1           came up with it.

2                           There were many pieces of art  
3           being discussed in many combinations. This  
4           one was that I felt was particularly relevant  
5           to certain claim elements in the '873 patent.

6           Q       In paragraph 27 of your  
7           declaration, you state towards the end of  
8           that paragraph that, "By employing the  
9           Erekson remote control with the Bi system, a  
10          single remote control could advantageously be  
11          used to control the computing platform as  
12          described in Bi and a stereo that receives  
13          its analogue output, as noted at paragraph 21  
14          of Bi, as well as other devices used with the  
15          stereo, such as a CD player."

16                           Do you see that?

17           A       Yes.

18           Q       What do you mean by "employing the  
19          Erekson remote control with the Bi system"?

20           A       Specifically what I'm employing is  
21          the ability of the Erekson remote control to  
22          control multiple devices to select a device  
23          and send commands to that device among a  
24          group of devices.

25                           And whether that means



1       literally using the remote control here or  
2       using that -- combining that functionality of  
3       this remote control with the navigator of Bi,  
4       the result is equally predictable.

5               Q       You state that a single remote  
6       control -- in that same sentence that I read  
7       into the record in its entirety, a single  
8       remote control could advantageously be used  
9       to control the computing platform as  
10      described in Bi and a stereo.

11                       Do you see that?

12               A       As well as other devices.

13               Q       Right.

14                       Now, let me turn your  
15      attention to paragraphs 28 and 29 of Bi.

16                       Do you see that -- why don't I  
17      give you a minute to read 28 and 29, and you  
18      tell me when you're done.

19                       (Deponent read document.)

20               A       Okay.

21               Q       Do you see that in -- at paragraphs  
22      28, 29 of Bi, Bi discloses that the navigator  
23      260 is capable of controlling the computing  
24      platform as well as an analogue stereo?

25               A       Well, I see that it has

1       bidirectional wireless communication with a  
2       computing platform. And I see that  
3       secondarily, it has an infrared transmitter,  
4       which I take to mean not bidirectional but  
5       unidirectional, because it doesn't say  
6       "transceiver," which allows it to control the  
7       stereo.

8               Q       Correct.

9                       So why would you need access  
10       remote to control a stereo as well as the  
11       computing platform when Bi is already  
12       controlling both the computing platform and a  
13       stereo via the navigator?

14               A       Well, actually, this further  
15       suggests since this remote control is  
16       controlling two different devices using two  
17       different communication means, this suggests  
18       the desirability of using only one  
19       communication means, as in Erekson, to  
20       control everything so that there would be a  
21       single-user interface.

22                       The user would simply select  
23       which device was to be controlled, and the  
24       commands would go out to a single interface.

25                       So it would be a simpler

1 design, which has advantages over what's in  
2 Bi.

3                   Secondarily, the wireless  
4 communication is bidirectional, and for  
5 certain application scenarios, it might be  
6 necessary to read status information back  
7 from the controlled device, which would not  
8 be possible over just an IR transmitter,  
9 because that's a one-way command connection.

10           Q     Right.

11                   But I point you back to your  
12 concluding sentence where you state that, By  
13 employing the Erekson remote control with the  
14 Bi system, a single remote control could be  
15 advantageously used to control the computing  
16 platform as described in Bi and a stereo that  
17 receives its analogue put as noted at  
18 paragraph 21 of Bi.

19                   But in Bi we already have a  
20 single remote control. You're not  
21 distinguishing in this paragraph between the  
22 different components that make up the remote  
23 control of Bi.

24                   You're not pointing out, you  
25 know, any drawbacks or deficiencies that one

1 of skill in the art would be motivated to  
2 replace by a system of Erekson, for example.

3 MR. YAP: Objection, form.

4 A Well, the Bi -- the Bi system  
5 actually has two remote controls in one  
6 package.

7 It has a wireless remote  
8 control if you're talking about the computer  
9 platform, and it has a secondary infrared  
10 remote control for talking to things like a  
11 stereo.

12 And it clearly would be  
13 advantageous to replace those two remote  
14 controls that happen to be in one box with  
15 one remote control.

16 Q Where do you see in Bi two remote  
17 controls? There is only one navigator.

18 It has many components in it,  
19 but I don't see a second remote control  
20 within Bi.

21 A For that we have to refer to the  
22 schematic diagrams at the end of the figures,  
23 and so my apologies to everybody in the room  
24 that isn't an electrical engineer.

25 MR. YAP: Counsel, we've been

1 going for over an hour --

2 MS. GLADSTEIN: A question is  
3 still pending --

4 MR. YAP: No, I understand.  
5 After you get to a good natural break,  
6 perhaps we can take a break?

7 MS. GLADSTEIN: Absolutely.  
8 (Deponent read document.)

9 A So the -- in referring, first of  
10 all, to Figure 9, there's one set of  
11 circuitry of which really consists of  
12 elements 615 -- 615, 265 and 617, which are  
13 the IR, remote control, electronics.

14 And then there is another set  
15 of electronics, which are the wireless remote  
16 control. So there are two separate pieces of  
17 circuitry in this system.

18 And Erekson, for example,  
19 points out the shortcoming of an arrangement  
20 like this, because in column 1 of Erekson, we  
21 find that -- and this is starting line 45 of  
22 column 1.

23 We find that the problem with  
24 using an infrared remote control is that its  
25 range is shorter and restricted to line of

1       sight when compared with a wireless remote  
2       control.

3                       So the -- one of the issues  
4       with the design in Bi is that if one is not  
5       standing directly in front of the music  
6       player system, one could control the  
7       computing platform, the application, but one  
8       would be unable to control the amplifier  
9       because the wireless range would be farther  
10      and more indirect than the IR range.

11                      And so Erekson offers us a  
12      solution to that problem of both having  
13      redundant componentry, two different remote  
14      control mechanisms in the navigator of Bi,  
15      but it also offers us a solution to the  
16      problem that one is restricted to using the  
17      system by the range of the IR remote control,  
18      which really gets rid of most of the  
19      advantage of the wireless remote control, as  
20      described in Erekson.

21              Q       Going back to my original question,  
22      which I did not hear an answer for, Bi does  
23      not disclose two separate remote controls,  
24      one to control the computing platform and the  
25      other to control a stereo; isn't that right?

1           A     It discloses two remote control  
2 mechanisms, which are disadvantageous, as  
3 described in Erekson.

4           Q     But it discloses a single remote  
5 control; isn't that right?

6           A     A single physical remote control  
7 device containing two remote control means  
8 for two different sets of devices.

9           Q     Now, Erekson only discloses  
10 Bluetooth, is that right, Bluetooth  
11 communications?

12                     I specifically direct --

13           A     No. I would suggest that in  
14 column 4, starting at line 49, it says,  
15 "However, it is appreciated that the present  
16 invention may be utilized with devices and  
17 systems compliant with standards different  
18 from Bluetooth, such as the IEEE 802.11  
19 standard, which nowadays we know as Wi-Fi.

20           Q     Well, we're talking about  
21 communication with devices that are  
22 Bluetooth- or Wi-Fi-enabled?

23           A     Bluetooth or Wi-Fi or other  
24 wireless technologies.

25           Q     Can you think of any other wireless

1 technologies besides Wi-Fi and Bluetooth?

2 A Lots of them. Zigbee, for example,  
3 Z-I-G-B-E-E.

4 Q But the devices would need to be  
5 enabled to communicate --

6 A With one or another of these, yes.

7 Q Okay.

8 So in 2004, stereos were not  
9 Bluetooth-enabled, were they?

10 A I believe some of them were, yes.

11 Q And what's the basis for your  
12 belief?

13 A There certainly were amplified  
14 speaker systems using Bluetooth technology by  
15 2004.

16 Q Can you give an example of those?

17 A I don't have a particular model  
18 number to suggest now, but there is --

19 Q Manufacturer?

20 A About the same time as Bluetooth  
21 headsets and Bluetooth printers and Bluetooth  
22 everything else became available, which was  
23 the early 2000s, Bluetooth-amplified speakers  
24 became available at roughly the same point in  
25 time.



1 Q How about a stereo player, not just  
2 a speaker but a device that plays a CD or a  
3 tape?

4 A Not certain.

5 Q You would agree with me that the  
6 remote control of Bi could play music via the  
7 computer platform?

8 A It could cause the computing  
9 platform to play music, yes.

10 Q Why don't we take a break.

11 THE VIDEOGRAPHER: The time is  
12 4:40 p.m. We are going off the record.

13 This will be the end of Disk 3  
14 in the deposition of V. Michael Bove, Jr.

15 (Recess.)

16 THE VIDEOGRAPHER: This is  
17 disk No. 4 in the deposition of V. Michael  
18 Bove, Jr.

19 We are back on the record.

20 The time is 4:58 p.m.

21 BY MS. GLADSTEIN:

22 Q Dr. Bove, did you have any  
23 substantive discussions about the subject  
24 matter of this deposition with counsel during  
25 the break?

1           A     No.

2           Q     Let's turn to Exhibit 6, which is  
3     the '099 patent.

4                     What is your understanding of  
5     the field of the invention to which the '099  
6     patent pertains?

7           A     The '099 patent is in many ways  
8     related to the patent we've just been  
9     discussing.

10                    The claims of the '099 are a  
11     system and a method, such the wireless remote  
12     control device can receive a playlist of  
13     songs from the remote source.

14                    A user can select songs from  
15     the playlist, and then a media player that's  
16     separate from the remote control device plays  
17     those songs.

18           Q     What is the relevant timeframe for  
19     assessing validity of the '099 patent?

20           A     My understanding is this is also  
21     May 2004.

22           Q     And you mentioned that the '099 is  
23     related to the '873 patent.

24                    Do you have an understanding  
25     whether they, in fact, are related patents?

1           A     My understanding is that this is a  
2           division of an application which is  
3           sequentially numbered one after the  
4           application from which '873 is a  
5           continuation.

6                     And there are many elements  
7           present in common between these two patent  
8           documents as issued.

9           Q     Okay.

10                    So would it be fair to say  
11           that they come from the same family or  
12           they're related?

13           A     They're related.

14           Q     They're related, okay.

15                    And would you -- let me --  
16           strike that.

17                    We -- in the first -- earlier  
18           in this deposition, we talked a lot about the  
19           state of the relevant art, especially as it  
20           existed around May of 2004.

21                    Would you say that the state  
22           of the art that we have already discussed  
23           with respect to the '873 patent would be same  
24           for the '099 patent as well?

25                    (Deponent read document.)

1           A     Essentially, yes.

2           Q     Is there any additional prior art  
3           that you would consider to be relevant with  
4           respect to the '099 patent that was not also  
5           relevant with respect to the '873?

6           A     Well, in my analysis of prior art,  
7           I -- in my declaration, that is to say, and  
8           to be more precise, my declaration is  
9           Exhibit 4 -- I consider items of prior art in  
10          here that are different from the items that I  
11          consider in -- at least some of them, that  
12          are different from the ones I consider in the  
13          other declaration we just finished  
14          discussing.

15          Q     Is there a particular prior art  
16          that stands out for purposes of showing the  
17          state of the art in 2004 that you haven't  
18          discussed with respect to the '873 patent?

19          A     Not with respect to the overall  
20          state of the art. Perhaps with respect to  
21          particular claim elements.

22          Q     Okay. All right.

23                         So turning our attention to  
24          the '099 patent itself, and particularly  
25          Figure 2, does Figure 2 show the remote

1 control 18 directly receiving a playlist from  
2 a server 11?

3 A Well, the figure itself simply  
4 discloses a bidirectional data path from the  
5 server to the Internet and from the Internet  
6 to the remote control.

7 It doesn't disclose in the  
8 figure precisely what information flows up  
9 and down through those paths.

10 Q But the remote control in Figure 2  
11 would -- is directly receiving some data from  
12 the server and from the Internet?

13 A In Figure 2, as opposed to Figure  
14 1, information passes from the server through  
15 the Internet to the remote control and  
16 potentially back as well.

17 Q Okay.

18 If I could direct your  
19 attention to column 6 at the bottom at around  
20 line 60, there is a description of Figure 2,  
21 and it says, "Figure 2 is a block diagram of  
22 another exemplary system for sharing  
23 playlists according to the present invention,  
24 wherein a server provides a playlist to a  
25 remote control of a dedicated media player,

1 wherein the playlists have been obtained from  
2 client computers or other devices."

3 Does the description in  
4 column 6 that I just read in, in conjunction  
5 with Figure 2, show the remote control  
6 directly receiving a playlist from the server  
7 via the Internet?

8 A Well, it shows it and it describes  
9 it receiving a playlist from the server  
10 across the Internet.

11 Whether there are proxies or  
12 anything else in there is just a function of  
13 how the Internet works.

14 Q Okay.

15 Does Figure 2 in conjunction  
16 with its description in column 6 show sending  
17 the playlist to the media player device?

18 (Deponent read document.)

19 A Figure 2 shows a one-directional  
20 dotted data path between remote control 18, a  
21 dedicated media player 17, but the actual  
22 description of that is I believe at the top  
23 of column 9.

24 Now, this doesn't specifically  
25 at the top of column 9 describe the situation

1 we're discussing. I think the relevant  
2 language starts at line 15 where it says,  
3 "Similarly, playlists that were communicated  
4 to the remote control 18 as shown in Figure 2  
5 may be further communicated to the dedicated  
6 media player 17 associated therewith.

7 "This communication may be  
8 from the remote control 18 or from any other  
9 source, such as from the server 11 via the  
10 Internet 12."

11 So the language here is really  
12 dealing with a huge variety of embodiments  
13 and a huge variety of dataflows.

14 Q Now, looking at Figure 1, what is  
15 the difference between Figure 1 and Figure 2?

16 A In Figure 1, the dedicated media  
17 player 17 connects to the Internet.

18 In Figure 2, the dedicated  
19 media player 17 is not shown to have an  
20 Internet connection.

21 Q If I could direct your attention to  
22 Figure 5, does Figure 5 show the remote  
23 control receiving a playlist directly from  
24 the Internet with input from one or more of  
25 the clients?

1 (Deponent read document.)

2 A The discussion of Figure 5 in  
3 column 10 says that the playlist may be  
4 communicated to a remote control 48 for the  
5 dedicated media player, but also says the  
6 client's 43 to 46 may communicate their user  
7 profiles to the remote -- it says "remove"  
8 control, but that's a typo. It should be  
9 "remote" control 48.

10 And then playlists may  
11 subsequently be forwarded to another device,  
12 such as the dedicated media player 47.

13 So it's unclear precisely  
14 where in this diagram the playlist comes  
15 from, but it does land in remote control 48  
16 at the end.

17 Q If I -- you could look at the brief  
18 description of Figure 5 in column 7 at  
19 line 5.

20 A Yes.

21 This is where a peer provides  
22 a playlist to a remote control of a dedicated  
23 media player without the use of a server.

24 But again, it just doesn't  
25 tell us whether that's 43 or 44 or 45 or 46



1 or some combination of them.

2 Q That's right.

3 So it's an input from one or  
4 more of the clients?

5 A Yes.

6 Q Okay.

7 Does Figure 5 show sending the  
8 playlist to the media player device without  
9 the use of a server?

10 (Deponent read document.)

11 A Well, the discussion in column 10  
12 of Figure 5 starting at line 38 says,  
13 "Similarly, playlists that were communicated  
14 to the remote control 48 as shown in  
15 Figure 5 may be further communicated to the  
16 dedicated media player associated therewith.

17 "This communication may be  
18 from the remote control 48 or from any other  
19 source, such as from one of the clients 43 to  
20 46, via the Internet 42."

21 So this implies that although  
22 there is no path between the Internet and 47  
23 illustrated here, the inventor understands  
24 that an embodiment according to Figure 5  
25 could have an implicit path between the

1 clients and element 47.

2 Q Just for clarification, you stated  
3 the inventor understands.

4 Did you mean to say a person  
5 of ordinary skill in the art understands?

6 A Well, no.

7 The inventor in describing  
8 Figure 5 is saying that despite the fact that  
9 Figure 5 doesn't show a path from the clients  
10 directly to element 47, this says that it can  
11 be communicated from the clients to 47.

12 So it implies there could be a  
13 path there even if one isn't illustrated  
14 here.

15 Because this discussion in  
16 column 10 is specifically addressing  
17 Figure 5.

18 Q Okay.

19 But ultimately, the playlist  
20 is being sent to the dedicated media player  
21 from the Internet, not from the server?

22 A Well, it's coming from one of the  
23 clients on the Internet. It's landing in the  
24 dedicated media player either through the  
25 remote control or through an Internet

1 connection to the dedicated media player,  
2 which is not illustrated in Figure 5 but is  
3 discussed in column 10 in conjunction with  
4 Figure 5.

5 Q Okay.

6 But you agree with the fact  
7 that there is no use of a server that is  
8 depicted in Figure 5?

9 MR. YAP: Objection.

10 Q There is no server that is depicted  
11 in Figure 5.

12 A There is no server depicted in  
13 Figure 5.

14 Q Are you familiar with the meaning  
15 of the term "playlist" as it was used in  
16 2004?

17 A My belief of the meaning of the  
18 term "playlist" in 2004 and the meaning of  
19 the term "playlist" now are essentially the  
20 same.

21 Q And what is the meaning of the term  
22 "playlist"?

23 A My understanding is that a playlist  
24 is just a list of media items that may be  
25 selected.

1           Q     And is -- is a playlist a list of  
2 items in some sort of an order?

3           A     By virtue of being a list, the  
4 items appear in an order.

5           Q     And what kind of order are the  
6 items typically in a playlist?

7           A     They could be in an order in which  
8 a user would want to hear them in sequence.  
9 They could be in an order by artist, by  
10 album, by genre.

11                     There are a variety of ways  
12 one could organize a playlist.

13           Q     Can a playlist be out of order?

14           A     Well, that -- such a statement  
15 implies that there is a canonical order for a  
16 given playlist, and that some other order is  
17 not that canonical order.

18                     If we're asking can a playlist  
19 be played in an arbitrary order, certainly.

20           Q     No, that's not the question.

21                     If a list is not in an order,  
22 would it still be a playlist?

23                     If a list of items --

24           A     Well, I think the plain meaning of  
25 "list" implies that there is an order in

1       which items appear.

2                       That makes it a list.

3           Q       So is there a difference between a  
4       list of media items and a playlist of media  
5       items?

6           A       If one wanted to split hairs, one  
7       could say I could have a list of media items  
8       written on a piece of paper, but I couldn't  
9       necessarily play that unless it had been  
10      converted to a machinery to perform.

11                    Playlist implies that a piece  
12      of software would be able to do something  
13      with it.

14          Q       So would you agree that the term  
15      "playlist" with respect to media items, such  
16      as songs, is a list of items arranged in a  
17      particular order?

18          A       First of all, I'm not sure what a  
19      particular order is.  It could be an  
20      arbitrary order, but the -- it is a list of  
21      items in an order.

22          Q       Okay.

23                    Would you agree that a  
24      playlist is a list of items designed to be  
25      played?

1           A     The items on the list are intended  
2           to be played or at least potentially to be  
3           played.

4                     So one could select one or  
5           some other subset thereof and play those  
6           individual items rather than playing the  
7           entire list.

8           Q     Would you agree that the term  
9           "playlist" is a list of items arranged to be  
10          played in a sequence?

11          A     Not necessarily.

12          Q     Could you explain?

13          A     As I said before, the -- the fact  
14          that there is a list implies that the items  
15          appear in an order, but that may or may not  
16          be an order in which anybody would want to  
17          play the items.

18                     They could be in alphabetical  
19          order, for example, and that might make no  
20          sense to play them in that order.

21          Q     But the default would be to play a  
22          playlist in a sequence in which the items  
23          appear on a list?

24          A     I would say that commonly a user  
25          interface would provide the ability to play

1 the items in the sequence in which they  
2 appear, as well as playing them potentially  
3 in some other order or selecting some subset  
4 and playing the subset.

5 (Counsel conferred.)

6 MR. YAP: This happens to all  
7 of us.

8 (Exhibit 10 marked for  
9 identification.)

10 (Exhibit 11 marked for  
11 identification.)

12 BY MS. GLADSTEIN:

13 Q Dr. Bove, I'm handing you  
14 Exhibits 10 and 11.

15 A Thank you.

16 MS. GLADSTEIN: Counsel.

17 MR. YAP: Thank you.

18 BY MS. GLADSTEIN:

19 Q So Exhibit 10 is what I will  
20 represent that I emailed to counsel for  
21 Yamaha, noting that we may be asking you  
22 questions at your deposition.

23 Exhibit 11 is a hard copy of  
24 the same chapter that appears in  
25 Exhibit 10 from the Microsoft Windows Media

1 Player 7 handbook.

2 We are able to obtain a hard  
3 copy, so that's what it is in actual print.

4 And the version that was  
5 emailed to you was what was available online  
6 from the Internet.

7 I will represent that they are  
8 one and the same in terms of the content of  
9 Chapter 2 that is copied in this Exhibit 11.

10 And so I would like to direct  
11 your attention to page 40 of Exhibit 11.

12 A Will we be using Exhibit 10 at all?

13 Q No, I just marked it up so that --

14 A Okay, thank you.

15 Q -- we have it on the record as  
16 something that was communicated to you.

17 And direct your attention to  
18 the definition of the term "shuffle" that  
19 appears in this chapter.

20 A Okay.

21 Q And if you would read the def --  
22 I'll read the definition into the record.

23 "Shuffle: Thus place the  
24 items in the current playlist in a random  
25 order. It does not change the order of the



1 items in the playlist, only the order in  
2 which they are played while the shuffle  
3 option is selected."

4 Do you -- does -- does this  
5 definition imply to you that the items in a  
6 playlist are arranged in an order?

7 A Yes.

8 Q And if you turn to page 39, with  
9 respect to the definitions of "skip back" and  
10 "skip forward," if you could read them to  
11 yourself and then answer the question of  
12 whether these definitions are consistent with  
13 your understanding that items in a playlist  
14 are arranged in an order.

15 (Deponent read document.)

16 A This implies that each item in the  
17 playlist, except possibly the beginning and  
18 the end, has an item before it and an item  
19 after it.

20 And pressing "skip back" or  
21 "skip forward" will move through the items in  
22 that way.

23 Q And --

24 A The word "order" doesn't appear  
25 here, but it does show that items in the

1 playlist are preceded by other items and  
2 followed by other items.

3 Q Right.

4 On the last sentence, for  
5 example, of the skip back paragraph states  
6 "If you're at this first item in a playlist  
7 and you select skip back, the last item in  
8 the playlist will be played."

9 A Right, which implies that they're  
10 actually treating the playlist as what a  
11 computer scientist would call a circular  
12 queue or a circular buffer. The end is  
13 attached to the beginning.

14 Q But you would agree that skip back  
15 and skip forward functions imply in their  
16 descriptions that the items are set up in a  
17 certain order?

18 That way, you would be able to  
19 go, say, from Track 2 to Track 1 or from  
20 Track 2 to Track 3?

21 A Yes.

22 Q All right.

23 Now, referring to paragraph 12  
24 in your declaration, which is Exhibit 4, your  
25 declaration for the '099 patent where you

1 discuss the term "playlist," do you agree  
2 that none of the references to the Weel  
3 patent that you rely upon are inconsistent  
4 with the notion that a playlist is a list of  
5 items arranged to be played in a sequence?

6 (Deponent read document.)

7 A Paragraph 12 of this declaration is  
8 not so much addressed to the issue of being  
9 played in a sequence as it addresses the  
10 issue of whether or not a playlist must be  
11 generated by a particular user.

12 So that was the question that  
13 I was asked to address in this point of this  
14 declaration.

15 So were I addressing the issue  
16 of sequence in this paragraph as the primary  
17 reason for writing this paragraph, I would  
18 probably have cited different language from  
19 the '099 patent.

20 Q Would you agree that a list of  
21 media items that are arranged to be played in  
22 a sequence can be generated automatically?

23 A With the potential that the  
24 sequence might be unpleasant in actuality,  
25 yes.

1           Q     Would you agree that a list of  
2     media items that are arranged to be played in  
3     a sequence can be generated by a user?

4           A     I would agree that a user could  
5     generate such a list.

6           Q     Are you aware of any reference in  
7     the context of your work with respect to the  
8     '099 patent and the '873 patent and the prior  
9     art that you've reviewed where such a  
10    reference used the term "playlist"  
11    inconsistently with the notion that a  
12    playlist is a list of items arranged to be  
13    played in a sequence?

14          A     So to state it in another way, is  
15    what you're asking me that across all of the  
16    references that I have considered and the  
17    ones that I have cited in my various  
18    declarations, would I agree that the use of  
19    the term "playlist" where it appears in any  
20    of those references would be consistent with  
21    the definition you just gave?

22                    Is that effectively what you  
23    asked me?

24          Q     Would be consistent with the notion  
25    that a playlist is a list of items arranged

1 to be played on a sequence.

2 MR. YAP: Objection, outside  
3 scope.

4 A I would say at the very least it  
5 would be consistent with a list of items that  
6 could be played in a sequence, not that must  
7 be played in such a sequence.

8 Q But it would be -- would it be  
9 consistent with the meaning of the term  
10 "playlist" as it would be understood by one  
11 of ordinary skill in the art?

12 A Okay. That's a very different  
13 question, so maybe what we really want to ask  
14 is we seem to have two definitions of  
15 "playlist" at play here, if we -- don't want  
16 to use that term too many times.

17 One of them is the one that  
18 Yamaha and I adopt, and the other one is the  
19 one that Black Hills adopts.

20 And the main difference seems  
21 to be the phrase involving sequence in the  
22 two definitions.

23 And as I've expressed my  
24 opinion that one of ordinary skill in the art  
25 would understand playlist -- and this is

1 really discussed more in the previous  
2 declaration that we just -- we were dealing  
3 with, which would have been Exhibit 3, and  
4 expressed my opinion that one of ordinary  
5 skill in the art would, in my opinion,  
6 understand the playlist just to be -- no, I'm  
7 sorry, not in the '873 declaration.

8 I'm actually thinking of one  
9 of the declarations we haven't yet dealt with  
10 today.

11 But it is my opinion that one  
12 of ordinary skill in the art would understand  
13 that a playlist is simply a list of media  
14 items from which a user may make selections,  
15 and that would be the broadest reasonable  
16 interpretation of playlist consistent with  
17 the specifications of these patents.

18 And my understanding is that  
19 Black Hills suggests a construction of  
20 "playlist" that includes the notion of  
21 playing in a particular sequence.

22 So you asked me do I think the  
23 use of "playlist" in these references is  
24 consistent with one of -- with what one of  
25 ordinary skill in the art would understand

1 "playlist" to be, and I just want to make  
2 sure that we're in agreement which of those  
3 definitions is the one that I believe one of  
4 ordinary skill in the art would understand a  
5 playlist to be.

6 Q Are you finished?

7 A Yes.

8 Q Okay.

9 So let me clarify. So my  
10 original question was whether you've  
11 encountered out of all the art that you  
12 reviewed in connection with the work for  
13 Yamaha with respect to the '099, '873 and the  
14 other two patents on which you will be  
15 deposed tomorrow, whether you have  
16 encountered any prior art reference that used  
17 the term "playlist" inconsistent with the  
18 notion that a playlist is a list of items  
19 arranged to be played in a sequence.

20 MR. YAP: Objection. Outside  
21 the scope.

22 A I would say that it is consistent  
23 with the use of the word "playlist" -- and in  
24 some references it appears as two words,  
25 "play list," rather than one word,

1 "playlist," so we'll equate those for  
2 purposes of this discussion.

3 It is at least consistent with  
4 the sense that a playlist is a list of media  
5 items; and by virtue of being a list, it can  
6 be played in a sequence.

7 Q Okay. Let's shift gears a little  
8 bit.

9 Now, we talked about your  
10 understanding of the concept of determining  
11 whether or not a patent is obvious in view of  
12 the prior art a little earlier today.

13 Do you have an understanding  
14 of how to determine whether a patent is  
15 anticipated by prior art?

16 A My understanding is that a patent  
17 is anticipated by a piece of prior art if  
18 each and every element of a given claim is  
19 present in a piece of prior art.

20 Q Anything else about that piece of  
21 prior art that needs to be present?

22 A Well, we're talking, first of all,  
23 about a specific piece of prior art. And  
24 presumably, it's a piece of prior art that  
25 would be understood to cover the same field



1 of practice.

2 Q Okay.

3 That's -- that's the entirety  
4 of your understanding.

5 A Well --

6 MR. YAP: Objection, calls for  
7 a legal conclusion.

8 A Right.

9 I am not representing myself  
10 as a legal expert, and I will also note that  
11 what I have been asked to do in each of these  
12 cases is that I am addressing obviousness  
13 rather than anticipation.

14 Q So in your declaration marked as  
15 Exhibit 4, you did not set out any opinion  
16 with -- let me take a step back.

17 First of all, have you  
18 reviewed the institution decision in the '099  
19 case?

20 A Yes, I have.

21 Q I just would like to correct  
22 myself. In the -- let -- let me just strike  
23 that.

24 The question is, did you  
25 review the institution decision issued in

1 IPR2013-00597?

2 A Which, just to be clear, is the one  
3 that relates to the '099 patent?

4 Q Yes.

5 A Yes, I have.

6 Q In its entirety?

7 A I didn't spend a lot of time  
8 dealing with the section of who the parties  
9 are. I was really just dealing with the  
10 technical portions.

11 Q Okay.

12 But you are aware that the  
13 trial has been instituted on three grounds.

14 One ground is on anticipation  
15 in view of Bi. The other ground is in  
16 anticipation of Gladwin, and then the third  
17 ground is obviousness in view of Berman.

18 A I'd have to see the little chart at  
19 the end to make certain, but that's  
20 consistent with my recollection.

21 Q Okay.

22 And in your declaration, you  
23 did not set out any opinion on whether the  
24 '099 is anticipated by Gladwin, correct?

25 A Again, we're talking about the

1 declaration that's marked Exhibit 4; and in  
2 this declaration, I have been asked to do  
3 analysis of prior art.

4 Prior art that I analyzed here  
5 is the Berman reference and a combination of  
6 two Janik references.

7 I'll note that I did review  
8 the claim charts in Yamaha's petition.

9 Q Did you have any input into the  
10 claim charts in Yamaha's petition?

11 A I don't believe that I had  
12 significant input into what's in them, but I  
13 have reviewed them, and I have discussed them  
14 with Yamaha's counsel.

15 And to the degree that an  
16 expert opinion has any bearing on that side  
17 of the case, there's nothing in there that I  
18 disagree with, but that was not what I was  
19 asked to address in this declaration.

20 Q What were you asked to address in  
21 this declaration?

22 A So in this declaration, I was asked  
23 to address in the -- with respect to the '099  
24 the term "playlist," but more particularly  
25 whether or not a playlist needs to be

1 generated by a particular user.

2 Second, I was asked to address  
3 the claim term "remote source" that appears  
4 in the independent claims of the '099 patent.

5 Third, I was asked to address  
6 whether the Berman reference discloses the  
7 replication of the graphical user interface  
8 of the media player on a remote control  
9 device, and also whether one of ordinary  
10 skill in the art will understand that the  
11 remote control device of Berman could be a  
12 wireless remote control.

13 I was further asked whether  
14 one of ordinary skill in the art would  
15 combine elements from the Janik 558 reference  
16 with the Janik 902 reference, and that was  
17 all that I was asked to address with respect  
18 to the '099 patent in this declaration, and  
19 that's all that I provide here.

20 Q And so just to confirm, you were  
21 not asked to opine on whether Gladwin  
22 anticipates the '099 patent?

23 A I was --

24 MR. YAP: Objection, asked and  
25 answered.

1           A     I was not asked to address that in  
2     this declaration.

3           Q     And you were not asked to address  
4     whether Bi anticipates the '099?

5                     MR. YAP:   Same objection.

6           A     Same answer.  I was not asked to  
7     address that in this declaration.

8           Q     Do you have an opinion on whether  
9     Bi anticipates the '099 patent?

10                    MR. YAP:   Objection, outside  
11     the scope.

12           A     Well, I was not specifically asked  
13     to address that.

14                    As I said, I did review the  
15     claim charts that include those references,  
16     and I find -- the claim charts from Yamaha's  
17     petition, and I find nothing to disagree with  
18     the identification of elements in those  
19     references that disclose elements in the '099  
20     claims.

21           Q     But you have no opinion on whether  
22     or not the '099 patent is anticipated by Bi?

23                    MR. YAP:   Objection, asked and  
24     answered.

25           A     Well, I haven't been asked to

1 provide such an opinion.

2 Q Okay.

3 (Exhibit 9 marked for  
4 identification.)

5 BY MS. GLADSTEIN:

6 Q I'm handing you what has been  
7 marked as Exhibit 9. It is a document US  
8 Patent 6,502,194 to Russell Todd Berman and  
9 others.

10 Have you seen this document  
11 before?

12 A Yes.

13 Q When was the last time you saw the  
14 document?

15 A Yesterday, I believe.

16 Q Is the remote control disclosed in  
17 Berman an infrared remote control?

18 (Deponent read document.)

19 A Well, it is disclosed that -- and  
20 this is in column 5 starting at line 46, The  
21 playback unit may include -- may also include  
22 a sensor such as an infrared sensor 206 for  
23 receiving command signals from a remote  
24 control unit.

25 So one possible means of

1 communication described in the specification  
2 is infrared.

3 Q Take a step back.

4 What is the remote control in  
5 Berman?

6 (Deponent read document.)

7 A The remote control in Berman is  
8 discussed in a variety of different places;  
9 but most notably in column 13 starting at  
10 line 60, it talks about how the -- how the  
11 audio playing device has a graphical user  
12 interface.

13 And this says that the  
14 graphical user interface may be replicated on  
15 a remote control device, as indicated in  
16 Figure 13.

17 So whatever the graphical user  
18 interface is on playback device, it is  
19 replicated or can be replicated on the remote  
20 control.

21 Q Okay.

22 So my question initially was,  
23 is the remote control an IR remote control in  
24 Berman?

25 And correct me if I'm wrong,

1 but what I heard your answer is that the  
2 playback unit has an IR interface?

3 A The playback unit has some kind of  
4 sensor for exchanging -- in that case  
5 receiving information. That's what 206 is  
6 from the remote control, and an example given  
7 is IR.

8 A And IR can be one-directional or  
9 bidirectional. They're well-known  
10 bidirectional IR communication methods.

11 Q Does Berman disclose any other type  
12 of interface than infrared?

13 A Well, it discloses other  
14 communication interfaces, but the only one  
15 that it discloses between the remote control  
16 and the playback unit is infrared.

17 Q And where were you looking to with  
18 respect to other?

19 A So this is in column 5 starting at  
20 line 11. It says, The playback unit includes  
21 a network interface 110 that provides a  
22 communication channel with the Internet 102  
23 and to the audio material server 104.

24 The network interface can  
25 communicate using a number of different



1 protocols having a variety of physical  
2 connection schemes.

3 And then it lists a number of  
4 different communication schemes with which  
5 the network interface can communicate with  
6 the Internet.

7 Q Now, this is with respect to the  
8 playback unit, but with respect to the remote  
9 control, only an infrared sensor is  
10 described?

11 A Well, the infrared sensor is  
12 described as being part of the playback unit.  
13 It implies that there's an infrared  
14 transmitter that's part of the remote control  
15 that would talk to that sensor.

16 And elsewhere, because it  
17 describes replicating the graphical user  
18 interface of the playback unit on the remote  
19 control, that implies that there might be a  
20 bidirectional data path, which is also  
21 supported by several of the diagrams.

22 For example, Figure 13, paths  
23 9 and 6.

24 Q How does an infrared remote control  
25 operate?

1           A     It depends on whether it's not a  
2     monodirectional or bidirectional.

3                     If it's one-directional, then  
4     the transmitter has an infrared LED. The  
5     receiver has a photodiode or phototransistor,  
6     and there's some agreed-upon sequence of  
7     pulses that correspond to each command or  
8     correspond to bits in a data packet.

9                     If it's bidirectional, then  
10    each element has both a transmitter and a  
11    receiver.

12           Q     With respect to the remote, does,  
13    does -- strike that.

14                     With respect to the remote,  
15    Berman describes only an IR receiver on the  
16    playback unit; isn't that right?

17           A     It describes only a sensor receiver  
18    on the playback unit, although it describes  
19    operations that would necessitate a  
20    transmitter on the playback unit and the  
21    receiver on the remote, which are not  
22    illustrated.

23           Q     Is there a more detailed  
24    description of the infrared sensor in Berman  
25    other than at column 5, lines 46 through 47?

1 (Deponent read document.)

2 A Apart from the element in Figure 2  
3 indicating the sensor, I think that's the  
4 only other appearance I see right now.

5 Q So Berman does not disclose an IR  
6 transmitter anywhere?

7 MR. YAP: Objection, asked and  
8 answered.

9 A Well, it discloses that the remote  
10 control unit sends command signals to the  
11 sensor, and that's in column 5, lines 48 and  
12 49.

13 And in order to send signals  
14 to the sensor, it must have a transmitter.

15 Q So the playback unit has a sensor,  
16 an infrared sensor for receiving command  
17 signals from a remote control unit, so the  
18 playback unit would have a receiver and the  
19 remote control would have a transmitter?

20 A At least, but that would not be  
21 consistent with the bidirectional data path  
22 that's needed to replicate the graphical user  
23 interface, and that's why I said "at least,"  
24 because in an embodiment where the graphical  
25 suer interface of a playback unit is

1 replicated on the remote control, it would be  
2 necessary for data to go from the playback  
3 unit to the remote control as well.

4 Q Okay.

5 So what types of remote  
6 control were known in 2004?

7 A Infrared, RF, ultrasonic. That  
8 would be the primary ones used in consumer  
9 electronics. And ultrasonic was well on its  
10 way out by then.

11 Q What about RF?

12 A RF was certainly known at the time.

13 Q Was it widely used?

14 A And we're saying as of which year?

15 Q 2004.

16 A 2004.

17 Well, we've already had an  
18 example from 2000, which was the Erekson  
19 reference we talked about this morning as  
20 Exhibit 8, and so that disclosed in 2000 that  
21 Bluetooth could be used for remote control.

22 Q How does a wireless remote control  
23 operate?

24 A A wireless remote control typically  
25 will have a transmitter and a receiver at

1 both ends of the communication channel.

2 If it's one directional, then  
3 it will just have a transmitter at one end  
4 and a receiver at the other.

5 There's an agreed-upon  
6 transmission protocol by which data are  
7 encoded in the RF signal, and then issuing a  
8 command at the remote control transmits an RF  
9 signal with that agreed-upon protocol to the  
10 receiver.

11 The receiver receives it,  
12 interprets it, and takes the appropriate  
13 action.

14 Q So in terms of having a transceiver  
15 and a receiver, a wireless remote control is  
16 identical to an IR remote control?

17 A Well, if you ask the physicist, the  
18 physicist would say it's exactly the same  
19 except for the wavelengths. It's all  
20 electromagnetic radiation when you step far  
21 enough back.

22 But for our purposes, you  
23 know, the IR has a source of infrared  
24 radiation which sends data and an electronic  
25 device that's sensitive to that infrared

1 radiation that receives it.

2 The wireless has a  
3 transmitting antenna and a receiving antenna.

4 Q In 2004, would a person of ordinary  
5 skill in the art understand that an IR remote  
6 is not the same as a wireless remote?

7 A Well, one of ordinary skill in the  
8 art would understand they use different  
9 electromagnetic wavelengths.

10 Q So that means they would understand  
11 that they are different remotes?

12 A Well, they can --

13 Q Different types of remotes.

14 A They send the same -- potentially  
15 send the same information but using different  
16 kinds of electromagnetic radiation.

17 Q In Berman, does the playback unit  
18 send any information to the remote control?

19 (Deponent read document.)

20 A Well, in order to replicate the  
21 graphical user interface of the playback unit  
22 on the remote control, that would imply that  
23 the information that's displayed on the  
24 graphical user interface of the playback unit  
25 has to be transmitted to the remote control

1 unit so it can display it as well.

2 Q Could you use Berman's remote  
3 control to operate the playback unit from  
4 another room?

5 A If it's using infrared, only if you  
6 bounce the light off the half-open door  
7 between the two rooms. Some of us do that on  
8 a regular basis because we're too lazy to get  
9 up.

10 Q Okay.

11 This goes back to the IR and  
12 RF remotes. Does an infrared channel behave  
13 the same as a radiofrequency channel with  
14 respect to occlusion of the transmitter and  
15 receiver?

16 A Depends on the wavelength. So  
17 higher frequencies are line of sight in RF in  
18 the same way that they are in -- as they are  
19 in infrared?

20 So once we get up into the  
21 gigahertz range, we have pretty much the same  
22 problem.

23 Q Practically speaking, you couldn't  
24 use Berman's remote control to operate the  
25 playback unit from another room?

1           A     Well, let's say through a wall,  
2           through a solid wall.

3                     If we are restricting Berman  
4           to using infrared, then you couldn't do it  
5           through a wall.

6           Q     Okay.

7                     Could Berman's remote control  
8           directly access a server without the playback  
9           unit?

10          A     Berman doesn't give an example of  
11          operating that way.

12          Q     Would one of skill in the art  
13          reading Berman understand Berman's remote  
14          control to be able to directly access a  
15          server without the playback unit?

16          A     Could you read that question back,  
17          whichever of you?

18          Q     Would one of skill in the art  
19          reading Berman understand Berman's remote  
20          control to be able to directly access a  
21          server without the playback unit?

22                     MR. YAP:  Objection, outside  
23          the scope.

24          A     I think one of ordinary skill in  
25          the art would understand that this remote



1 control would need to communicate through the  
2 playback unit.

3 Q Could Berman's remote control  
4 directly access Internet without the playback  
5 unit?

6 MR. YAP: Same objection.

7 A As disclosed here, I don't think it  
8 could.

9 Q And what would Berman's remote  
10 control need to have in order to access a  
11 server or the Internet directly?

12 MR. YAP: Objection, outside  
13 the scope.

14 A It would probably need, for  
15 example, the network interface as illustrated  
16 in Figure 14.

17 Q And that network interface is  
18 present on the playback unit?

19 A Correct.

20 Q Would it need a microprocessor?

21 Would the remote control need  
22 a microprocessor in order to be able to  
23 access the Internet?

24 A To the extent that we're taught  
25 that the remote control replicates the

1 graphical user interface on the playback  
2 unit, I think one of ordinary skill in the  
3 art would understand that it would already  
4 have a microprocessor, as disclosed here.

5 Q What about a memory?

6 A It would need to have enough memory  
7 to store the information associated with the  
8 graphical user interface and also to store  
9 the program being executed by the  
10 microprocessor as part of the function.

11 Q Does Berman explain how to  
12 replicate the graphical user on the remote  
13 control?

14 A Not in detail.

15 Q What would a person of ordinary  
16 skill in the art understand with respect to  
17 how to replicate the graphical user interface  
18 on the remote control device?

19 A Well, one of ordinary skill in the  
20 art would understand that the playback unit  
21 has the necessary hardware and software to  
22 replicate -- to create the graphical user  
23 interface.

24 One of ordinary skill in the  
25 art would understand that there would have to

1 be communication means by which whatever was  
2 displayed on the graphical user interface of  
3 the playback unit was duplicated on the  
4 display of the remote control and would also  
5 understand that whatever user input that was  
6 given by the user to the remote control would  
7 be sent to the same -- would be transmitted  
8 back to the playback unit and go to the same  
9 software functions that evaluate the user  
10 input if it were given directly on the  
11 graphical user interface of the playback  
12 system.

13 So it would be a relatively  
14 simple process, because the two things would  
15 be synchronized.

16 Q Where does Berman disclose that the  
17 remote control has a microprocessor or  
18 memory?

19 A One of ordinary skill in the art  
20 would understand that in order to have a  
21 display, it has to have sufficient memory to  
22 hold at least the contents of the display.

23 One of ordinary skill in the  
24 art would understand that in order to be able  
25 to evaluate the user input and transmit that

1 to the playback unit and then update its  
2 display, it would need to have a  
3 microprocessor to execute the software or  
4 firmware associated with those functions.

5 Q But Berman nowhere in the  
6 specification or the claims or the abstract  
7 discloses those components?

8 A No, Berman does not give hardware  
9 architecture for the remote control.

10 Q Can the -- can the remote replicate  
11 the graphical user interface without having  
12 its own microprocessor but relying on the  
13 playback unit's processor?

14 A It could be done very  
15 inefficiently, but it could be done. That  
16 would involve having the remote control  
17 basically be a video display that would be --  
18 just wirelessly transmit the video signal  
19 associated with the graphical user interface  
20 backup to the remote control as if it were a  
21 TV signal, display that, and then have some  
22 dedicated hardware that evaluated the user  
23 inputs and sent it back.

24 That would probably be  
25 significantly more expensive and less

1 responsive than doing it with a  
2 microprocessor.

3 Q Would a person of ordinary skill in  
4 the art endeavor to do that?

5 A I think one of ordinary skill in  
6 the art would understand that given how  
7 inexpensive the microprocessor would be that  
8 one would need for this functionality, it  
9 would be much better just to use a very, very  
10 cheap microprocessor to solve the problem.

11 Q You mentioned that the remote  
12 control of Berman would need to have a  
13 network interface in order to be able to  
14 communicate with a server or an intranet,  
15 correct?

16 A Yes.

17 Q The remote control that is  
18 described in Berman, does it have a Bluetooth  
19 or Wi-Fi transceiver?

20 MR. YAP: Objection, asked and  
21 answered.

22 A That specific means of  
23 communication is not described in Berman.

24 Q Only the IR means as described --

25 A The IR means is given as an example

1 of the kind of communication that could  
2 happen.

3 Q Is the remote control of Berman  
4 able to be discovered by another device or  
5 paired with another device?

6 A I guess the question is could it  
7 talk to a different playback unit or could it  
8 talk to something else running similar  
9 software to what its original playback unit  
10 was running.

11 Q Let's start with that question.

12 A Okay.

13 We aren't given a lot of  
14 detail about device IDs and things like that,  
15 but my sense is that this remote control  
16 could talk to multiple devices.

17 Q To multiple devices that run the  
18 same software as the playback unit itself?

19 A Or if not run the same software, at  
20 least use the communication protocol that  
21 whoever is building the system had  
22 established as the means of communication  
23 between the remote control and the playback  
24 unit.

25 So the -- it could talk to a

1 very different kind of device as long as that  
2 device spoke the same language.

3 Q But the only communications means  
4 disclosed in Berman is the infrared  
5 communications?

6 MR. YAP: Objection, asked and  
7 answered.

8 A That's correct.

9 Q So in view of the infrared  
10 communications, the range of devices with  
11 which the remote control could communicate  
12 would be quite limited?

13 A Not necessarily. And I'd give  
14 several examples, one of them being that at  
15 the time universal remote controls were well  
16 known, which would be a single infrared  
17 remote control that can talk to multiple  
18 devices.

19 The other thing that was well  
20 known were bidirectional infrared  
21 communication standards, like IRDA, which at  
22 the time I believe Apple laptops and a number  
23 of other commercial products incorporated  
24 IRDA as a digital infrared communications  
25 link.

1           Q     Now, where does Berman describe  
2     connecting to multiple playback units by a  
3     remote control?

4           A     It doesn't.  You asked me whether  
5     in my opinion one of ordinary skill in the  
6     art would understand that it could, and you  
7     have my response on the record to that.

8                     So the disclosure doesn't  
9     explicitly say it could, but if the multiple  
10    units were able to speak to the remote  
11    control, it could communicate with more than  
12    one playback unit or even with other things  
13    that weren't playback units.

14                    And additionally, given the  
15    architecture that's laid out here, if the  
16    remote control spoke to the playback unit,  
17    the playback unit then communicated with a  
18    server on the Internet, that server on the  
19    Internet could then use the Internet  
20    connection to a different playback unit.

21                    So we could communicate  
22    directly to one playback unit but command  
23    another one by means of the Internet.

24                    The architecture laid out here  
25    would support that.



1           Q     Are you aware of the use of IRDA in  
2     2004 timeframe in remote controls?

3           A     Certainly used by inexpensive  
4     devices to talk to one another.

5                     I'm not sure whether remote  
6     controls generally used it, but it was used  
7     for exchange of information among a variety  
8     of inexpensive devices because it was much  
9     cheaper than wireless.

10          Q     In 2004?

11          A     Yes.

12          Q     What types of inexpensive devices  
13     were utilizing IRDA?

14          A     There were various computer  
15     peripherals, I believe, that were able to  
16     communicate using IRDA.

17          Q     Any other types of devices?

18          A     I believe there were just modules  
19     that were available for incorporation into  
20     various devices so that one could easily  
21     design it into a multiplicity of things.

22                     But right at the moment, I  
23     haven't looked back into what was available  
24     of that sort ten years ago.

25          Q     Were cellphones using IRDA?

1           A     I don't know if cellphones were. I  
2 think there were PDAs that did.

3           Q     There were PDAs?

4           A     I believe there were PDAs that were  
5 able to talk IRDA or pocket PCs.

6                     Anyway, handheld computing  
7 devices of one sort or another.

8           Q     If -- hypothetical situation.

9                     If you take your Berman remote  
10 control and you come over to my house where I  
11 also have a Berman system, what content would  
12 you be able to play on my Berman system with  
13 your Berman remote control?

14                     MR. YAP: Objection,  
15 incomplete hypothetical.

16           A     Again, this calls for a certain  
17 degree of speculation, because this is  
18 referring to a situation that Berman doesn't  
19 describe.

20                     But to the degree that I  
21 understand the architecture and the data  
22 interchange of Berman, if I go to your house,  
23 your playback unit knows your user ID. And  
24 so whatever material you were authorized to  
25 receive I would be able to control using the

1 remote control that I brought over.

2 Q So with the Berman system, you  
3 would only be able to play my content on my  
4 system?

5 With the Berman remote control  
6 at my house, you would only be able to play  
7 my content on my Berman system?

8 MR. YAP: Objection,  
9 mischaracterizes.

10 A Well, potentially I could configure  
11 your system to have my ID while I was there,  
12 in which case I'd be able to access my  
13 content on your playback unit.

14 But if I just walked in the  
15 door with my remote control and it synched  
16 with your playback unit, what I would see  
17 would be your media content.

18 Q Could you point me where in the  
19 specification Berman describes for the ID  
20 setup?

21 (Deponent read document.)

22 A So we find one example of this in  
23 column 13 starting at line 41, where it says,  
24 "Next, the user identification information  
25 provides identification of the listener for

1 billing purposes and for personalization  
2 features, such as described above.

3 "The user identification  
4 information can be entered if desired using a  
5 card with magnetically encoded user  
6 information, so such as a credit card or the  
7 information can be entered manually through  
8 the user display interface.

9 Q So the user identification  
10 information is optional?

11 A This doesn't say it's optional.  
12 Elsewhere it says it's optional because in  
13 some situations we can -- the inventor --  
14 inventors understand that there could be a --  
15 an embodiment in which every user was  
16 authorized for every piece of content.

17 And in that case it's  
18 unnecessary to check for authorization or to  
19 deal with billing.

20 In cases where it's necessary  
21 to check for authorization to deal with  
22 billing or to have things like personalized  
23 playlists, it would be necessary to have a  
24 way of entering the user information and of  
25 transmitting that from the playback unit to

1 the server.

2 Q Okay.

3 So how does the user in Berman  
4 select a song to be played on the Berman  
5 system?

6 A One example of this is given in the  
7 flowchart in Figure 3, which is described in  
8 the specification in column 6 starting at  
9 line 50 where it says, "Playback unit  
10 operating steps."

11 So the system is powered on,  
12 the user can enter some information if the  
13 user wants to constrain the kinds of content  
14 that are accessible.

15 The system verifies that its  
16 song list is up to date with respect to  
17 material available at the server by actually  
18 sending the song list back up to the server,  
19 and the server compares that with its current  
20 song list.

21 If the song list is not up to  
22 date, then the server provides a new song  
23 list to the playback unit.

24 That song list is displayed on  
25 the graphical user interface. The user uses

1 the graphical interface to select an artist  
2 and the song title, basically to select a  
3 media item, to use the terms you've been  
4 talking about.

5 That user selection is sent  
6 back up to the server. The server then  
7 provides a URL on the Internet where the  
8 actual content can be fetched.

9 Now, there are a number of  
10 variations on that theme, including having  
11 the playback unit actually download the first  
12 few seconds of each song on the list so that  
13 when the user selects a song, it can begin  
14 playing immediately with no delay.

15 And while the first few  
16 seconds are playing, the playback unit goes  
17 and gets the remainder of the song.

18 Q Okay.

19 Let's -- let's take a closer  
20 look at Figure 3.

21 So after the system powers on,  
22 in Step 3 the user selects artist, or title  
23 or album or genre, et cetera.

24 The system sends the current  
25 song list version to DUL server. What is the

1 current song list version?

2 Is that a song list or is that  
3 something else?

4 A No, I'm sorry, I may have -- I may  
5 have missed saying "version" when I was  
6 reciting the operation of this flowchart  
7 previously on the record, and what I meant to  
8 say is it sends the song list version back to  
9 the server.

10 So the communication protocol  
11 actually has an ID number associated with the  
12 song list for a particular user, and that's  
13 illustrated in Figure 6.

14 And so what it does is it  
15 sends the user ID and then the song list  
16 version. And then the server compares that  
17 song list version with the latest song list  
18 version number that might be associated with  
19 a server -- service or with just that user.

20 So that's akin to your  
21 figuring out if your phone is up to date by  
22 looking at the version number of the  
23 operating system rather than comparing byte  
24 by byte everything that's stored in the  
25 operating software.

1                   If the version number that was  
2                   transmitted does not match the latest  
3                   version, then the latest version will be  
4                   provided automatically.

5                   So the user doesn't see any of  
6                   this happening.

7                   Q     Would you agree that in Step 302,  
8                   the user is doing some sort of browsing?

9                   A     The user might be said to be doing  
10                  browsing or might be said just to be limiting  
11                  the scope of the song list that's going to  
12                  come back.

13                  So the user might say I only  
14                  want to listen to country music right now.

15                  Q     Okay.

16                  And so it's -- so once the  
17                  song list -- an updated song list is sent to  
18                  the playback unit in Step 308 or Box 308,  
19                  it's only after that point that the user is  
20                  able to select an artist and song title?

21                  A     Right.

22                  The user can select an artist,  
23                  for example, immediately upon turning on the  
24                  device, but the user can't necessarily select  
25                  a particular song until it's verified that



1 the song list is current.

2 As a practical matter, this  
3 probably occurs essentially instantaneously,  
4 because the song list isn't that big for  
5 something like this.

6 So it wouldn't take long to  
7 transmit it back down. It would need to be  
8 updated. And most of the time, it wouldn't  
9 need to be updated.

10 But yes, the answer is in Step  
11 310, that's where the user can go through the  
12 song list and select a song.

13 Q Now, is the song list in Berman the  
14 same as a playlist?

15 Is what you get in Box 308 a  
16 playlist?

17 MR. YAP: Objection, compound.

18 A Well, my understanding of a  
19 playlist is that it's a list of media items  
20 from which items may be selected, and that --  
21 this certainly agrees with my understanding  
22 of that term.

23 Q So when in Step 302 the user  
24 selects an artist, for example, and in step  
25 304 -- 304 a current song list version is

1 being sent to the DUL server and afterwards  
2 there is very -- a verification step of  
3 whether the song list is current, and if it  
4 is, only at that point in time can the user  
5 select an artist and song title, would you  
6 say that what is received from the DUL server  
7 is merely an updated song list and not the  
8 browse results?

9 (Deponent read document.)

10 A Well, I would say that until we  
11 reach Box 310, the user can't actually browse  
12 through the list and select a song, a  
13 specific song or multiple songs as described  
14 elsewhere in the spec.

15 Q To say that the record is clear,  
16 what information does the DUL send to the  
17 playback unit in Berman?

18 A The song list ultimately originates  
19 with the DUL. And if the song list that  
20 resides in the playback unit is current, then  
21 it doesn't send another one until there's a  
22 change in the song list.

23 So it's essentially giving a  
24 list of the available songs.

25 And as that gets updated, as

1 necessary, it supplies a new song list to the  
2 playback unit.

3 MR. YAP: Counsel, do you  
4 still have a lot more or -- we've been going  
5 on for about an hour and 40 minutes, and you  
6 probably only have about 20 minutes left,  
7 so --

8 MS. GLADSTEIN: Let me just  
9 ask two follow-up questions, and then we can  
10 take a break, and then I can regroup to see  
11 if there's anything more that we need to ask.

12 MR. YAP: Thank you.

13 BY MS. GLADSTEIN:

14 Q So a quick one with respect to the  
15 IRDA that we talked about earlier.

16 What is the operational range  
17 of the IRDA devices?

18 A I think that's typically within a  
19 room, a few meters.

20 Q A few meters?

21 A At most. I mean, it depends on a  
22 lot of things, like how powerful an LED one  
23 uses and how big the lens is on the receiver  
24 and things like that.

25 Q So in practical terms, the

1 application of IRDA technology in a remote  
2 control is not attractive?

3 A Well, I would say it is limited to  
4 using the remote control within a certain  
5 proximity of the things to be controlled.

6 People have built IR  
7 repeaters. And in fact those have been  
8 around for probably 20 years at this point,  
9 so that one can actually extend the range of  
10 IR remote controls across multiple rooms in  
11 the house, so that's a way to get around that  
12 limitation.

13 Q Okay.

14 I just wanted to follow up on  
15 the Berman and the user ID aspect.

16 So we talked earlier about  
17 there being a user ID associated with the  
18 playback unit.

19 Do you recall that?

20 A Well, what I'm really saying is  
21 that a user provides user information to a  
22 playback unit, and that's the information  
23 that the playback unit transmits to the  
24 server.

25 And apparently one can change

1       which user is associated with a playback  
2       unit.

3               Q       Is the user ID also associated with  
4       the remote in Berman?

5                        (Deponent read document.)

6               A       Well, the user ID could be entered  
7       on the remote control as well as being  
8       entered directly on the playback unit,  
9       because the two share a graphical user  
10       interface.

11                       And we're told in column 13  
12       that the information can be entered manually  
13       through the user display interface.

14                       Now, whether -- what the  
15       implications of that are to how long does the  
16       remote control remember it and what does it  
17       do with it, the Berman patent is silent on  
18       that point.

19               Q       So you're not able to say one way  
20       or the other whether a user ID is associated  
21       with the remote?

22                       MR. YAP:  Objection,  
23       mischaracterizes.

24               A       Well, what I can say is that it can  
25       be entered on the remote, but I don't know

1       whether the remote's communication with the  
2       playback unit or with anything else beyond  
3       the playback unit involves the user ID.

4           Q     If I were to carry the Berman  
5       remote to a different playback unit, not my  
6       playback unit, somebody else's Berman  
7       playback unit, I would be required to enter  
8       the user ID at the new playback unit?

9                   MR. YAP:  Objection,  
10       incomplete hypothetical.

11           A     You might or might not.  And we had  
12       this discussion a few moments ago where I  
13       said it might simply replicate whatever was  
14       on the graphical user interface of that  
15       playback unit, in which case if your ID had  
16       previously been entered into that playback  
17       unit or somebody else's ID had previously  
18       been entered into that playback unit, that  
19       playback unit would simply use that ID but  
20       would now allow you to use that remote  
21       control.

22                   Berman doesn't say whether or  
23       not there's a specific pairing of user ID  
24       with remote control and with playback unit  
25       such that the playback unit and the remote

1 control both have to have the same user ID to  
2 work together.

3 It just doesn't tell us that.

4 Q What would a person of ordinary  
5 skill in the art think about that?

6 A I think one of --

7 MR. YAP: Objection, form.

8 A I'm sorry. I think one of ordinary  
9 skill in the art reading the specification  
10 would say that the most likely case is just  
11 that the remote control is a replication of  
12 the graphical user interface on the playback  
13 unit.

14 And so whatever is -- whatever  
15 interactions are happening on one are  
16 happening on the other.

17 MS. GLADSTEIN: Okay.

18 Why don't we take a short  
19 break.

20 THE VIDEOGRAPHER: The time is  
21 6:47 p.m. We are going off the record. This  
22 is the end of Disk 4 in the deposition of V.  
23 Michael Bove, Jr.

24 (Recess.)

25 THE VIDEOGRAPHER: This is

1 Disk No. 5 in the deposition of V. Michael  
2 Bove, Jr.

3 We are back on the record.  
4 The time is 7:05 p.m.

5 BY MS. GLADSTEIN:

6 Q Dr. Bove, in connection with  
7 Exhibit 9 that's the Berman patent, I'm  
8 looking at Figure 3, but you're welcome to  
9 look at Figure 3 and anything else.

10 Is it -- what is your  
11 understanding of whether or not the updated  
12 song list that is sent from the DUL to the  
13 playback unit intended to be played in an  
14 order in which the song list is arranged when  
15 it is -- when the DUL sends it to the  
16 playback unit?

17 (Deponent read document.)

18 A So are you asking simply can a user  
19 select more than one song or are you asking  
20 does the user begin playing at a given point  
21 and the song plays in sequence?

22 Q The latter.

23 A Given that the remote control and  
24 the graphical user interface on the playback  
25 unit implement a skip forward button, one



1 would generally understand that the skip  
2 forward button is essentially just saying  
3 don't wait until the end of this song to play  
4 the next one. Go there now.

5 So we are told that there is a  
6 skip track or a skip forward button as part  
7 of the user interface, so that suggests, just  
8 as with the Windows Media Player reference we  
9 discussed earlier today, that the songs are  
10 in an order and can be played in that order.

11 I'll also note that there's  
12 discussion in column 9 that talks about  
13 playing in a random order as well as the user  
14 can record a program of track selections for  
15 playback in the programmed order.

16 This is in column 9 starting  
17 at about line 10.

18 Q Is the updated song list in Berman  
19 more than what the user specifically has  
20 asked for, seen in Step 302 when the user  
21 selects artist, title?

22 MR. YAP: Objection, outside  
23 the scope.

24 A That's not entirely clear from the  
25 description in column 6 and 7.

1           Q     How would a person of ordinary  
2           skill in the art reading the section of the  
3           playback unit operating step that begins at  
4           the bottom of column 6 over to column 7  
5           understand whether the user gets more than  
6           what he has asked for in the song list?

7           A     Well, as I said, it's my opinion --  
8           and I think one of ordinary skill in the art  
9           would see the same thing, that it's not  
10          entirely clear from this description what the  
11          scope is of what's on the song list that  
12          comes back.

13                     It is a list of available  
14          songs, and the user apparently can confine  
15          the query to specific categories. And  
16          there's a discussion of that at the top of  
17          column 7, but it does not give a detailed  
18          walk-through of exactly what the user does or  
19          what comes back in response to that query.

20          Q     So say if a user asks for a  
21          specific artist, would the update be of  
22          everything on the user's list or just those  
23          entries that correspond to the artist?

24                     (Deponent read document.)

25          A     Well, I suspect that if the user

1 put in a search saying give me only songs by  
2 a specific artist, what would end up being  
3 displayed would be only songs by that artist.  
4 That's the whole point of having that step.

5 But if one did something very  
6 general, if one entered the musical genre hip  
7 hop, then one could potentially get hundreds  
8 of thousands of songs in response to that.

9 Q Is that how a person of ordinary  
10 skill in the art would understand the  
11 operation of the playback unit?

12 A Well, what this says is that the  
13 user selects music category or type of song  
14 desired for playback from a list, which can  
15 include categories such as artist, song,  
16 title, album and musical genres.

17 It may through other things,  
18 and it might even be the case that it's  
19 possible to select none of them, in which  
20 case one gets everything available, although  
21 this doesn't say that in so many words.

22 But ultimately, the reason for  
23 doing that is so that every time one turns on  
24 the device, one doesn't get 50,000 songs that  
25 one might not want.

1                               Elsewhere in the  
2                               specification, there's information about  
3                               personalization for a particular user, and so  
4                               presumably, there is a mechanism by which a  
5                               user can create a specific song list using  
6                               the graphical user interface.

7                               Q        So, Dr. Bove, what is your  
8                               understanding of what is the updated list  
9                               that DUL sends to the playback unit?

10                              MR. YAP:  Objection, outside  
11                              the scope.

12                              A        Well, it can -- ultimately it  
13                              contains a list of songs that are available.  
14                              It includes information which might not be  
15                              displayed as such about where to access those  
16                              songs by means of URLs.

17                              It includes information about  
18                              song name, artist, title, all that sort of --  
19                              album title, whatever, and it may be bounded  
20                              by the user having circumscribed the scope of  
21                              it.

22                              Now, there also is a  
23                              description of personalization features, and  
24                              so it may be a user's personal song list  
25                              further circumscribed by the fact that this

1 morning I feel like listening to jazz.

2 (Exhibit 12 marked for  
3 identification.)

4 BY MS. GLADSTEIN:

5 Q Okay.

6 I'm handing you what has been  
7 marked as Exhibit 12.

8 This is a US Patent  
9 Application No. 2003/0045955 to Craig Janik.

10

11 I also refer you to Exhibit 3,  
12 which is your declaration on the '873 patent,  
13 and particularly page 13, Section G, titled  
14 "Bi in combination with Erekson and Janik  
15 955."

16 Would it be fair to say that  
17 you are relying on the shuffle playback  
18 feature disclosed in Janik 955, Exhibit 12.

19 In paragraph 99 of Exhibit 2,  
20 you're relying on the shuffle playback  
21 feature as the only feature of Janik that in  
22 combination with Bi and Erekson renders --  
23 strike that.

24 Would it be fair to say that  
25 the only aspect of Exhibit 12 that you're

1 relying on is the shuffling playback feature  
2 disclosed at paragraph 99?

3 A That is the only element of Janik  
4 955 that I'm relying on in this declaration  
5 for that particular Item G, yes.

6 Q And this is in connection with your  
7 opinion that it would have been obvious to  
8 one of skill in the art to add a shuffle  
9 feature to the combination of Bi and Erekson?

10 A This and also just one of ordinary  
11 skill in the art knowing that shuffle was a  
12 common feature in other audio-playing  
13 systems, yes.

14 Q And did you conduct prior art  
15 search to arrive at the combination of Bi and  
16 Erekson and Janik?

17 MR. YAP: Objection, work  
18 product.

19 MS. GLADSTEIN: No, it's not.

20 MR. YAP: Under the federal  
21 rules --

22 MS. GLADSTEIN: I am asking  
23 whether the expert has conducted a prior art  
24 search. I'm entitled to know whether the  
25 expert has conducted a prior art search.

1                   It's a yes or no answer.

2                   MR. YAP: That's fine.

3                   BY MS. GLADSTEIN:

4                   Q     Did you conduct a prior art search  
5                   to arrive at the combination of Bi, Erekson  
6                   and Janik?

7                   A     I believe we've already had a  
8                   discussion of Bi and Erekson, and so in this  
9                   particular case, let me -- so that would be  
10                  Item E up above.

11                  So all I'm doing here is I'm  
12                  saying one element that that is -- that does  
13                  not explicitly appear in the population of Bi  
14                  and Erekson is playing back in a random  
15                  order.

16                  Inasmuch as the Janik 955  
17                  reference was already a reference in the  
18                  general pool of references that were being  
19                  discussed in this case, I spotted that there  
20                  was random play in this reference and decided  
21                  that was as good as any for demonstrating  
22                  that.

23                  Q     Okay.

24                  So you did not conduct your  
25                  own independent prior art search to arrive at

1 a combination of Bi, Ereksen and Janik 99 --  
2 955?

3 MR. YAP: Same objection.

4 A Well, what I did, we already  
5 discussed how I arrived at Bi and Ereksen,  
6 and for claims that require random playback,  
7 I used this reference.

8 Q Did you conduct any prior art  
9 search in connection with your work on the  
10 '873 and the '099 patents?

11 A Yes.

12 Q And what type of prior art search  
13 did you conduct?

14 A I reviewed a variety of potential  
15 references, some of which may have landed in  
16 one or another of these declarations, and  
17 others of which I am not using.

18 But looking for combinations  
19 of references to deal with obviousness on  
20 claim elements that were not present in a  
21 single reference.

22 Q Where did you get the references  
23 that you reviewed from?

24 MR. YAP: Counsel, your time's  
25 up.



1 MS. GLADSTEIN: There's a  
2 question pending.

3 MR. YAP: Object. Work  
4 product.

5 MS. GLADSTEIN: The source of  
6 the references is not work product.

7 I'm entitled to know whether  
8 the expert obtained the references via his  
9 own efforts or whether the expert obtained  
10 the references that were provided to him by  
11 counsel.

12 That's not work product.

13 MR. YAP: Why don't you just  
14 ask it.

15 MS. GLADSTEIN: I have.

16 A I'll answer in this way:

17 There was a prior art search  
18 that was instituted by counsel. At about the  
19 same time, let's say late last summer, I did  
20 my own prior art search, and indeed it turned  
21 out that some of the same references that  
22 turned up in their search turned up in mine,  
23 so it's difficult to say where they came  
24 from.

25 In some cases, I used their

1 references, and in some cases I may have  
2 provided references to them that I had found  
3 that I thought were interesting.

4 At this point in time, I don't  
5 think I could ultimately reconstruct why any  
6 individual reference or the means by which  
7 any individual reference landed in my  
8 declaration or in their petition.

9 Q Okay. Thank you, Dr. Bove.

10 Would you like to take a break  
11 or would you like to continue?

12 MR. FEHRMAN: I think we can  
13 just go on.

14 THE DEPONENT: It's fine with  
15 me if we just wrap this up.

16 MR. FEHRMAN: Just another  
17 couple of hours.

18 THE DEPONENT: Sure.

19

20 EXAMINATION

21 BY MR. FEHRMAN:

22 Q Dr. Bove, I have just a couple of  
23 questions, we'll start with '099, which is  
24 pretty much where we were leaving off here.

25 So you had a lot of discussion

1 with counsel regarding the construction of  
2 playlist.

3 And as I recall, you were  
4 indicating that you had proposed a  
5 construction of a playlist that is a list of  
6 media items from which one or more selections  
7 may be made by a user and that the patent  
8 owner had proposed a construction that a  
9 playlist is a list referencing media items  
10 arranged to be played in a sequence?

11 A Yes.

12 Q And you reviewed the decision by  
13 the board to implement the IPR or '099?

14 A I did.

15 Q And you understand that they  
16 actually adopted yet a different  
17 construction?

18 A Yes.

19 Q And their construction, which is on  
20 page 9 of the decision, is simply a list of  
21 media selections --

22 I'm reading it from that.

23 A Yes, that is my recollection.

24 MS. GLADSTEIN: Counsel, hang  
25 on a second.

1 MR. FEHRMAN: Can you make  
2 that an exhibit?

3 MS. GLADSTEIN: Why don't you  
4 mark it as an exhibit so that Dr. Bove can  
5 follow, Exhibit 13.

6 MR. FEHRMAN: Thirteen. Thank  
7 you.

8 (Exhibit 13 marked for  
9 identification.)

10 BY MR. FEHRMAN:

11 Q So if you look at page 9 of  
12 Exhibit 13, the first paragraph --

13 A Yes.

14 Q -- can you review that quickly?

15 (Deponent read document.)

16 A Okay.

17 Q So you see that the board  
18 references column 1, lines 33 to 34 of the  
19 '099?

20 A Yes.

21 Q You have that in front of you as  
22 well now.

23 A I see that, yes.

24 Q Okay.

25 A This is in the background Section

1 of the '099 patent?

2 Q Right.

3 It states there that "A  
4 playlist is a list of user's favorite  
5 selections."

6 A Yes.

7 Q Just the simple statement.

8 And you're aware, aren't you,  
9 that the -- in an IPR proceeding, the  
10 construction that is to be employed is the  
11 broadest reasonable construction consistent  
12 with specification?

13 A IPRs are somewhat new to me, as  
14 perhaps to all of us, but I have been so  
15 information.

16 Q So do you believe that the board's  
17 construction is consistent with the broadest  
18 reasonable construction consistent with the  
19 specification?

20 A Yes, I believe that's a consistent  
21 construction.

22 Q Okay.

23 And there may be other  
24 reasonable constructions, but that's the  
25 broadest construction, reasonable

1 construction that's consistent with the  
2 specification?

3 A It would be hard to make broader.  
4 It has so few words in it.

5 Q Okay.

6 If you look at Berman  
7 reference --

8 A Exhibit 9.

9 Q I'm trying to find.

10 So you have quite a bit of  
11 discussion regarding the disclosure in  
12 Berman, column 13, lines 60 to 64.

13 MS. GLADSTEIN: Objection.  
14 Mischaracterization.

15 Q So you discussed the disclosure at  
16 column 13, lines 60 to 64, and specifically  
17 the statement that the GUI may be replicated  
18 on a remote control device as indicated in  
19 Figure 13?

20 A Yes.

21 Q And looking at Figure 13, there is  
22 a disclosure of a playback dataflow from  
23 playback unit to the user display interface  
24 at the line 9 in Figure 13?

25 A Yes.

1           Q     And if you look at column 14, lines  
2     5 to 9, is that basically indicating that?

3           A     Well, actually, I'd say in  
4     particular -- I'm sorry, you're talking about  
5     the dataflow from the playback unit to the  
6     graphical user interface?

7           Q     Right.

8           A     Right.

9                     And that's indicated at lines  
10    8 to 10 in column 14.  It says, The dataflow  
11    from the playback unit to the user display  
12    interface is indicated by the Figure 13  
13    dataflow arrow marked 9."

14          Q     Okay.

15                    So regarding the statement  
16    that the GUI may be replicated on a remote  
17    control device, do you think it would be --  
18    would have been difficult for a person of  
19    ordinary skill in the art to do such  
20    implementation?

21          A     Well --

22                    MS. GLADSTEIN:  Objection,  
23    leading.

24          A     -- what I would -- what I believe  
25    one of ordinary skill in the art would

1 understand is that there is a graphical user  
2 interface which is implemented as a piece of  
3 hardware, as well as some software, on the  
4 playback unit, and there is data that has to  
5 go from the -- let's say from the operating  
6 software of the playback unit to that  
7 display, and that is represented by the arrow  
8 marked 9.

9                   And the same information has  
10 to go outside the box and go to the  
11 replicated display on the remote control, and  
12 I don't think that would be a particularly  
13 difficult thing to do.

14                   The difference is that  
15 presumably inside the box, it goes over wires  
16 and presumably outside the box it needs to go  
17 over some non-wired interface, whether it's  
18 infrared or something else.

19           Q       So given the functional statement  
20 that the GUI can be replicated, do you  
21 believe that one of ordinary skill in the art  
22 could implement such a replication without  
23 undue experimentation?

24           A       I think it would be essentially off  
25 the shelf as of 2004.



1 Q Okay.

2 Let's go back to the '873 for  
3 a few minutes, the Bi and the Erekson  
4 references as well.

5 A Okay.

6 Q So if you first look at Bi,  
7 paragraph 29?

8 A Yes.

9 Q And you had discussed this earlier,  
10 the last sentence of that states that there  
11 is an IR transmitter in the navigator 260.

12 A In the IR -- right. There is an IR  
13 transmitter 265 in the navigator 260, yes.

14 Q Correct.

15 And you have some discussion  
16 of previously if you were in a different room  
17 or something, is an IR transmitter basically  
18 limited to line of sight?

19 A Unless it reflects off something,  
20 yes.

21 Q Okay.

22 So normal operations in the  
23 same room?

24 A Yes.

25 Q And with an open space?

1           A     Yes.

2           Q     So regarding Erekson, Erekson's  
3           disclosure is the use of a wireless link,  
4           such as Bluetooth, to control various  
5           devices; is that correct?

6           A     That is correct.

7           Q     So, for example, at column 4, lines  
8           41 to 52?

9           A     Right.

10                         So this discusses Bluetooth as  
11           well as other standards, like 802.11, which  
12           we now know as Wi-Fi.

13                         MS. GLADSTEIN:  Objection.

14                         Was there a question pending  
15           after you stated "so, for example, column 4,  
16           lines 41 to 52"?

17                         MR. FEHRMAN:  I'm sorry, I  
18           didn't phrase it as a question, but I asked  
19           him to confirm that it does disclose use of a  
20           wireless connection, such as Bluetooth, for  
21           its remote control.

22           A     What I said is that it does  
23           disclose Bluetooth as well as other wireless  
24           standards.

25           Q     And does it say a similar thing at

1 column 2, lines 22 to 24?

2 MS. GLADSTEIN: Objection,  
3 leading.

4 Q Will you look at column 2, lines 22  
5 to 24.

6 A It says here, "In a preferred  
7 embodiment the transceiver and the remote  
8 devices are Bluetooth-enabled devices. So  
9 that's consistent with the language in  
10 column 4.

11 Q Is a Bluetooth device limited to  
12 line-of-sight applications?

13 A No.

14 Q And is that an advantage over an IR  
15 transmitter or IR remote?

16 A Yes.

17 Q So a Bluetooth type or 802.11 type  
18 of remote control would provide at least that  
19 advantage over an IR remote; is that correct?

20 A Well, in fact, this reference  
21 discusses that in column 1, where -- starting  
22 at line 45, it says, "Commonly remote control  
23 devices use infrared beams to communicate  
24 commands to the device that is to be  
25 controlled, and so the remotes can only be

1 used for a line-of-sight applications.

2 "Devices behind an object,  
3 around a corner or in another room cannot be  
4 controlled if they are not in the line of  
5 sight of an infrared remote.

6 Q If you can look at column 2,  
7 line 58 also, 58 to 64.

8 A Right.

9 This, again, is discussing the  
10 fact that under Bluetooth, we were not  
11 limited to line-of-sight communication.

12 Q All right.

13 And the last sentence of that  
14 starts, "With a radio connection"?

15 A With a --

16 MS. GLADSTEIN: Is there a  
17 question, counsel?

18 MR. FEHRMAN: I'm asking him  
19 to make sure -- to read that statement.

20 A So this is another reinforcement of  
21 the same point where it just says "With a  
22 radio connection, the system of the present  
23 invention is not limited to line-of-sight  
24 applications."

25 MS. GLADSTEIN: And is there a

1 question --

2 MR. FEHRMAN: I'm following up  
3 with a question.

4 Q So would the use of an  
5 all-Bluetooth remote control for plural  
6 devices, such as disclosed in Erekson,  
7 provide a benefit over using a remote, such  
8 as that in Bi, that uses an IR transmitter?

9 A Particularly in the case where the  
10 devices were not all located in close  
11 proximity to one another, so that one would  
12 not have to point the remote control  
13 individually at the devices.

14 Q So would that benefit provide one  
15 reason to one of ordinary skill in the art to  
16 use the combination of features of Bi with  
17 those of Erekson?

18 MS. GLADSTEIN: Objection,  
19 leading.

20 A Well, one reading Bi would see the  
21 discussion of infrared, and then one reading  
22 Erekson would say whatever you can do with  
23 infrared you can do better with Bluetooth.

24 And inasmuch as they're both  
25 talking about controlling audio devices, it

1 would make sense to one of ordinary skill in  
2 the art to follow the Erekson's suggestion to  
3 use Bluetooth.

4 Q Okay.

5 That's all the questions that  
6 I have.

7 MS. GLADSTEIN: Give us --  
8 let's go off the record for just ten minutes  
9 and --

10 THE VIDEOGRAPHER: The time is  
11 7:37 p.m. We are going off the record.

12 (Recess.)

13 THE VIDEOGRAPHER: We are back  
14 on the record. The time is 7:56 p.m.

15 BY MS. GLADSTEIN:

16 Q Dr. Bove, with respect to the  
17 standard for claim construction in the inter  
18 partes review proceedings, isn't it true that  
19 the broadest reason of all claim construction  
20 has to be consistent with the specification  
21 of the patent?

22 A I have been so informed.

23 Q Now, you referred to line 33, 34 in  
24 column 1 of the '099 that states a playlist  
25 is a list of a user's favorite selections.

1           A     Sorry, this -- you're referring to  
2     in my declaration or in my testimony?

3           Q     I'm referring -- I'm referring to  
4     Exhibit 6, but you have referred to it --  
5     your counsel has referred to it just a few  
6     minutes ago as the -- the support and the  
7     specification for the claim construction  
8     proposed by the petitioner.

9                     And I would like to direct  
10    your attention to the next sentence in  
11    column 1 at line 34 that states, "Popular  
12    personal computer (PC) media playing  
13    programs, such as Windows Media Player, a  
14    trademark of Microsoft Corporation, offer the  
15    capability for a user to compile a playlist."

16                     Do you see that?

17           A     I do.

18                     But I would also like to note  
19    that it was actually the decision that  
20    referenced lines 33 and 34 in support of the  
21    board's construction.

22                     I didn't reference that  
23    language in support of their construction.  
24    They cited it.

25           Q     If -- if I may direct your

1 attention to your declaration, which is  
2 Exhibit 4, at paragraph 12 on page 5, you  
3 state "A discussion of playlists in the  
4 specification describes a playlist as, in  
5 quotes, a list of users' favorite  
6 selections"?

7 A Right.

8 But there I'm not discussing  
9 the board's construction, because the board's  
10 construction had not yet been made.

11 Q That is correct. I'm not saying  
12 that you are discussing the board's  
13 construction.

14 A I'm sorry, I thought when you first  
15 posed the question you said I had cited lines  
16 33 and 34 in column 1 in support of the  
17 board's construction.

18 And what I'm saying is no, the  
19 board cites lines 33 and 34 in support of  
20 their construction.

21 Q That is correct, but you're  
22 referring to that sentence in support of your  
23 position on the construction of the term  
24 "playlist," and I would like to ask you the  
25 following:



1                   Since we've agreed that the  
2                   rule is that in the IPR proceedings the  
3                   claims are to be construed -- are to be given  
4                   their broadest reasonable interpretation in  
5                   view of the specification, I am pointing your  
6                   attention to the next sentence in the  
7                   specification after the one that is quoted in  
8                   your declaration and is also quoted in the  
9                   board's decision on institution that says  
10                  that the Windows Media Player -- and I'm  
11                  paraphrasing -- offers the capability of a  
12                  user to compile a playlist.

13                   Now, isn't it true that when  
14                   you compile a playlist using the Windows  
15                   Media Player, you compile a list that  
16                   contains items arranged in an order?

17                  A       Well, my recollection, and it's  
18                  been a while since I used Windows Media  
19                  Player -- I suppose we could spend some time  
20                  going through the manual -- is that Windows  
21                  Media Player essentially allows the user the  
22                  ability to append items to the end of an  
23                  existing playlist.

24                   So the "add item to playlist"  
25                   functionality in Windows Media Player, as I

1 recall, essentially just appends it to the  
2 end of the existing playlist.

3 I could spend some time going  
4 through that exhibit if we'd like to.

5 Q The Windows Media Player, I'll just  
6 represent for the record, also allows a user  
7 to create a brand-new playlist.

8 A Understood.

9 But what I'm saying is that  
10 the mechanism for doing it is to append items  
11 to a playlist.

12 So you could say the creation  
13 of a new one is taking what a computer  
14 scientist would call the null playlist and  
15 appending something to it, and then  
16 recursing on that process.

17 (Counsel conferred.)

18 BY MS. GLADSTEIN:

19 Q Okay.

20 Dr. Bove, isn't it true that a  
21 playlist that the Windows Media Player makes  
22 has an order no matter how that list  
23 ultimately gets generated?

24 A Yes.

25 As we discussed earlier, it

1 being a list, contains items in an order.

2 Q If you look down in column 1 at  
3 lines 47 through 53, the paragraph that  
4 states, "Playlists also facilitate the  
5 playing of a plurality of selections in a  
6 particular order. That is, the playlist can  
7 be compiled in an order in which the playing  
8 of selections therefrom is desired. The  
9 selections may then be automatically played  
10 sequentially from the playlist. Typically,  
11 selections may also be played randomly from a  
12 playlist."

13 A Is that a question?

14 Q Did you see that paragraph?

15 A Yes.

16 Q So in view of this paragraph, does  
17 this reinforce the notion that a playlist  
18 necessarily is a list of items arranged in an  
19 order?

20 A It is a list of items, and as we've  
21 been saying since 10:00 this morning, being a  
22 list, items on a list are in an order.

23 And I don't need to refer to  
24 this language to have that reinforced.  
25 That's a property of lists.

1           Q     And you don't see anything in the  
2           specification of the '099 that would  
3           contradict the concept that items on a list  
4           are arranged in an order?

5                     MR. YAP:  Objection,  
6           mischaracterizes.

7                     MS. GLADSTEIN:  It's a  
8           question.

9           A     I don't see anything in here that  
10          says one could have an un-ordered list.

11          Q     Can I ask you a few questions with  
12          respect to Exhibit 7, which is the Bi  
13          reference?

14                    I believe you testified on  
15          redirect that a person of ordinary skill in  
16          the art would replace the IR transmitter in  
17          Bi with a wireless transmitter; is that  
18          right?

19          A     If one wanted to --

20                    MR. YAP:  Objection,  
21          mischaracterizes.

22          A     I was going to say, if one wanted  
23          to overcome the limitations that we  
24          discussed --

25          Q     Which --

1           A     -- of IR, which include line of  
2     sight.

3           Q     So to overcome a line-of-sight  
4     limitation, a person of ordinary skill in the  
5     art would replace the IR transmitter with a  
6     wireless transmitter?

7           A     That would be one way to do it,  
8     yes.

9                     But I'm not completely sure.  
10    Are we really talking about the Bi reference  
11    here or are we talking about some other  
12    reference? Because the navigator in the Bi  
13    reference is not restricted to IR.

14                    Are we talking about the  
15    Berman reference, perhaps?

16                    MR. YAP: Exhibit 9.

17           Q     The declaration. Okay.

18                    It's been a long day, and I  
19    think what we're -- what your counsel has  
20    asked you on redirect -- and correct me if  
21    I'm wrong, because it has been a very long  
22    day -- is that it would be obvious to a  
23    person of ordinary skill in the art to  
24    replace the remote of Bi with the remote of  
25    the Erekson because the remote of Erekson

1 enhances the capability of a remote of Bi by  
2 virtue of it being a wireless remote as  
3 opposed to an IR remote.

4 Do you recall that?

5 MR. FEHRMAN: It's not a  
6 completely accurate characterization, but if  
7 you want to ask him that, that's fine.

8 MS. GLADSTEIN: But the  
9 question was posed with a disclaimer.

10 Q Correct me if I'm off on this  
11 characterization of the gist of the question  
12 and answer that was given on redirect.

13 (Deponent read document.)

14 A My understanding is that the reason  
15 for combining the remote control of Erekson  
16 with the system of Bi was not because of the  
17 communication method but because of the  
18 ability to control multiple devices using a  
19 single communication channel.

20 Q Is it your position that Bi is not  
21 capable of controlling multiple devices?

22 A As I say -- and again, we're  
23 talking about my declaration, Exhibit 3 of  
24 the '873, in paragraph 27, I say that -- I  
25 note "While the Bi reference does not

1 disclose selection and control of multiple  
2 devices on the display, the Erekson reference  
3 does disclose the control of several devices  
4 from a handheld computer used as a wireless  
5 remote control."

6 So I was just saying that one  
7 could take the known technique from Erekson  
8 and use it in combination with the remainder  
9 of the system disclosed in Bi.

10 So Bi has a wireless control  
11 of one device. Erekson has wireless -- and I  
12 will say actually RF, to be more precise, it  
13 has an RF control of one device. Erekson has  
14 an RF control of multiple devices.

15 Both of them are in the same  
16 general domain in terms of the kinds of  
17 devices they're controlling.

18 And so that's why it's my  
19 opinion that it would be obvious for one of  
20 ordinary skill in the art to use the Erekson  
21 remote control in conjunction with the Bi  
22 system.

23 Q So how would you go about changing  
24 the navigator of Bi to a wireless system of  
25 Erekson?

1           A     Well, the navigator of Bi is  
2           already wireless in terms of how it  
3           communicates with the computing platform.

4                     And indeed we even learn from  
5           a reading of the specification -- let me just  
6           use the language in paragraph 20 of Bi. We  
7           learned that the wireless communication can  
8           be over Bluetooth. So the navigator already  
9           has a Bluetooth radio in it.

10                    The only thing that we're  
11           doing to use Erekson with Bi is we are adding  
12           functionality to the display of Bi akin to  
13           the functionality of Erekson that allows it  
14           to select from multiple devices and direct  
15           the commands to the device of choice.

16                    In so doing, we wouldn't need  
17           the infrared aspect of the navigator of Bi  
18           anymore, provided the controllable devices  
19           were equipped with Bluetooth or other RF  
20           controllability.

21           Q     Let me -- let me ask you this:

22                    Bi certainly discloses  
23           controlling of multiple devices, such as, you  
24           know, interaction with the platform -- of the  
25           computing platform as well as a stereo,



1 right?

2 So in 2004, what motivation  
3 would you have to employ the system of  
4 Erekson with the system of Bi except for  
5 hindsight?

6 A No.

7 What I'm actually saying is  
8 that the Bi reference does not explicitly  
9 disclose functionality on the display that  
10 allows the selection of multiple devices.

11 So there is no illustration in  
12 Bi that corresponds to Figure 7 of Erekson.

13 Q But why would you want to have that  
14 functional in Bi where Bi's navigator is  
15 capable of talking primarily to the computing  
16 platform and then also tell a stereo player  
17 to play a song as opposed to a system where  
18 the navigator can talk to the Internet or to  
19 a data server?

20 MR. YAP: Objection, asked and  
21 answered.

22 A Yes, I've already answered this  
23 question earlier.

24 One of the reasons is, as  
25 we've been discussing, the fact that the

1 infrared connection would be limited to line  
2 of sight and the wireless wouldn't.

3 So that if we have the  
4 computing platform of Bi sitting in a room  
5 next to some other audio component that I  
6 want to control, I can't control both things  
7 unless I'm standing in front of them both.

8 Even though I could  
9 communicate with the computing platform from  
10 another room, I couldn't turn on the audio  
11 amplifier from another room because that  
12 interface would be infrared.

13 It would certainly be  
14 advantageous to have the ability to have the  
15 same conductivity range for all the devices  
16 I'm controlling instead of having some of  
17 them controllable only line of sight and  
18 others controllable at a distance.

19 And indeed that's discussed in  
20 Erekson as a reason for wanting to use  
21 Bluetooth for everything.

22 Q Okay.

23 My question is, aside from the  
24 benefit of a wireless transmitter being able  
25 to transmit the signal farther than a few

1 feet or the line of sight, what other  
2 motivation in 2004 a person of ordinary skill  
3 in the art would have reading Bi to  
4 incorporate Erekson into Bi?

5 MR. YAP: Objection, asked and  
6 answered.

7 A One of our -- I think I've answered  
8 it three times now, but I'll do it a fourth  
9 time.

10 Q Aside --

11 A One reading --

12 Q -- from the elimination of the  
13 line-of-sight limitation with respect to  
14 controlling a stereo device.

15 MR. YAP: Asked and answered.

16 A Okay.

17 I think the other -- another  
18 advantage would be simply unifying the  
19 control, because Bi does not describe in the  
20 specification or in the illustrations the  
21 figures something like Figure 7 of Erekson,  
22 which says you pick the device, you send a  
23 command to it.

24 Now, that's not to say that Bi  
25 doesn't potentially have that functionality,

1 but it's not called out explicitly in Bi. It  
2 is called out in Erekson.

3 Q So what would you need to change in  
4 the navigator 260 of Bi to incorporate the  
5 functionality of Erekson?

6 MR. YAP: Objection, asked and  
7 answered.

8 A I think one would have to  
9 potentially change the user interface to  
10 allow selection of multiple devices from some  
11 universe of visible devices.

12 And again, recall that with  
13 infrared remote control that's one way, the  
14 user can't see what devices are available for  
15 control, whereas with a system like Erekson,  
16 Erekson ascertains what devices may be  
17 controlled, because those are the devices  
18 that have responded to Bluetooth.

19 So it's able to adapt to  
20 whatever devices happen to be available at  
21 the time as opposed to saying we're going to  
22 hard-wire this to control the stereo using  
23 infrared and if you bring in a CD player, the  
24 remote control won't know about it.

25 With a Bluetooth control, the

1 remote control can discover that CD player as  
2 well.

3 Q In the system of Bi where the  
4 computing platform is communicating with the  
5 navigator and the navigator has the  
6 capability to send -- to request a stereo  
7 device to play a song, why would a person of  
8 ordinary skill in the art want to have the  
9 capability of selecting multiple other  
10 devices from a list of devices to play a  
11 song?

12 MR. YAP: Objection, asked and  
13 answered.

14 A I might, for example, want to  
15 direct the sound to come out of a different  
16 set of speakers.

17 Q So besides changes to the user  
18 interface, what else would need to be changed  
19 in Bi to incorporate the system of Erekson?

20 A Well, that would depend upon which  
21 of the several potential wireless  
22 communication protocols were used.

23 I think in the case of a  
24 Bluetooth, it would not be a matter of just  
25 having to establish conductivity between the

1 navigator and the computing platform, so  
2 there might be some additional device  
3 discovery software.

4 Q Anything else?

5 A I think that would be the majority  
6 of what would need to be done.

7 The computing platform  
8 wouldn't have to change at all. It would all  
9 be changes to the navigator.

10 (Counsel conferred.)

11 Q Dr. Bove, thank you very much. I  
12 have nothing further.

13 A Thank you. Might I request  
14 given --

15 THE VIDEOGRAPHER: The time is  
16 8:20 p.m. We're going off the record.

17 This is the end of Disk 5 in  
18 the deposition of V. Michael Bove, Jr.

19 (Proceedings adjourned.)

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C E R T I F I C A T E

I, Jill K. Ruggieri, Registered Merit Reporter and Certified Realtime Reporter, do certify that the deposition of VICTOR MICHAEL BOVE, JR., Ph.D., in the above-captioned matter, on May 29, 2014, was stenographically recorded by me; that the witness provided satisfactory evidence of identification, as prescribed by Executive Order 455 (03-13) issued by the Governor of the Commonwealth of Massachusetts, before being sworn by me, a Notary Public in and for the Commonwealth of Massachusetts; that the transcript produced by me is a true record and accurate record of the proceedings to the best of my ability; that I am neither counsel for, related to, nor employed by any of the parties to the above action; and further that I am not a relative or employee of any attorney or counsel employed by the parties thereto, nor financially or otherwise interested in the outcome of the action.

\_\_\_\_\_  
Jill K. Ruggieri, RPR, RMR, CRR

Transcript review was requested of the reporter.

1 WITNESS: VICTOR MICHAEL BOVE, JR., Ph.D.

2 SIGNATURE PAGE/ERRATA SHEET

3	PAGE	LINE	CHANGE OR CORRECTION AND REASON
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____
7	_____	_____	_____
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11	_____	_____	_____

13 I have read the transcript of my deposition taken  
14 on May 29, 2014. Except for any  
15 corrections or changes noted above, I hereby  
16 subscribe to the transcript as an accurate record  
17 of the statements made by me.

18 Signed under the pains and penalties of perjury.

19 Deponent: \_\_\_\_\_ /\_\_\_\_/2014

20 VICTOR MICHAEL BOVE, JR., Ph.D.

21 CERTIFICATE OF NOTARY PUBLIC

22 Sworn and subscribed to before me this

23 \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

24 \_\_\_\_\_

25 NOTARY PUBLIC

MY COMMISSION EXPIRES



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# **EXHIBIT 1**

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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YAMAHA CORPORATION OF AMERICA  
Petitioner

v.

BLACK HILLS MEDIA, LLC  
Patent Owner

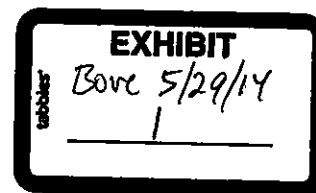
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Case IPR2013-00598  
Patent 8,214,873 B2

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**NOTICE OF DEPOSITION OF  
V. MICHAEL BOVE, JR.**

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P.O. Box 1450  
Alexandria, VA 22313-1450





*NOTICE OF DEPOSITION OF V. MICHAEL BOVE, JR.*

In accordance with 37 C.F.R. § 42.53, Patent Owner Black Hills Media, LLC provides notice to Petitioner Yamaha Corporation of America that the deposition of V. Michael Bove, Jr. will be held Thursday, May 29, 2014, commencing at 9:00am in the offices of Pepper Hamilton LLP, 125 High Street, 19<sup>th</sup> Floor – High Street Tower, Boston, MA 02110-2736. The deposition will be recorded by stenographic and audiovisual (videotape) means before an officer duly authorized by law to administer oaths under 35 U.S.C. § 23.

Pursuant to 37 C.F.R. § 42.53(d)(1), the parties have conferred and have agreed on this date and location for the deposition.

Respectfully submitted,

/Lana Gladstein/

Lana Gladstein (Reg. No. 48,502)  
Lead Attorney for Patent Owner Black Hills  
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**CERTIFICATE OF SERVICE**

The undersigned hereby certifies that the above-captioned "Notice of Deposition of V. Michael Bove, Jr." was served in its entirety on April 25, 2014, via email upon the following counsel of record for the Patent Owner:

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# **EXHIBIT 2**

UNITED STATES PATENT AND TRADEMARK OFFICE

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YAMAHA CORPORATION OF AMERICA  
Petitioner

v.

BLACK HILLS MEDIA, LLC  
Patent Owner

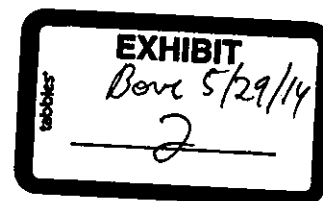
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Case IPR2013-00597  
Patent 8,230,099 B2

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Alexandria, VA 22313-1450



*NOTICE OF DEPOSITION OF V. MICHAEL BOVE, JR.*

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Pursuant to 37 C.F.R. § 42.53(d)(1), the parties have conferred and have agreed on this date and location for the deposition.

Respectfully submitted,

/Reza Mollaaghababa/

Reza Mollaaghababa (Reg. No. 43,810)  
Lead Attorney for Patent Owner Black Hills  
Media, LLC

Date: April 25, 2014  
PEPPER HAMILTON LLP  
125 High Street  
19<sup>th</sup> Floor – High Street Tower  
Boston, MA 02110-2736  
(617) 204-5100

**CERTIFICATE OF SERVICE**

The undersigned hereby certifies that the above-captioned "Notice of Deposition of V. Michael Bove, Jr." was served in its entirety on April 25, 2014, via email upon the following counsel of record for the Patent Owner:

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# **EXHIBIT 3**

Patent No. 8,214,873  
Petition For *Inter Partes* Review

**UNITED STATES PATENT AND TRADEMARK OFFICE**

**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

Yamaha Corporation of America  
Petitioner

v.

Black Hills Media, LLC  
Patent Owner

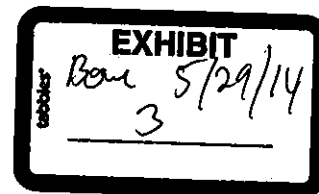
Patent No. 8,214,873

Issue Date: July 3, 2012

Title: METHOD, SYSTEM, AND COMPUTER-READABLE MEDIUM FOR  
EMPLOYING A FIRST DEVICE TO DIRECT A NETWORKED AUDIO  
DEVICE TO RENDER A PLAYLIST

*Inter Partes* Review No. \_\_\_\_\_

**DECLARATION OF V. MICHAEL BOVE, JR.**





I, V. Michael Bove, Jr., make this declaration in connection with the proceeding identified above.

## **I. INTRODUCTION**

1. I have been retained by counsel for Yamaha Corporation of America ("Yamaha") as a technical expert in connection with the proceeding identified above. I submit this declaration in support of Yamaha's Petition for *Inter Partes* Review of United States Patent No. 8,214,873 ("the '873 patent").

2. I am being paid at an hourly rate for my work on this matter. I have no personal or financial stake or interest in the outcome of the present proceeding.

## **II. QUALIFICATIONS**

3. I am employed as a Principal Research Scientist at the Massachusetts Institute of Technology, where I am also currently head of the Object-Based Media group at the Media Laboratory, co-director of the Center for Future Storytelling, and co-director of the consumer electronics working group CE2.0. I was also co-founder of and technical advisor to WatchPoint Media, Inc., an interactive television products and services company with offices in Lexington, Massachusetts and London, England, which is now part of Ericsson. I currently serve as technical advisor to One Laptop Per Child, creators of an inexpensive laptop computer for children in developing nations.

4. I hold an S.B. in Electrical Engineering, an S.M. in Visual Studies, and a Ph.D. in Media Technology, all from the Massachusetts Institute of Technology. I have authored over ninety journal and conference papers on distributed media, interactive media, and digital media. I have supervised over fifty graduate theses, and since 1990 have taught a graduate subject at MIT called Signals, Systems and Information for Media Technology. I am a Fellow of the Society of Photo-Instrumentation Engineers, a member of the Board of Editors of the Journal of the Society of Motion Picture and Television Engineers, and a member of a number of other professional organizations including the Optical Society of America, the Association for Computing Machinery, and the Institute of Electrical and Electronic Engineers. I am a named inventor on seventeen U.S. patents. I served as General Chair of the 1996 ACM Multimedia Conference and of the 2006 IEEE Consumer Communications and Networking Conference (CCNC'06). Attached as Appendix A is a copy of my curriculum vitae.

### **III. MATERIALS CONSIDERED**

5. In preparing this declaration, I have reviewed, among other things, the following materials: (a) the '873 patent and its prosecution history; (b) U.S. Patent Application Publication 2002/0068558 A1 ("Janik '558"); (c) U.S. Patent Application Publication US2002/0065902 ("Janik '902"); (d) U.S. Patent Application Publication US2002/0040255 ("Neoh"); (e) Cardoza, *Take a Look at*

*the Latest Integrated PDA/Cell Phone Devices*, TECHREPUBLIC, Apr. 8, 2002 (“Cardoza”); (f) U.S. Patent Application Publication US2003/0045955 (“Janik '955”); (g) U.S. Patent Application Publication US2002/0087996 (“Bi”); (h) U.S. Patent No. 6,622,018 (“Erekson”); (i) Sony Ericsson P800/P802 White Paper (“the P800”); (j) U.S. Patent No. 6,502,194 (“Berman”); (k) U.S. Patent No. 6,127,941 (“Van Ryzin”), and (l) the Petition for *Inter Partes* Review of the '873 patent to which my declaration relates.

#### IV. DEFINITIONS AND STANDARDS

6. I have been informed and understand that claims are construed from the perspective of one of ordinary skill in the art at the time of the claimed invention, and that during *inter partes* review, claims are to be given their broadest reasonable construction consistent with the specification.

7. I have also been informed and understand that the subject matter of a patent claim is obvious if the differences between the subject matter of the claim and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I have also been informed that the framework for determining obviousness involves considering the following factors: (i) the scope and content of the prior art; (ii) the differences between the prior art and the claimed subject matter; (iii) the level of ordinary skill in the art;

and (iv) any objective evidence of non-obviousness. I understand that the claimed subject matter would have been obvious to one of ordinary skill in the art if, for example, it results from the combination of known elements according to known methods to yield predictable results, the simple substitution of one known element for another to obtain predictable results, use of a known technique to improve similar devices in the same way or applying a known technique to a known device ready for improvement to yield predictable results. I have also been informed that the analysis of obviousness may include recourse to logic, judgment and common sense available to the person of ordinary skill in the art that does not necessarily require explication in any reference.

8. In my opinion, a person of ordinary skill in the art pertaining to the '873 patent would have at least a bachelor's degree in computer science or electrical engineering, and at least one year of practical experience with networked multimedia.

9. I have been informed that the relevant date for considering the patentability of the claims of the '873 patent is May of 2004. Based on my education and experience in the fields of networked digital media and consumer electronics, I believe I am qualified to provide opinions about how one of ordinary skill in the art in 2004 would have interpreted and understood the '873 patent and the prior art discussed below.

## V. THE '873 PATENT

10. The claims of the '873 patent are directed to a system and method by which a handheld remote control can display a device identifier for selecting a media player, can receive a playlist, allow a user to select one or more songs from the playlist, and cause playback of the song or songs on the media player without the user having to interact directly with the media player. The remote control can also control other typical media player functions such as volume, tone, etc.

## VI. CLAIM CONSTRUCTION

11. I have been asked to provide my opinion on a number of claim terms by discussing what one of ordinary skill in the art at the time of the patent filing would regard as the broadest reasonable interpretation consistent with the specification. In each case, my opinion agrees with the position taken in Yamaha's Petition for *Inter Partes* Review.

### A. "identifier"

12. The term "identifier" appears in multiple claims in association with devices ("device identifier") and media ("media item identifier").

13. When devices and media items are discussed in the specification, they appear as entities that are selected by a user from a displayed list. For example, 11:63-64 states that, "[a] particular second device may be selected from a list of second devices that is displayed on the first device." Similarly, at 10:36-38,

“a listener selects a song to be played from a playlist on the first device and the song is then played on another device, e.g., a second device.” Therefore, although the claims recite that the media identifiers are received and selected, the claims do not explicitly recite that they are displayed; it is apparent that they cannot be selected without being displayed.

14. Accordingly, I agree with Yamaha’s proposed construction, “a visual representation of an item that is displayed and may be selected, including representations of devices and songs contained in a playlist.”

**B. “directing, from the first device, the second device to receive a media item”**

15. Each of the independent claims of the '873 patent requires that a second device receives or obtains a media item selected with an identifier displayed on the first device.

16. It is my understanding from the specification and from the prosecution history that the second device is not a passive destination for the media item but must itself take some action as part of obtaining the item. Step 48 in FIG. 4, for example, shows that the second device must “send information representative of the selected song(s) from the second device to a content server”; this is discussed in more detail at 12:8-23.

17. It is thus my opinion that for consistency with the specification, the reception of the media item by the second device requires some active participation in the process by the second device after receiving direction from the first device.

**C. “download” and “stream”**

18. Claims 15, 18, 28, and 44 of the '873 patent require downloading a media item, while claims 16, 19, 29, and 45 require streaming a media item. One of ordinary skill in the art would understand there to be a distinction between these two modes of operation. The customary meaning of “download” would be the reception and storage of a file (such as a media item) in its entirety to a local storage device such that it can be accessed as desired, while “streaming” of a media file means transmitting and playing on-the-fly with no storage at the receiver except for buffering.

19. I note, however, that the '873 specification uses these two terms essentially interchangeably (*e.g.*, “the present invention generally does not attempt to store songs within the music rendering devices themselves, but rather generally downloads songs via a network, as needed” at 10:7-10). The specification refers to saving a file in its entirety as “caching” at 10:22-29. *See also* 12:41-55. It is thus my opinion that “download” in the claims should be construed in the same way that one of ordinary skill in the art would customarily construe “stream,” namely

receiving and playing a media item in real time on an as-needed basis for immediate playing.

## **VII. ANALYSIS OF PRIOR ART**

### **A. Janik '558 In Combination With Janik '902**

20. I have been asked whether it would have been obvious to a person of ordinary skill in the art to employ the features of Janik '902 with the system disclosed in Janik '558. It is my opinion that one of ordinary skill in the art would have recognized that the Janik '558 and '902 references originate from the same source and describe systems of similar type. More particularly, the Janik '558 reference describes a complete system (including a webpad used as a remote control for accessing playlists), while the '902 reference discloses the features and operation of the webpad in more detail. Thus, it is my opinion that one of ordinary skill in the art would have found it obvious to employ features of the '902 reference – specifically the nested playlist structure and the graphical user interface for displaying and selecting tracks from the playlist – with the system disclosed in the '558 reference.

21. I have additionally been asked whether it would have been obvious to include tone control functionality (as in '873 claims 9 and 38) to the above combination of references. It is my opinion that one of ordinary skill in the art would have understood tone (like the volume and balance controls disclosed in



the Janik '558 reference at [0178]) to be a basic control for an audio system and would have found it obvious to include it in a remote control for an audio system.

22. I have further been asked whether it would have been obvious to implement a remote control webpad without local audio playback capability (as in claim 24). It is my opinion that one of ordinary skill in the art would understand that such a configuration would still operate as a remote control as required in claim 24, and might be desirable under certain design constraints (such as creating a lower-cost product).

**B. Janik '558 And Janik '902 In Combination With Neoh**

23. I have been asked whether it would have been obvious to one of ordinary skill in the art to include tone control functionality (as in '873 claims 9 and 38) in the combination of Janik '558 and '902 references, in light of the Neoh reference's disclosure of a remote control providing tone control. Again, it is my opinion that one of ordinary skill in the art would have understood tone (like the volume and balance controls disclosed in the Janik '558 reference at [0178]) to be a basic control for an audio system, and would have further found the feature disclosed in Neoh to be an obvious addition to the remote control of the Janik references to provide more functionality at the remote.

**C. Janik '558 And Janik '902 In Combination With Cardoza**

24. I have been asked whether it would have been obvious to one of ordinary skill in the art to implement the PDA of the combined Janik references using a combined PDA/telephone device, for example as disclosed in the Cardoza reference. It is my opinion that one of ordinary skill in the art would have understood that such devices were well-known and that the PDA functionality of such devices would be capable of providing the required functionality; the addition of telephone functionality was a known feature that would not affect the suitability of such a device for acting as an appropriate remote control.

**D. Janik '558 And Janik '902 In Combination With Janik '955**

25. I have been asked my opinion as to whether it would have been obvious to one of ordinary skill in the art to add shuffle, or random-order playback functionality (as in claims 13 and 42), to the combination of the Janik '558 and '902 references, in light of the Janik '955 reference's disclosure (at [0099]) of shuffle playback functionality. It is my opinion that one of ordinary skill in the art would understand that providing shuffle playback in this case would have simply constituted adding a well-known feature from a similar system.

**E. Bi In Combination With Erekson**

26. I have been asked my opinion as to whether it would have been obvious to one of ordinary skill in the art to combine the portable ("palmtop or

hand-held computer” [2:19-20]) of the Erekson reference with the system disclosed in the Bi reference.

27. I note that while the Bi reference does not disclose selection and control of multiple devices on the display, the Erekson reference does disclose the control of several devices from a handheld computer used as a wireless remote control. It is my opinion that it would have been obvious for one of ordinary skill in the art to understand that the known technique from Erekson would be an appropriate combination with the system disclosed in Bi. The Erekson reference (at, for example, 1:18-20) mentions “stereos” as a sort of device that might be controlled with the disclosed invention, and also throughout proposes the use of the Bluetooth wireless technology (which one of ordinary skill in the art would understand is commonly used in association with audio devices), thus further reinforcing the idea of combining the Erekson remote control with the Bi system. By employing the Erekson remote control with the Bi system, a single remote control could advantageously be used to control the computing platform as described in Bi and a stereo that receives its analog output as noted at [0021] of Bi, as well as other devices used with the stereo, such as a CD player.

28. With respect to claim 21, I understand that while a local area network is not explicitly disclosed in Bi, Bi discloses a network interface to connect to the Internet or other network. ([0018].) It would have been obvious

that the network interface could also be used to connect to a local area network because local area networks are commonly used for connecting computers.

**F. Bi In Combination With Ereksen And The P800**

29. I have additionally been asked to address the further combination of Bi and Ereksen with the Sony P800 device. As the P800 device uses Bluetooth communication, it would have been obvious to one of ordinary skill in the art to consider the use of the P800 device (a mobile phone that also functions as a palmtop computer and an MP3 player) as the Bluetooth-equipped “palmtop or hand-held computer” of Ereksen.

30. In so doing, a system would result in which the remote control device would have the additional ability to play back music itself, as well as controlling other devices capable of playing music (as in '873 claims 4 and 33).

31. Approaching the situation from the opposite direction, one of ordinary skill in the art would have found it obvious (in my opinion) to add MP3 playback capability to the device disclosed in the Bi reference, as the inclusion of MP3 playback into devices of similar hardware architecture and user interface to the “navigator” of Bi was well known.

32. Finally, the well-known existence of combined palmtop/PDA devices that include mobile phone capabilities (such as the P800) would have made it obvious to one of ordinary skill in the art that the remote control functionality

could be implemented on a combined phone/PDA device (as in '873 claims 5 and 34).

**G. Bi In Combination With Erikson And Janik '955**

33. I have been asked whether it would have been obvious to one of ordinary skill in the art to add a shuffle (*i.e.*, random playback) feature to the above combination of Bi and Erikson. It is my opinion that one of ordinary skill in the art would have known that such functionality was in common use (and indeed was available in earlier audio devices like CD players) and would have found it obvious to implement in an audio playback system such as that disclosed by a combination of the Bi and Erikson references. The Janik '955 reference discloses shuffle playback at [0099].

**H. Berman In Combination With Van Ryzin**

34. I have been asked my opinion on two points with respect to a combination of the Berman and Van Ryzin references.

35. First, I have been asked whether it would have been obvious to one of ordinary skill in the art to use a remote (as in Van Ryzin) that can control multiple devices in the system disclosed in Berman. It is my opinion that one of ordinary skill in the art would have understood that control of multiple devices with a single remote as in Van Ryzin was a known technique that would have been obvious to combine with the system disclosed in Berman. The appropriateness of

such combination is further supported by the fact that the Van Ryzin reference repeatedly discusses using the remote control with audio playback devices, and in its title (and elsewhere) discloses that the remote control has a “graphical user interface,” while the “virtual buttons of a touch panel screen” disclosed in Berman at 5:59 would also have been understood as a graphical user interface by one of skill in the art. Providing a remote control with the ability to control multiple devices as in Van Ryzin would provide the advantageous operation of being able, for example, to control both the playback unit 100 and any components of home audio system 106 (*e.g.*, amplifier, CD player, tape player, etc.) in Berman with a single remote.

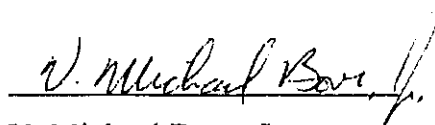
36. I have additionally been asked whether it would have been obvious to include volume, tone and balance control functionality (as in '873 claims 8-10 and 37-39) in the above combination of Berman and Van Ryzin. It is my opinion that one of ordinary skill in the art would have understood volume, tone and balance to be basic controls for an audio system and would have found it obvious to include them in a remote control for an audio system. I further believe it would have been obvious to integrate the playback unit 100 of Berman into a receiver or amplifier of the home audio system 106 of Berman, as one of ordinary skill in the art would have understood that some users prefer a single unit rather than multiple components. In this case, the unified system would provide standard

audio controls for volume, tone, and balance as disclosed in the Van Ryzin reference. The remote would control the main receiver or amplifier, as well as other components such as a CD player as illustrated in Van Ryzin.

\* \* \*

I 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 that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code.

Dated: September 19, 2013

  
V. Michael Bove, Jr.

Last updated June 2013

Massachusetts Institute of Technology  
School of Architecture and Planning Personnel Record  
Victor Michael Bove, Jr.  
Media Arts and Sciences Program

*Date of Birth*  
23 December 1960

*Citizenship*  
United States of America

*Education*  
M.I.T., S.B. Electrical Engineering, June 1983  
M.I.T., S.M. Visual Studies, September 1985  
M.I.T., Ph.D. Media Technology, June 1989

*Title of Thesis for Most Advanced Degree*  
V. M. Bove, Jr., *Synthetic Movies Derived from Multi-Dimensional Image Sensors*, Ph.D. thesis, M.I.T., June 1989.

*Principal Fields of Interest*  
Applications of machine analysis to media-related applications (adding intelligence to live interpersonal communications and authored content), advanced user interfaces for consumer electronics, novel imaging hardware (in particular holographic television)

*Non-M.I.T. Experience*  
R.C.A. Microcomputer Products Division, Summer Student Employee, May 1980-Aug. 1980  
Co-Founder and Technical Advisor, WatchPoint Media, Inc., 1999-2003

*History of M.I.T. Appointments*  
Technical Assistant, May 1983-Sept. 1983  
Graduate Research Assistant, Sept. 1983-April 1989  
Postdoctoral Research Associate, April 1989-July 1989  
Assistant Professor of Media Technology, July 1989-July 1993  
Associate Professor of Media Technology, July 1993-July 1997



Principal Research Scientist, MIT Media Laboratory, July 1997-present

*Consulting Record*

Aware, Inc., July-Sept. 1991

Bell Northern Research, August 1991, August-Sept. 1995

Plaza Investment Managers, Inc., July-August 1992

World Book Publishing (encyclopedia revisions), March 1993

Van Nostrand Reinhold (book manuscript reviewing), April 1994-present

Analog Devices, Inc., July-August 1994

Blackside Productions, Inc. (consultant for the TV series "Breakthrough: People of Color in American Science"), October-December 1994

Axiom Venture Partners, Nov. 1995-March 1996

Data Translation Inc./Kenyon and Kenyon (consultant on patent case), March 1996

Naval Undersea Warfare Center, June 1996

Copyright Clearance Center, Inc., Sept. 1996-Sept. 1997

Artech House Publishers (book manuscript reviewing), 1996-2002

Research Grants Council of Hong Kong (proposal evaluator), Feb. 1997-present

Hughes Electronics (expert witness before International Trade Commission), Feb. 1997-July 1997

Mercury Computer, May 1997

Thomson Consumer Electronics (expert witness before International Trade Commission), June 1997-August 1998

Swedish Research Council for Engineering Sciences (proposal evaluator), August 1997

Texas Instruments, 1998-2003

Cirrus Logic, Inc., Dec. 1998-Jan. 2000

Ezenia!, Inc., Jan. 1999-Aug. 2000

Thomson Consumer Electronics (expert witness), Nov. 2000-Feb. 2002; 2007-2008.

Intel, Jan. 2001-April 2001

Bain and Co., Jan. 2001-April 2001

DirecTV, Inc. (expert witness), 2002-2009

DRTV Systems Ltd., April 2002

Pause Technology (expert witness), 2003

Polycom (expert witness), 2003

Forney Corporation (expert witness), 2003-2005

IPIX Corp. (expert witness), 2005  
Motorola, Inc. (expert witness), 2006-2008, 2011-present  
Scientific Atlanta (expert witness), 2006-2008  
Technical Advisor, One Laptop Per Child, 2006-present  
Technical Advisor, TDVision Systems, 2006-present  
Eastman Kodak (expert witness), February 2007-January 2008  
EchoStar (expert witness), 2007-2008  
Funai (expert witness), 2007-2010  
Kyocera Sanyo Telecom and Palm, Inc. (expert witness) 2009-2010  
Thomson Licensing, 2010  
Research in Motion, Ltd. (expert witness), 2011-present  
Twentieth Century Fox Home Entertainment (expert witness), 2011-2012  
HTC, (expert witness), 2011-present

*Department and Institute Committees, Other Assigned Duties*

School of Architecture and Planning Committee on Academic Computing Needs, 1989-1990

Freshman advisor and seminar leader, 1990-present

*The Tech* advisory board, 1991-present

Independent Activities Period Policy Committee, 1991-1994, 1995-1997

Media Arts & Sciences Program IAP Coordinator, 1992-present

Media Arts & Sciences Departmental Committee on Graduate Students, 1994-1997, 2005-2006 (acting head, spring semester 1996)

Committee on the Undergraduate Program Subcommittee on Freshman Advising, 1998-1999

Media Arts & Sciences Undergraduate Officer, 1996-present

Founder and Director, Media Arts & Sciences Freshman Program, 1999-present

*Government and Other Committees, Service, etc.*

Committee on Open High-Resolution Systems, 1990-1991

Federal Communications Commission Advisory Committee on Advanced Television Service, Planning Subcommittee Working Party 4, 1992

Local Arrangements Chair, IEEE International Conference on Multimedia Computing and Systems, 1994

Conference Co-Chair, SPIE Conference on Integration Issues in Large Commercial Media Delivery Systems, 1995, 1996

Board of Editors, SMPTE Journal, 1995-present

Conference Co-Chair, SPIE Conference on Reconfigurable Technology for Rapid Product Development and Computing, 1996  
General Chair, ACM Multimedia Conference, 1996  
Organizer, Objects of Communication Symposium, 1996  
Conference Co-Chair, SPIE Conference on Multimedia Networks and Applications, 1997, 1998, 1999, 2000  
Conference Co-Chair, SPIE Conference on Media Processors, 1999, 2000, 2001, 2002, 2003, 2004, 2005  
Manuscript reviewer for six journals and three book publishers  
Associate Editor, *Optical Engineering*, 2004-present  
ARDA Exploratory Program Executive Committee member, 2004-2006  
Technical Advisory Panel, Council for Research Excellence, 2005-present  
General Chair, IEEE Consumer Communications and Networking Conference 2006  
Emmy Advanced Media Committee, National Academy of Television Arts and Sciences, 2006-present  
Board of Governors, National Academy of Media Arts and Sciences, 2007-present  
Conference co-chair, SPIE Practical Holography conference, 2011, 2012, 2013  
Conference co-chair, International Symposium on Display Holography, 2012  
Co-Chair, Optical Society of America 3D Display Technology, Perception, and Application Incubator Meeting, 2012

#### *Awards Received*

I.B.M. Communications Doctoral Fellowship, 1986 and 1987  
Sony Corporation Career Development Professorship, 1991-1995  
IEEE ASIC '93 (Conference on Application Specific Integrated Circuits) Speaker's Award, 1993  
IEEE Computer Society Certificate of Appreciation, 1994  
Alex W. Dreyfoos, Jr. Career Development Professorship, 1995-1997  
Marquis Who's Who in Science and Engineering, 1996-1997; Who's Who in the East, 1997, 1998; Who's Who in Entertainment, 1997; Who's Who in America, 2001  
ACM Recognition of Service Award, 1997  
Distinguished Alumnus Award, John Piersol McCaskey High School, Lancaster PA, 1997  
Fellow, IC<sup>2</sup> Institute, University of Texas at Austin, 2001  
Fellow, SPIE, 2002

INDEX: Design to Improve Life Award (as member of team that designed OLPC XO laptop), 2007

Effic Award (bronze) for work on Sprite Slam Dunk Competition, 2013

### *Current Organization Membership*

American Institute of Physics

Association for Computing Machinery (ACM)

Institute of Electrical and Electronic Engineers (IEEE)

Optical Society of America (OSA)

Society of Photo-Instrumentation Engineers (SPIE) (Fellow, 2002-present; Associate Editor, *Optical Engineering*, 2004-2011)

Society of Motion Picture and Television Engineers (SMPTE) (Manager, New England Section, 1993-1995; Board of Editors, 1995-present)

### *Patents*

1. U.S. Patent 4,673,981, "Unrecordable Video Signals," (co-inventors Andrew Lippman and Jerome Wiesner)
2. U.S. Patent 5,185,852, "Antialiasing Apparatus and Method for Computer Printers," (co-inventor Christopher Mayer)
3. U.S. Patent 5,946,425, "Method and Apparatus for Automatic Alignment of Volumetric Images Containing Common Subject Matter," (co-inventor Tamas Sandor)
4. U.S. Patent 6,022,648, "Bistable, Thermochromic Recording Materials for Rendering Color and Gray Scale," (co-inventor Joseph Jacobson).
5. U.S. Patent 6,642,940, "Management of Properties for Hyperlinked Video," (co-inventors Edmond Chalom, Jonathan Dakss, and Nuno Vasconcelos).
6. U.S. Patent 6,816,628, "Methods for Outlining and Filling Regions in Multi-Dimensional Arrays," (co-inventors Karen Sarachik, Jonathan Dakss, and Joshua Wachman).
7. U.S. Patent 6,879,720, "Methods for Outlining and Filling Regions in Multi-Dimensional Arrays," (co-inventors Karen Sarachik, Jonathan Dakss, and Joshua Wachman).
8. U.S. Patent 6,944,228, "Method and Apparatus for Encoding Video Hyperlinks," (co-inventors Jonathan Dakss and Daniel Katcher).
9. U.S. Patent 6,978,053, "Single-Pass Multilevel Methods for Applying Morphological Operators in Multiple Dimensions," (2 co-inventors).
10. U.S. Patent 7,117,517, "Method and Apparatus for Generating Data Structures for a Hyperlinked Television Broadcast," (4 co-inventors).
11. U.S. Patent 7,120,924, "Method and Apparatus for Receiving a Hyperlinked

- Television Broadcast," (5 co-inventors).
12. U.S. Patent 7,249,367, "Method and Apparatus for Switching Between Multiple Programs by Interacting with a Hyperlinked Television Broadcast," (3 co-inventors).
  13. U.S. Patent 7,367,042, "Method and Apparatus for Hyperlinking in a Television Broadcast," (6 co-inventors).
  14. U.S. Patent 7,636,365, "Smart Digital Modules and Smart Digital Wall Surfaces Combining the Same," (3 co-inventors).
  15. U.S. Patent 8,010,986, "Synchronization and Automation in an ITV Environment," (4 co-inventors).
  16. U.S. Patent 8,149,265, "Holographic Video Display System," (3 co-inventors).
  17. U.S. Patent 8,356,329, "Method and Apparatus for Interaction with Hyperlinks in a Television Broadcast," (8 co-inventors).
  18. U.S. Patent applied for 2001, "Program Stream Switching in a Hyperlinked Video Broadcast," (2 co-inventors).
  19. U.S. Patent applied for 2007, "Self-Refreshing Display Controller for a Display Device in a Computational Unit," (3 co-inventors).
  20. U.S. Patent applied for 2009, "Tangible Social Network," (1 co-inventor).
  21. U.S. Patent applied for 2010, "Methods and Apparatus for Holographic Animation," (2 co-inventors).
  22. U.S. Patent applied for 2012, "Methods and Apparatus for Accessing Peripheral Content," (2 co-inventors).
  23. U.S. Patent applied for 2013, "Force-Sensing Net," (3 co-inventors).
  24. U.S. Patent applied for 2013, "Context-Aware Omnidirectional Projector," (4 co-inventors).

*Teaching Experience of V. Michael Bove, Jr.*

FT89, 4.994, Media Arts and Sciences Doctoral Proseminar, taught unit on signals and systems (3 weeks), 10 students  
ST90, 4.998, Digital Image Processing for Hard Copy, 12 students  
FT90, 4.890, Signals and Systems for Media Technology, one of four instructors, 12 students  
FT90, 4A05 (freshman advising seminar), Case Studies in Visual Communications, 9 students  
ST91, 4.964, Digital Image Processing for Hard Copy, 6 students  
FT91, 4.890, Signals and Systems for Media Technology, one of four instructors, 12 students  
FT91, 4A05 (freshman advising seminar), Case Studies in Visual Communications, 9 students  
ST92, 4.964, Digital Image Processing for Hard Copy, 9 students  
FT92, 4.890, Signals and Systems for Media Technology, one of two instructors, 13 students  
FT92, 4A05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
IAP93, "Ernie Kovacs"  
ST93, 4.964, Digital Image Processing for Hard Copy, 8 students  
FT93, MAS101/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 20 students  
FT93, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
IAP94, "A Look Back at Colorization"  
ST94, MAS814, Digital Image Processing for Hard Copy, 8 students  
FT94, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
FT94, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 16 students  
IAP95, "Dimensional Transcendence," one of three instructors  
ST95, MAS814, Digital Image Processing for Hard Copy, 5 students  
FT95, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 7 students  
FT95, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 15 students  
ST96, MAS961, On Being Meta, one of three instructors, 14 students  
FT96, MASA05 (freshman advising seminar), Case Studies in Visual Commu-

nications, 8 students  
 FT96, MAS160/MAS510, Signals, Systems, and Information for Media Technology, sole instructor, 19 students  
 ST97, MAS814, Digital Image Processing for Hard Copy, 7 students  
 ST97, MAS961, On Being Meta, one of three instructors  
 FT97, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
 FT97, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 10 students  
 ST98, MAS816, On Being Meta, one of three instructors  
 FT98, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
 ST99, MAS814, Digital Image Processing for Hard Copy, 12 students  
 ST99, MAS111, Introduction to Doing Research in Media Arts and Sciences, 12 students  
 FT99, MASA09 (freshman advising seminar), Television, Inside and Out, 8 students  
 ST00, MAS111, Introduction to Doing Research in Media Arts and Sciences, 15 students  
 ST00, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 24 students  
 FT00, MASA09 (freshman advising seminar), Television, Inside and Out, 8 students  
 ST01, MAS111, Introduction to Doing Research in Media Arts and Sciences, 25 students  
 ST01, MAS814, Digital Hard Copy, 6 students  
 FT01, MASA09 (freshman advising seminar), Television, Inside and Out, 9 students  
 FT01, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 14 students  
 ST02, MAS111, Introduction to Doing Research in Media Arts and Sciences, 25 students  
 ST02, MAS890, Workshop in Community-Maintainable Online Collaborative Spaces, 20 students  
 FT02, MASA09 (freshman advising seminar), Television, Inside and Out, 9 students  
 ST03, MAS111, Introduction to Doing Research in Media Arts and Sciences, 15 students  
 FT03, MASA18 (freshman advising seminar), Engineering: the Good, the Bad,

and the Ugly, 10 students

FT03, MAS160/MAS510/MAS511, Signals, Systems, and Information for Media Technology, one of two instructors, 24 students

ST04, MAS111, Introduction to Doing Research in Media Arts and Sciences, 15 students

FT04, MASA18 (freshman advising seminar), Engineering: the Good, the Bad, and the Ugly, 7 students

ST05, MAS111, Introduction to Doing Research in Media Arts and Sciences, 15 students

FT05, MAS160/MAS510/MAS511, Signals, Systems, and Information for Media Technology, 14 students

ST06, MAS111, Introduction to Doing Research in Media Arts and Sciences, 10 students

FT06, MASA18 (freshman advising seminar), Engineering: the Good, the Bad, and the Ugly, 11 students

ST07, MAS111, Introduction to Doing Research in Media Arts and Sciences, 10 students

FT07, MASA18 (freshman advising seminar), Engineering: the Good, the Bad, and the Ugly, 10 students

FT07, MAS160/MAS510/MAS511, Signals, Systems, and Information for Media Technology, 12 students

FT07, MAS110, Fundamentals of Computational Media Design, 25 students

ST08, MAS111, Introduction to Doing Research in Media Arts and Sciences, 18 students

FT08, MAS110, Fundamentals of Computational Media Design, 25 students

ST09, MAS111, Introduction to Doing Research in Media Arts and Sciences, 9 students

ST09, MAS963, New Media Storytelling, 10 students

FT09, MAS110, Fundamentals of Computational Media Design, 25 students

FT09, MASA19 (freshman advising seminar), Designing Consumer Electronics, 9 students

ST10, MAS111, Introduction to Doing Research in Media Arts and Sciences, 21 students

ST10, MAS963, New Media Storytelling, 9 students

FT10, MAS110, Fundamentals of Computational Media Design, 28 students

FT10, MASA19 (freshman advising seminar), Designing Consumer Electronics, 10 students

ST11, MAS111, Introduction to Doing Research in Media Arts and Sciences, 12



students

FT11, MAS110, Fundamentals of Computational Media Design, 30 students

FT11, MASA19 (freshman advising seminar), Designing Consumer Electronics, 10 students

ST12, MAS111, Introduction to Doing Research in Media Arts and Sciences, 20 students

ST12, MAS160/MAS510/MAS511, Signals, Systems, and Information for Media Technology, 6 students

FT12, MAS110, Fundamentals of Computational Media Design, 30 students

FT12, MASA19 (freshman advising seminar), Designing Consumer Electronics, 10 students

ST13, MAS111, Introduction to Doing Research in Media Arts and Sciences, 20 students

Publications of V. Michael Bove, Jr.

Books

(for book chapters see Other Major Publications)

1. S. A. Benton and V. M. Bove, Jr., *Holographic Imaging*, Wiley, 2008.

Papers in Refereed Journals

1. V. M. Bove, Jr., "A Probabilistic Method for Integrating Multiple Sources of Range Data," *Journal of the Optical Society of America A*, 7, Dec. 1990, pp. 2193-2198.
2. V. M. Bove, Jr. and A. B. Lippman, "Scalable Open Architecture Television," *SMPTE (Society of Motion Picture and Television Engineers) Journal*, 101, Jan. 1992, pp. 2-5.
- <sup>o</sup> 3. A. Singh and V. M. Bove, Jr., "Multidimensional Quantizers for Scalable Video Compression," *IEEE Journal on Selected Areas in Communications*, 11, Jan. 1993, pp. 36-45.
4. V. M. Bove, Jr., "Entropy-Based Depth from Focus," *Journal of the Optical Society of America A*, 10, Apr. 1993, pp. 561-566.
- <sup>o</sup> 5. K. Tsunashima, J. B. Stampleman, and V. M. Bove, Jr., "A Scalable Motion-Compensated Subband Image Coder," *IEEE Transactions on Communications*, 42, Apr. 1994, pp. 1894-1901.
6. V. M. Bove, Jr. and J. A. Watlington, "Chcops: A Reconfigurable Data-Flow System for Video Processing," *IEEE Transactions on Circuits and Systems for Video Technology*, 5, Apr. 1995, pp. 140-149.
7. V. M. Bove, Jr., "Object-Oriented Television," *SMPTE Journal*, 104, Dec. 1995, pp. 803-807.
8. V. M. Bove, Jr., "Multimedia Based on Object Models: Some Whys and Hows," *IBM Systems Journal*, 35, 1996, pp. 337-348.
9. V. M. Bove, Jr., "Beyond Images," *Convergence: The Journal of Research into New Media Technologies*, 2, Autumn 1996, pp. 30-46.
- <sup>o</sup> 10. J. A. Watlington and V. M. Bove, Jr., "Stream-Based Computing and Future Television," *SMPTE Journal*, 106, April 1997, pp. 217-224.
- <sup>o</sup> 11. J. A. Watlington and V. M. Bove, Jr., "A System for Parallel Media Processing," *Parallel Computing*, 23:12 December 1997, pp. 1793-1809.
- <sup>o</sup> 12. S. Agamanolis and V. M. Bove, Jr., "Multilevel Scripting for Responsive Multimedia," *IEEE Multimedia*, 4:4 October-December 1997, pp. 40-50.
- <sup>o</sup> 13. V. M. Bove, Jr., J. Dakss, S. Agamanolis, E. Chalom, "Adding Hyperlinks to Digital Television," *SMPTE Journal*, 108, November 1999, pp. 795-801.
14. V. M. Bove, Jr. and W. Butera, "The Coding Ecology: Image Coding Via

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<sup>o</sup>Outgrowths of supervised theses or research projects.

Competition among Experts," *IEEE Transactions on Circuits and Systems for Video Technology*, 10, October 2000, pp. 1049-1058.

<sup>o</sup> 15. V. M. Bove, Jr., J. Dakss, E. Chalom, and S. Agamanolis, "Hyperlinked Television Research at the MIT Media Laboratory," *IBM Systems Journal*, 39, 2000, pp. 470-478.

<sup>o</sup> 16. S. Agamanolis and V. M. Bove, Jr., "Viper: a Framework for Responsive Television," *IEEE Multimedia*, 10:3, July-Sept. 2003, pp. 88-98.

<sup>o</sup> 17. V. M. Bove, Jr. and Wilfrido Sierra, "Personal Projection," *SMPTE Motion Imaging Journal*, 113, Jan. 2004, pp. 17-21.

<sup>o</sup> 18. V. M. Bove, Jr. and J. Mallett, "Collaborative Knowledge Building by Smart Sensors," *BT Technology Journal*, 22:4, Oct. 2004, pp. 45-51.

<sup>o</sup> 19. D. Butler, V. M. Bove, Jr., and S. Sridharan, "Real-Time Adaptive Foreground/Background Segmentation," *EURASIP Journal on Applied Signal Processing*, 14:11, Aug. 2005, 2292-2304.

<sup>o</sup> 20. W. Plesniak, M. Halle, V. M. Bove, Jr., J. Barabas, and R. Pappu, "Re-configurable Image Projection (RIP) Holograms," *Optical Engineering*, 45:11, Nov. 2006.

21. V. M. Bove, Jr., "Holographic Television: What and When?" *SMPTE Motion Imaging Journal*, 120:4, May/June 2011, pp. 36-40.

22. V. M. Bove, Jr., "Engineering for Live Holographic TV" *SMPTE Motion Imaging Journal*, 120:8, November/December 2011, pp. 56-60.

23. V. M. Bove, Jr., "Display Holography's Digital Second Act," *Proceedings of the IEEE*, 100:4, April 2012, pp. 918-928.

<sup>o</sup> 24. S. Jolly, D. E. Smalley, J. Barabas, and V. M. Bove, Jr., "Direct Fringe Writing Architecture for Photorefractive Polymer-Based Holographic Displays: Analysis and Implementation," *Opt. Eng.* 52:5, 055801, 2013, doi: 10.1117/1.OE.52.5.055801

<sup>o</sup> 25. D. E. Smalley, Q. Y. J. Smithwick, V. M. Bove, J. Barabas and S. Jolly, "Anisotropic leaky-mode modulator for holographic video displays," *Nature*, 498, 20 June 2013, pp. 313 - 317.

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1. V. M. Bove, Jr., "Pictorial Applications for Range Sensing Cameras," in *SPIE Vol. 901: Image Processing, Analysis, Measurement, and Quality*, Society of Photo-Optical Instrumentation Engineers, Bellingham WA, 1988, pp. 10-17.

2. B. Girod, V. M. Bove, Jr., A. B. Lippman, "Automatic 3-D Scene Modeling from Range and Motion," *Proc. Second International Workshop on 64kbit/s Coding of Moving Video*, Hannover Germany, 1989.

3. V. M. Bove, Jr., "Discrete Fourier Transform Based Depth-from-Focus," *OSA Technical Digest Series Vol. 14: Image Understanding and Machine Vision*, Optical Society of America, Washington DC, 1989, pp. 118-121.

4. V. M. Bove, Jr. and A. B. Lippman, "Open Architecture Television Receivers and Extensible/Intercompatible Digital Video Representations," *Proc. IEEE ISCAS (International Symposium on Circuits and Systems)*, New Orleans LA, 1990, pp. 1294-1297.
5. V. M. Bove, Jr., "Scalable, Spatiotemporal Resolution-Independent Digital Image Format," *Proc. Picture Coding Symposium*, Cambridge MA, 1990, pp. 4.6.1-4.6.4.
6. V. M. Bove, Jr. and A. B. Lippman, "Open Architecture Television," in *A Television Continuum - 1967 to 2017*, SMPTE, White Plains NY, 1991, pp. 210-218.
7. W. R. Neuman, A. N. Crigler, V. M. Bove, Jr., "Television Sound and Viewer Preference," *Proc. AES 9th International Conference*, Detroit MI, 1991.
8. V. M. Bove, Jr. and J. A. Watlington, "Cheops: A Modular Processor for Scalable Video Coding," in *SPIE Vol. 1605*, Society of Photo-Optical Instrumentation Engineers, Bellingham WA, 1991, pp. 886-893.
9. I. J. Shen and V. M. Bove, Jr., "Minimization of Aliasing Artifacts During Partial Subband Reconstruction with Wiener Filters," in *SPIE Vol. 1657*, Society of Photo-Optical Instrumentation Engineers, Bellingham WA, 1992, pp. 14-23.
10. V. M. Bove, Jr. and J. A. Watlington, "Experiments in Hardware and Software for Real-Time Image Sequence Processing," *Proc. IEEE Workshop on Visual Signal Processing and Communications*, Raleigh NC, 1992, pp. 98-103.
11. V. M. Bove, Jr. and E. Chalom, "Open Architecture Television for Motion-Compensated Coding," in *SPIE Vol. 1818*, Society of Photo-Optical Instrumentation Engineers, Bellingham WA, 1992, pp. 1088-1091.
12. V. M. Bove, Jr., "Hardware and Software Implications of Representing Scenes as Data" (invited paper), *Proc. ICASSP-93*, Minneapolis MN, 1993, pp. I-121-I-124.
13. V. M. Bove, Jr., B. D. Granger, and J. A. Watlington, "Real-Time Decoding and Display of Structured Video," *Proc. IEEE ICMCS '94*, Boston MA, 1994, pp. 456-462.
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15. V. M. Bove, Jr., "Object-Oriented Television," *Proc. 136th SMPTE Technical Conference*, Los Angeles CA, 1994, paper 136-3.
- <sup>0</sup> 16. J. A. Watlington, M. Lucente, C. J. Sparrell, V. M. Bove, Jr., and I. Tamitani, "A Hardware Architecture for Rapid Generation of Electro-Holographic Fringe Patterns," *Proc. SPIE Practical Holography IX, 2406*, 1995, pp. 172-183.

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<sup>0</sup>Outgrowths of supervised theses or research projects.

- <sup>0</sup> 17. S. Becker and V. M. Bove, Jr., "Semiautomatic 3-D Model Extraction from Uncalibrated 2-D Camera Views," *Proc. SPIE Image Synthesis*, 2410, 1995, pp. 447-461.
- <sup>0</sup> 18. E. Chalom and V. M. Bove, Jr., "Segmentation of Frames in a Video Sequence using Motion and Other Attributes," *Proc. SPIE Digital Video Compression: Algorithms and Technologies*, 2419, 1995, pp. 230-241.
- <sup>0</sup> 19. J. A. Watlington and V. M. Bove, Jr., "Stream-Based Computing and Future Television," *Proc. 137th SMPTE Technical Conference*, New Orleans LA, 1995, pp. 69-79.
- <sup>0</sup> 20. E. K. Acosta, V. M. Bove, Jr., J. A. Watlington, and R. A. Yu, "Reconfigurable Processor for a Data-Flow Video Processing System," *Proc. SPIE FPGAs for Fast Board Development and Reconfigurable Computing*, 2607, 1995, pp. 83-91.
- <sup>0</sup> 21. T. Chang and V. M. Bove, Jr., "Experiments in Real-Time Decoding of Layered Video," *Proc. SPIE Integration Issues in Large Commercial Media Delivery Systems*, 2615, 1995, pp. 99-106.
- <sup>0</sup> 22. E. Chalom and V. M. Bove, Jr., "Segmentation of an Image Sequence using Multi-Dimensional Image Attributes," *Proc. IEEE ICIP-96*, Lausanne, 1996, pp. II-525 - II-528.
23. V. M. Bove, Jr., "Algorithms and Systems for Modeling Moving Scenes," *Proc. EUSIPCO-96 (European Signal Processing Conference)*, Trieste, 1996, pp. 1685-1688.
24. V. M. Bove, Jr., "The Impact of New Multimedia Representations on Hardware and Software Systems," (invited paper) *Proc. SPIE Multimedia Hardware Architectures 1997*, 3021, 1997, pp. 34-39.
- <sup>0</sup> 25. J. Wong, J. Watlington, and V. M. Bove, Jr., "The H-Bus: A Media Acquisition Bus Optimized for Multiple Streams," *Proc. SPIE Multimedia Hardware Architectures 1997*, 3021, 1997, pp. 40-50.
- <sup>0</sup> 26. J. Newbern and V. M. Bove, Jr., "Generation of Blue Noise Arrays by Genetic Algorithm," *Proc. SPIE Human Vision and Electronic Imaging II*, 3016, 1997, pp. 441-450.
- <sup>0</sup> 27. J. A. Watlington and V. M. Bove, Jr., "A System for Parallel Media Processing," *Proc. Workshop on Parallel Processing and Multimedia, IEEE International Parallel Processing Symposium*, Geneva, 1997, pp. 59-74.
- <sup>0</sup> 28. S. Agamanolis and V. M. Bove, Jr., "Reflection of Presence: Toward More Natural and Responsive Telecollaboration," *Proc. SPIE Multimedia Networks*, 3228, 1997, pp. 174-182.
29. V. M. Bove, Jr., "Object-Based Media and Stream-Based Computing," (invited paper) *Proc. SPIE Multimedia Hardware Architectures 1998*, 3311, 1998, pp. 24-29.
30. V. M. Bove, Jr., J. Dakss, S. Agamanolis, E. Chalom, "Adding Hyperlinks to Digital Television," *Proc. 140th SMPTE Technical Conference*, 1998, pp 395-

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31. J. Dakss, S. Agamanolis, V. M. Bove, Jr., E. Chalom, "Hyperlinked Video," *Proc. SPIE Multimedia Systems and Applications*, 3528, 1998, pp. 2-10.
32. V. M. Bove, Jr., "Media Processing with Field-Programmable Gate Arrays on a Microprocessor's Local Bus," *Proc. SPIE Media Processors*, 3655, 1999.
33. A. Westner and V. M. Bove, Jr., "Blind Separation of Real World Audio Signals Using Overdetermined Mixtures," *Proc. ICA '99*, 1999, pp. 251-256.
34. A. Westner and V. M. Bove, Jr., "Applying Blind Source Separation and Deconvolution to Real-World Acoustic Environments," *Proc. 106th Audio Engineering Society Convention*, 1999.
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36. V. M. Bove, Jr., "Will Anyone Really Need a Web Browser in Five Years?" *Proc. Montreux World Television Forum*, 2000.
37. V. M. Bove, Jr. and S. Agamanolis, "Responsive Television," *Proc. International Broadcasting Convention*, 2000, pp. 622-626.
38. W. Butera and V. M. Bove, Jr., "Literally Embedded Processors," *Proc. SPIE Media Processors*, v. 4313, 2001, pp. 29-37.
39. V. M. Bove, Jr. and W. Butera, "Extremely Distributed Multimedia," *Proc. 6th Eurographics Workshop on Multimedia*, 2001.
- <sup>0</sup>40. V. M. Bove, Jr. and J. Mallett, "Eye Society: Collaborative Problem Solving by Intelligent Mobile Cameras," *Proc. First GSFC/JPL Workshop on Radical Agent Concepts*, 2001.
- <sup>0</sup>41. W. Butera, V. M. Bove, Jr. and J. McBride, "Extremely Distributed Media Processing," *Proc. SPIE Media Processors*, v. 4674, 2002, pp. 37-41.
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- <sup>0</sup>43. D. Butler, S. Sridharan, and V. M. Bove, Jr., "Real-Time Adaptive Video Segmentation," *Proc. ICASSP 2003*, 2003.
- <sup>0</sup>44. V. M. Bove, Jr. and W. Sierra, "Personal Projectors Based on VCSEL Arrays," *Proc. SPIE Projection Displays IX*, v. 5002, 2003, pp. 1-6.
- <sup>0</sup>45. V. M. Bove, Jr. and W. Sierra, "Personal Projection, or How to Put a Large Screen in a Small Device," *Proc. SID 2003 International Symposium, XXXIV*, 2003.
- <sup>0</sup>46. J. Mallett and V. M. Bove, Jr., "Eye Society," *Proc. IEEE ICME 2003*, 2003.
47. V. M. Bove, Jr., "Media Processing Ecologies," *Proc. IEEE ITRE 2003*, 2003.
48. G. Nanda, V. M. Bove, Jr., and A. Cable, "BYOB (Build Your Own Bag):

- A Computationally-Enhanced Modular Textile System," *Proc. UBICOMP '04*, 2004.
- <sup>49</sup> T. Quentmeyer, W. J. Plesniak, and V. M. Bove, Jr., "Computing Real-Time Holographic Video Content with Off-the-Shelf PC Hardware," *Proc. OSA Frontiers in Optics/Laser Science Meeting*, 2004.
- <sup>50</sup> V. M. Bove, Jr., W. J. Plesniak, T. Quentmeyer, and J. Barabas, "Real-Time Holographic Video Images with Commodity PC Hardware," *Proc. SPIE Stereoscopic Displays and Applications*, 5664A, 2005.
- <sup>51</sup> B. C. Dalton and V. M. Bove, Jr., "Audio-Based Self-Localization for Ubiquitous Sensor Networks," *Proc. 118th Audio Engineering Society Convention*, 2005.
- <sup>52</sup> D. E. Smalley, Q. Y. J. Smithwick, and V. M. Bove, Jr., "Holographic Video Display Based on Guided-Wave Acousto-Optical Devices," *Proc. SPIE Practical Holography XXI*, 6488, 2007.
- <sup>53</sup> V. M. Bove, Jr., D. E. Smalley, and Q. Y. J. Smithwick, "Making Holographic Television a Consumer Product," (invited paper) *Proc. OSA Topical Meeting on Digital Holography and Three-Dimensional Imaging*, 2007.
- <sup>54</sup> Q. Y. J. Smithwick, D. E. Smalley, V. M. Bove, Jr., and J. Barabas, "Progress in Holographic Video Displays Based on Guided-Wave Acousto-Optical Devices," *Proc. SPIE Practical Holography XXII*, 6912, 2008.
- <sup>55</sup> B. T. Taylor and V. M. Bove, Jr., "The Bar of Soap: A Grasp Recognition System Implemented in a Multi-Functional Handheld Device," *Proc. ACM CHI*, 2008.
- <sup>56</sup> J. J. Kalanithi and V. M. Bove, Jr., "Connectibles: Tangible Social Networks," *Proc. 2nd Intl. Conf. on Tangible and Embedded Interaction (TEI'08)*, 2008.
- <sup>56</sup> Q. Y. J. Smithwick, J. Barabas, D. E. Smalley, and V. M. Bove, Jr., "Real-Time Shader Rendering of Holographic Stereograms," *Proc. SPIE Practical Holography XXIII*, 7233, 2009.
- <sup>57</sup> B. T. Taylor and V. M. Bove, Jr., "Graspables: Grasp-Recognition as a User Interface," *Proc. ACM CHI*, 2009.
- <sup>58</sup> V. M. Bove, Jr., Q. Y. J. Smithwick, J. Barabas, and D. E. Smalley, "Is 3-D TV Preparing the way for Holographic TV?" *Proc. 8th International Symposium on Display Holography*, 2009.
- <sup>59</sup> A. L. Santos and V. M. Bove, Jr., "uCom: Spatial Displays for Visual Awareness of Remote Locations," *Proc. ACM CHI 2010*, 2010.
- <sup>60</sup> J. Barabas, Q. Y. J. Smithwick, and V. M. Bove, Jr., "Evaluation of Rendering Algorithms for Presenting Layered Information on Holographic Displays," *Proc. SID 10 Digest*, 2010.
- <sup>61</sup> V. M. Bove, Jr., "What is Holographic Television, and Will it Ever be in My Living Room?" *Proc. 2010 SMPTE International Conference on Stereoscopic*

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63. V. M. Bove, Jr., "Live Holographic TV: From Misconceptions to Engineering," *Proc. 2011 SMPTE International Conference on Stereoscopic 3D for Media and Entertainment*, 2011.

<sup>0</sup>64. E. Portocarrero, D. Cranor, and V. M. Bove, Jr., "Pillow-Talk: Seamless Interface for Dream Priming Recalling and Playback," *Proc. TEI '11*, 2011.

<sup>0</sup>65. D. Cranor, A. Peyton, A. Persaud, R. Bhatia, S. Kim, and V. M. Bove, Jr., "ShakeOnIt: An Exploration Into Leveraging Social Rituals for Information Access," *Proc. TEI '11*, 2011.

<sup>0</sup>66. J. Barabas, S. Jolly, D. E. Smalley, and V. M. Bove, Jr., "Depth Perception and User Interface in Digital Holographic Television," *Proc. SPIE Practical Holography XXVI*, 8281, 2012.

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<sup>0</sup>68. D. Smalley, Q. Smithwick, J. Barabas, V. M. Bove, Jr., S. Jolly, and C. Della Silva, "Holovideo for Everyone: a Low-Cost Holovideo Monitor," *J. Phys.: Conf. Ser.* 415, 012055, 2013.

<sup>0</sup>69. J. Barabas and V. M. Bove, Jr., "Visual Perception and Holographic Displays," *J. Phys.: Conf. Ser.* 415, 012056, 2013.

<sup>0</sup>70. S. Jolly, D. E. Smalley, J. Barabas, and V. M. Bove, Jr., "Progress in Updatable Photorefractive Polymer-Based Holographic Displays via Direct Optical Writing of Computer-Generated Fringe Patterns," *Proc. SPIE Practical Holography XXVII*, 8644, 2013.

#### *Other Major Publications*

1. W. Bender, V. M. Bove, Jr., A. Lippman, L. Liu, J. Watlington, "High Definition Systems in the 1990s: Open Architecture and Computational Video," *HDTV World Review*, 1:3, Summer 1990, pp. 11-15.

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4. V. M. Bove, Jr., "Scalable (Extensible, Interoperable) Digital Video Representations" (book chapter), A. B. Watson, ed., *Digital Images and Human*

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<sup>0</sup>Outgrowths of supervised theses or research projects.



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  6. V. M. Bove, Jr. and A. B. Lippman, "Television," *World Book Encyclopedia*, Vol. 19, World Book, Chicago IL, 1995, pp. 124-128.
  7. N. Negroponte and V. M. Bove, Jr., "Object Oriented Television," *Wired*, July 1996, p. 188.
  8. V. M. Bove, Jr., *et al.*, Comment on FCC 96-207, Fifth Further Notice of Proposed Rule Making in the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, 1996.
  9. V. M. Bove, Jr., N. Miyaho, and D. A. Harris, introductory chapter, *Multimedia Communication Networks: Technologies and Services*, M. Tatipamula and B. Khasnabish, eds., Artech House, Norwood MA, 1997.
  10. V. M. Bove, Jr., "Online to the Future" (opinion column), *The Sunday Times* (London), October 4, 1998.
  11. V. M. Bove, Jr., "Communication," *The New Book of Knowledge*, Grolier, Bethel CT, 2000, pp. 462-471.
  12. V. M. Bove, Jr., "Astronauts and Mosquitos" (opinion column), *Communications of the ACM*, March 2001, p. 48.
  13. V. M. Bove, Jr., "Connected by Media" (opinion column), *IEEE Multimedia*, Oct. 2001.

#### *Invited Lectures and Seminars*

1. "Model Building Cameras," National Computer Graphics Association, Philadelphia PA, April 18, 1989.
2. "Extensible/Intercompatible Digital Video Representations," EIA Digital Advanced Television Workshop, Washington DC, November 7, 1989.
3. "Television of Tomorrow," ILP Symposium on Telecommunications Technology and Policy for the 21st Century, M.I.T., April 24, 1990.
4. "Open Architecture Television," Symposium on the Media Laboratory 5th Anniversary, M.I.T., October 2, 1990.
5. "Open Architecture Television," EIA/IEEE Second International Workshop on Digital Video Communications, Cambridge MA, November 26, 1990.
6. "Scalable Video Representations for Visual Information Services," National Engineering Consortium Information Networking ComForum, Orlando FL, December 14, 1990.
7. "Scalable (Extensible, Interoperable) Video Coding," National Research Council Visual Factors in Electronic Image Communications Conference, Woods Hole MA, July 22, 1991.
8. "Scalability and Open Architecture," Digital Television Symposium, M.I.T.,

May 21, 1992.

9. "A Future Model for HDTV," Production '93, Montreal, May 26, 1993.
10. "Hardware and Software Implications of Representing Scenes as Data," (banquet address) IEEE Conference on Application Specific Integrated Circuits '93, Rochester NY, September 29, 1993.
11. "Some Thoughts on Image Representations, Scene Representations, and Hardware/Software Architectures," IEEE International Conference on Computer Design '93, Cambridge MA, October 4, 1993.
12. "Image and Scene Representations and System Architectures," EIA Digital Advanced Television Workshop, Cambridge MA, October 14, 1993.
13. "Machines Behind the Scenes: Computation and Structured Video," Perspectives Lecture Series, M.I.T., April 26, 1994.
14. "Object-Oriented Television," Joint New England SIGGRAPH/New England SMPTE Meeting, Cambridge MA, October 27, 1994.
15. "Object-Oriented Television," Symposium on The Digital Revolution and its Effect on Japanese Industry (sponsored by Kodansha Publishing), Tokyo, March 15, 1995.
16. "Multimedia Computing: Parallelism without Pain," IEEE Workshop on Multimedia Processors (part of ICMCS '95), Washington DC, May 19, 1995.
17. "Stream-Based Computing and Future Television," EIA/IEEE-CES Digital Television Workshop, Philadelphia, October 5, 1995.
18. "Eyes, Cameras, Objects," Symposium on the Media Laboratory 10th Anniversary, M.I.T., October 10, 1995.
19. "Future Television: Why We Need All Those MIPS and Where We're Going to Get Them," Princeton University Dept. of Electrical Engineering, October 24, 1995.
20. "The Likely Convergence of Multimedia, Video, Communications, and Computing" (panel discussion), Photonics East '95, Philadelphia, October 24, 1995.
21. "Trends to Watch For in Consumer (and Professional) Multimedia," ComExpo, Houston TX, January 11, 1996.
22. "Multimedia Trends," Texas Instruments National Sales Meeting, Dallas TX, April 23, 1996.
23. "Object-Based Multimedia," Objects of Communication Symposium, M.I.T., May 22, 1996.
24. "Object-Based Media and Why It's a Good Problem," Bell Laboratories, Murray Hill NJ, August 28, 1996.
25. "The Future of Electronic Visual Communications," Medientage München, Munich, October 17, 1996.
26. "Hardware and Software Impacts of New Media Representations," ACM Workshop on Media Processors (part of ACM MIM'96), Boston, November 19,

1996.

27. "Convergence in the 21st Century" (panel discussion), SPIE International Symposium on Voice, Video and Data Communications, Boston, November 20, 1996.
28. "Object-Based Media," Hewlett-Packard Laboratories, Palo Alto CA, February 11, 1997.
29. "Stream-Based Media Computing: What, How, and Why," University of California at Berkeley Dept. of EECS, January 30, 1998.
30. "Responsive Object-Based Media," Greater Boston ACM, February 19, 1998.
31. "Stream-Based Media Processing," American Physical Society Symposium on the Physics of Imaging, Rochester NY, April 24, 1998.
32. "The Future of Media is Object-Based," Southeastern Mass. MIT Alumni Club, New Bedford MA, May 20, 1998.
33. "Object-Based Media and Stream-Based Computing," First International Workshop on Advanced Graphics and Multimedia Systems, Naples Italy, November 17, 1998.
34. "The Object-Based Media Group," Mitsubishi Electric Research Laboratory, Cambridge MA, December 11, 1998.
35. "The Object-Based Media Group," Stanford University Computer Science Dept., January 29, 1999.
36. "Hyperlinked Television as an E-Commerce Portal," Vanguard Technology Transfer Institute, Cambridge MA, May 17, 1999.
37. "Video and the Internet: TV or not TV?" American Museum of the Moving Image, New York, December 8, 1999.
38. "Will Anyone Really Need a Web Browser in Five Years?" Canadian Institute for Telecommunication Research annual meeting, Ottawa, August 28, 2000.
39. "Imaging at the MIT Media Lab" (plenary speaker), IS&T PICS 2001, Montreal, April 23, 2001.
40. "The Future" (panel discussion), ITV Content E-mergency, Columbia University, New York, July 17, 2001.
41. "Responsive Media: The Intersection between Broadcast and Personalization," The Interactive TV Show USA, New York, August 16, 2001.
42. "Development of Technology from Unlikely Sources," Canadian Undergraduate Technology Conference, Toronto, January 17, 2002.
43. "Sharing and Playing Well with Others: Everything We Need to Know about the Future, We Learned in Kindergarten," (keynote) IDC Imaging Convergence Forum, New York, August 7, 2002.
44. "Really Smart Cameras and Sugar-Cube-Sized Video Projectors," MIT

- Family Weekend, Cambridge MA, October 18, 2003.
45. "Computational Ecosystems," Ubi-Comp Symposium on Ubiquitous Computing, Seoul, December 10, 2003.
  46. "Really Smart Cameras and Sugar-Cube-Sized Video Projectors," MIT Alumni Club of RI, Warwick RI, April 13, 2004.
  47. "The Consumer Electronics Laboratory at the MIT Media Laboratory," GSPx, Santa Clara CA, September 29, 2004.
  48. "Really Smart Cameras and Sugar-Cube-Sized Video Projectors," MIT Alumni Club of Cape Cod, Hyannis MA, November 17, 2004.
  49. "Consumer Electronics Research at the MIT Media Lab," Harvard Business School Entrepreneurship Conference, March 3, 2005.
  50. "Changing Dynamic in Consumer Electronics," 2005 Perspective Forum, Berkeley CA, March 9, 2005.
  51. "View from the Consumer Electronics Laboratory," 2005 North American Broadcasters Association General Meeting, Toronto, May 18, 2005.
  52. "Musings – and a Few Facts – about 3-D TV," MIT CIPS Workshop on Advanced Television, Cambridge, January 21, 2009.
  53. "Holographic Video and 3-D Television," "Photons, Neurons and Bits: Holography for the 21st Century," Cambridge MA, March 7, 2009.
  54. "From 3-D TV to Holographic TV," Microsoft Hardware Day, Redmond WA, August 5, 2009.
  55. "Debunking Hollywood's Holograms," MIT Museum, Cambridge MA, December 11, 2009.
  56. "Moving Holographic TV from the Lab to Your Living Room," New England Section, Optical Society of America, Cambridge MA, 20 October 2010.
  57. "Hollywood's Holograms (and MIT's)" and "Pattern Recognition is Everywhere." (2 lectures), Connecticut Science Education Conference, Hamden CT, 30 October 2010.
  58. "A Look Back – and Forward – at Holographic TV," New England SID and SMPTE joint meeting, Needham MA, 18 January 2012.
  59. "Holographic Video and How it Might Become Part of the 3D Ecosystem," Third Workshop on 3D Cinematography (part of CVPR 2012), Providence RI, 16 June 2012.
  60. "A Look Back – and Forward – at Holographic TV," IEEE Photonics Laser Workshop, Lexington MA, 7 November 2012.

### *Research Funding*

Television of Tomorrow Consortium, 1989-1996

Digital Life Consortium, 1997-present

Intel Digital Expression Project, 2000-2002

*Although one of several researchers on the above two contracts, I accounted for a major portion of the research volume. On Television of Tomorrow, for example, I typically supported six research assistants and five UROP students as well as a \$150,000 fabricated equipment budget annually. I was responsible for approximately a third of the \$2M annual research volume.*

Movies of the Future Consortium, 1989-1994, (supported one research assistant annually)

DARPA Contract DAAD 05-90-C-0333, "Scalable Video," 1990-1993, (supported one research assistant annually)

Bell Northern Research, "Video Coding Testbed," \$30,000 annually, 1991-1993

NASA SRC-B093-93-043, "High Speed Research," (subcontractor to Honeywell Technology Center), project approved to begin in 1995 but funds were never released by NASA

Broadercasting Special Interest Group, Principal Investigator, 1999-2002

NASA Hierarchical Learning Networks, Principal Investigator, \$250,000 annually, 2002-2005

"Smart Architectural Surfaces," ICU/Korean Ministry of Information and Communications, 2003-2004

CELab (consumer electronics research program), Principal Investigator, 2004-present

Center for Future Storytelling, co-director, 2008-present

Office of the Director of National Intelligence (ODNI), Intelligence Advanced Research Projects Activity (IARPA), through the AFRL contract FA8650-10-C-7034, 2010-2012

### *Theses Supervised by V. Michael Bove, Jr.*

#### *SB Theses*

Chun, Jang H., *Decoding Data in the NTSC Chrominance Channel*, EECS SB, June 1990.

Davis, Desmond O., *Encoding Digital Data in the NTSC Chrominance Channel*, EECS SB, June 1990.

Lee, David S., *Compression of Images Using Zero Crossings of Bandpass Signals*, EECS SB, June 1990.

Blount, Alan W., *Display Manager for a Video Processing System*, EECS SB, June 1991.

Mitchell, Michael D., *X Windows for an Intelligent Display*, EECS SB, June 1991.

Tewari, Rajeev, *The Cheops Input Module: A Real Time Digitizing and Filtering Engine*, EECS SB, June 1991.

Chackerian, Mark, *A Motion-Estimating Board for the Cheops Imaging System*, EECS SB, May 1992.

Kwon, Chris C., *A Stream Processor for Vector Quantized Images*, EECS SB, May 1992.

Lawai, Adnan H., *Scalable Subband Coding for Continuously Variable Raster Sizes*, EECS SB, May 1992.

Nanayakkara, Prasath S. W., *Communication Protocol for a Digital Video Processor*, EECS SB, May 1992.

Evanco, Kathleen L., *A Compiler for an Object-Oriented Parallel Stream Processing Language*, EECS SB, May 1993.

O, Cholwon, *Motion Compensation Decoder for Cheops Imaging System*, EECS SB, May 1993.

Yu, Jung, *Real-Time Image Morphing, Motion Compensation, and Hidden Surface Removal*, EECS SB, May 1994.

Hsieh, P. Angela, *Solutions for Bus Bandwidth Limitations in a Network Printing Environment*, EECS SB, May 1994.

Sung, Julie, *Image Segmentation using Multi-Dimensional Attributes*, Physics SB, May 1997.

#### SM Theses

Liu, Lin L., *Digital Intermediate Format for Video Frame Rate Conversion*, EECS SM, September 1990.

Mayer, Christopher M., *Antialiasing Methods for Laser Printers*, EECS SM, June 1991.

Woo, Peter H., *An Accumulating Frame Buffer Architecture for a High-Performance Graphics Engine*, EECS SM, June 1991.

Firestone, Scott S., *VideoChannel: A Real Time Window Processor*, EECS SM, February 1992.

Eldridge, Creighton L., *A Smart Memory for Processing Images*, EECS SM, May 1992.

Shen, Irene J., *Real-Time Resource Management for Cheops: A Configurable, Multi-Tasking Image Processing System*, EECS SM, September 1992.

Hewlett, Gregory J., *Scalable Video in a Multiprocessing Environment*, MAS SM, February 1993.

Lawai, Adnan H., *Scalable Coding of HDTV Pictures Using the MPEG Coder*, EECS SM, May 1994.

Granger, Brett D., *Real-Time Structured Video Decoding and Display*, MAS SM, February 1995.

Acosta, Edward K., *A Programmable Processor for the Cheops Image Processing System*, EECS SM, June 1995.

- Chang, Christopher I., *Handwriting Recognition on a Programmable Digital Signal Processor*, EECS SM, June 1995.
- Chang, Tzu-Yun, *Real-Time Decoding and Display of Layered Structured Video*, EECS M. Eng., June 1995.
- Mikkelson, Chad, *An Implementation of the MPEG-2 Audio Decoding Specification*, EECS M. Eng., June 1995.
- Inguilizian, Araz V., *Building a Better "Picture": Synchronized Structured Sound*, MAS SM, September 1995.
- Evanco, Kathleen L., *Personalized Video Synthesis for an Information System*, MAS SM, February 1996.
- Agamanolis, Stefan, *High-Level Scripting Environments for Interactive Multimedia Systems*, MAS SM, February 1996.
- Davison, Brian C., *Image Enhancements for Low-Bitrate Videocoding*, EECS M. Eng., May 1996.
- Lin, Eugene S., *Recovery of 3-D Shape of Curved Objects from Multiple Views*, EECS M. Eng., May 1996.
- Newbern, Jeffrey L., *Global Optimization of Dither Arrays*, EECS M. Eng., May 1996.
- Suryadevara, Rajesh, *Visual Perception Based Bit Allocation for Low Bitrate Video Coding*, EECS M. Eng., May 1996.
- Wong, Jeffrey, *Hoover Bus: An Input Bus Optimized for Multiple Real-Time Data Streams*, EECS M. Eng., September 1996.
- Yu, Ross A., *A Field Programmable Gate Array Based Stream Processor for the Cheops Imaging System*, EECS M. Eng., September 1996.
- Belostotsky, Eugene B., *Secure SNMP*, EECS M. Eng., February 1997.
- Chuang, Erika Shu-Ching, *Design and Implementation of a Real-Time Video and Graphics Scaler*, EECS M. Eng., May 1997.
- Swamidoss, Kamal S., *Optimizing a Reed-Solomon Decoder for the Texas Instruments TMS320C62x DSP*, EECS M. Eng., May 1998.
- Lau, Simon, *Adaptive Degradation of Images in Network Applications*, EECS M. Eng., May 1998.
- Lee, Mark, *A Data Servicing Subsystem for the Chidi Reconfigurable Processor*, EECS M. Eng., August 1998.
- Liu, Yuan-Min, *A 1394 Bus Interface for the Chidi Processor*, EECS M. Eng., August 1998.
- Slowe, Thomas E., *People Objects: 3-D Modeling of Heads in Real-Time*, MAS SM, August 1998.
- Westner, Alexander G., *Object-Based Audio Capture: Separating Acoustically-Mixed Sounds*, MAS SM, October 1998.
- Zhang, Xiaozhen, *Implementing IS-95, the CDMA Standard, on TMS320C6201*

DSP, EECS M. Eng., May 1999.

Dakss, Jonathan, *HyperActive: An Automated Tool for Creating Hyperlinked Video*, MAS SM, September 1999.

Mallett, Jacky, *Kami: An Anarchic Approach to Distributed Computing*, MAS SM, September 2000.

Wang, Xin, *X-Conference: Reinventing a Teleconference System*, MAS SM, June 2001.

Murithi, Kirimania, *IP Multicast in Digital Television Transmission Infrastructure*, EECS M. Eng., June 2001.

Li, Yi, *VoiceLink: A Speech Interface for Responsive Media*, MAS SM, Sept. 2002.

Patel, Surjit, *MediaConnector: A Gestalt Media Sharing System*, MAS SM, Sept. 2002.

Sierra Hernandez, Wilfrido, *Micro Laser Personal Projector*, MAS SM, May 2003.

Vora, Parul, *Simulacrum: Situated Memory for Architectural Space*, MAS SM, Sept. 2003.

Quentmeyer, Tyler, *Delivering Real-Time Holographic Video Content with Off-the-Shelf PC Hardware*, EECS MEng, May 2004.

Hill, Samuel L., *Scalable Multi-view Stereo Camera Array for Real World Real-Time Image Capture and Three-Dimensional Displays*, MAS SM, May 2004.

Pilpre, Arnaud, *Self-\* Properties of Multi-Sensing Entities in Smart Environments*, MAS SM, May 2005.

Dalton, Benjamin C., *Audio-Based Localization for Ubiquitous Sensor Networks*, MAS SM, May 2005.

Nanda, Gauri, *Accessorizing with Networks: the Possibilities of Building with Computational Textiles*, MAS SM, Sept. 2005.

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Smalley, Daniel E., *Integrated Optics for Holographic Video*, EECS MEng, Sept. 2006.

Kalanithi, Jeevan J., *Connectibles: Tangible Social Networking*, MAS SM, Sept. 2007.

Taylor, Brandon T., *Graspables: Grasp Recognition as a User Interface*, MAS SM, Sept. 2008.

Smalley, Daniel E., *High-Resolution Spatial Light Modulation for Holographic Video*, MAS SM, Sept. 2008.

de Araujo Santos, Ana Luisa, *uCom: Spatial Displays for Visual Awareness of*



- Remote Locations*, MAS SM, Sept. 2009.
- Alfaro, Santiago, *SurroundVision: A Handheld Screen for Accessing Peripheral Content Around the TV*, MAS SM, Sept. 2010.
- Portocarrero, Edwina, *Inside/Out: Mirrors for Reflective, Creative Thinking*, MAS SM, Sept. 2011.
- Cranor, David, *Prototouch: A System for Prototyping Ubiquitous Computing Environments Mediated by Touch*, MAS SM, Sept. 2012.
- Jolly, Sundeep, *An Updatable Three-Dimensional Display via Direct Optical Fringe Writing of Computer-Generated Holographic Stereograms in Photorefractive Polymer*, MAS SM, Sept. 2012.
- Bardagjy, Andrew, *Low Dimensionality Spectral Sensing for Low Cost Material Discrimination and Identification*, MAS SM, Feb. 2013.

#### *Doctoral Theses, Supervisor*

- Becker, Shawn, *Vision-Assisted Modeling for Model-Based Video Representations*, MAS PhD, February 1997.
- Chalom, Edmond, *Image Segmentation Using Multi-Dimensional Attributes*, EECS PhD, February 1998.
- Agamanolis, Stefan, *Isis, Cabbage, and Viper: New Tools and Strategies for Designing Responsive Media*, MAS PhD, June 2001.
- Kung, Ling-Pei, *Obtaining Performance and Programmability Using Configurable Hardware for Media Processing*, MAS PhD, February 2002.
- Butera, William, *Paintable Computing*, MAS PhD, February 2002.
- Mallett, Jacqueline, *The Role of Groups in Smart Camera Networks*, MAS PhD, Feb. 2006.

#### *Doctoral Theses, Reader*

- St. Hilaire, Pierre, *A Parallel Approach to Holographic Video Scanning*, MAS PhD, September 1994.
- Polley, Michael O., *Efficient Channel Coding for HDTV Terrestrial Broadcasting*, EECS PhD, February 1996.
- Halle, Michael, *Image Synthesis for Multi-Perspective Spatial Displays*, MAS PhD, September 1997.
- Love, Nicole S., *Recognition of 3D Compressed Images and its Traffic Monitoring Applications*, EECS PhD, June 2004.
- Karahalios, Kyratso G., *Social Catalysts: Enhancing Communication in Mediated Spaces*, MAS PhD, August 2004.

# **EXHIBIT 4**

Patent No. 8,230,099  
Petition For *Inter Partes* Review

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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Yamaha Corporation of America  
Petitioner

v.

Black Hills Media, LLC  
Patent Owner

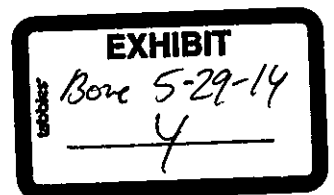
Patent No. 8,230,099  
Issue Date: July 24, 2012  
Title: SYSTEM AND METHOD  
FOR SHARING PLAYLISTS

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*Inter Partes* Review No. \_\_\_\_\_

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**DECLARATION OF V. MICHAEL BOVE, JR.**



I, V. Michael Bove, Jr., make this declaration in connection with the proceeding identified above.

## **I. INTRODUCTION**

1. I have been retained by counsel for Yamaha Corporation of America ("Yamaha") as a technical expert in connection with the proceeding identified above. I submit this declaration in support of Yamaha's Petition for *Inter Partes* Review of United States Patent No. 8,230,099 ("the '099 patent").

2. I am being paid at an hourly rate for my work on this matter. I have no personal or financial stake or interest in the outcome of the present proceeding.

## **II. QUALIFICATIONS**

3. I am employed as a Principal Research Scientist at the Massachusetts Institute of Technology, where I am also currently head of the Object-Based Media group at the Media Laboratory, co-director of the Center for Future Storytelling, and co-director of the consumer electronics working group CE2.0. I was also co-founder of and technical advisor to WatchPoint Media, Inc., an interactive television products and services company with offices in Lexington, Massachusetts and London, England, which is now part of Ericsson. I currently serve as technical advisor to One Laptop Per Child, creators of an inexpensive laptop computer for children in developing nations.

4. I hold an S.B. in Electrical Engineering, an S.M. in Visual Studies, and a Ph.D. in Media Technology, all from the Massachusetts Institute of Technology. I have authored over ninety journal and conference papers on distributed media, interactive media, and digital media. I have supervised over fifty graduate theses, and since 1990 have taught a graduate subject at MIT called Signals, Systems, and Information for Media Technology. I am a Fellow of the Society of Photo-Instrumentation Engineers, a member of the Board of Editors of the Journal of the Society of Motion Picture and Television Engineers, and a member of a number of other professional organizations including the Optical Society of America, the Association for Computing Machinery, and the Institute of Electrical and Electronic Engineers. I am a named inventor on seventeen U.S. patents, including U.S. Patent No. 7,249,367, which was cited in the prosecution of the '099 patent. I served as General Chair of the 1996 ACM Multimedia Conference and of the 2006 IEEE Consumer Communications and Networking Conference (CCNC'06). Attached as Appendix A is a copy of my curriculum vitae.

### **III. MATERIALS CONSIDERED**

5. In preparing this declaration, I have reviewed, among other things, the following materials: (a) the '099 patent and its prosecution history; (b) U.S. Patent No. 6,502,194 ("Berman"); (c) U.S. Patent Application Publication

US2002/0068558 A1 (“Janik '558”); (d) U.S. Patent Application Publication US2002/0065902 A1 (“Janik '902”); and (e) the Petition for *Inter Partes* Review of the '099 patent to which my declaration relates.

#### **IV. DEFINITIONS AND STANDARDS**

6. I have been informed and understand that claims are construed from the perspective of one of ordinary skill in the art at the time of the claimed invention, and that during *inter partes* review, claims are to be given their broadest reasonable construction consistent with the specification.

7. I have also been informed and understand that the subject matter of a patent claim is obvious if the differences between the subject matter of the claim and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I have also been informed that the framework for determining obviousness involves considering the following factors: (i) the scope and content of the prior art; (ii) the differences between the prior art and the claimed subject matter; (iii) the level of ordinary skill in the art; and (iv) any objective evidence of non-obviousness. I understand that the claimed subject matter would have been obvious to one of ordinary skill in the art if, for example, it results from the combination of known elements according to known methods to yield predictable results, the simple substitution of one known element

for another to obtain predictable results, use of a known technique to improve similar devices in the same way or applying a known technique to a known device ready for improvement to yield predictable results. I have also been informed that the analysis of obviousness may include recourse to logic, judgment and common sense available to the person of ordinary skill in the art that does not necessarily require explication in any reference.

8. In my opinion, a person of ordinary skill in the art pertaining to the '099 patent would have at least a bachelor's degree in computer science or electrical engineering, and at least one year of practical experience with networked multimedia.

9. I have been informed that the relevant date for considering the patentability of the claims of the '099 patent is May of 2004. Based on my education and experience in the fields of networked digital media and consumer electronics, I believe I am qualified to provide opinions about how one of ordinary skill in the art in 2004 would have interpreted and understood the '099 patent and the prior art discussed below.

## **V. THE '099 PATENT**

10. The claims of the '099 patent are directed to a system and method for a wireless remote control device to receive a playlist of songs from a remote

source, allowing a user to select one or more songs from the playlist for playback on a media player that is associated with but separate from the remote control.

## **VI. CLAIM CONSTRUCTION**

11. I have been asked to provide my opinion on two claim terms: “playlist” and “remote source,” by discussing what one of ordinary skill in the art at the time of the patent filing would regard as the broadest reasonable interpretation consistent with the specification. In each case my opinion agrees with the position taken in Yamaha’s Petition for *Inter Partes* Review.

### **A. “playlist”**

12. The term “playlist” appears in all of the independent claims of the '099 patent. A discussion of playlists in the specification (1:33-2:26) describes a playlist as “a list of a user’s favorite selections.” While this section of the patent specification discusses playlists generated based on a user’s selections of songs, it also describes the sharing of playlists and “identifying playlists that are likely to contain selections that will be enjoyed by a user.” The specification elsewhere (4:15-17) discloses “a method of defining a playlist, wherein the method comprises defining a user profile and the user profile is used to determine selections that may be enjoyed by a user,” at 4:32-44 discloses creating a playlist based on song popularity during a particular period of time, and at 4:51-61 discloses automatically updating a playlist without user intervention. Accordingly, it is my



opinion that the broadest reasonable interpretation of “playlist” does not require that it be generated by a particular user but rather that it is simply a list of media items from which a user may make selections.

**B. “remote source”**

13. The term “remote source” appears in all of the independent claims of the '099 patent. The use of this term in several of the dependent claims provides context for the meaning of this term. Claim 6 (which depends on claim 1) requires that “the remote source is a central server,” implying that the “remote source” of claim 1 should be understood more broadly. Other claims dependent on claim 1 give alternate possibilities, including a peer-to-peer network (claim 7) and the media player device itself (claim 9). The latter example is consistent with the specification, for example, at 9:9-13 and 10:31-36, where it is stated that the playlist can be communicated from the media player to a remote control. This suggests that “remote” should be understood to require separateness rather than physical distance, in the same way that a “remote control” does not need to be – and indeed commonly is not – far distant from the device it controls. Thus it is my opinion that one of ordinary skill in the art would understand “remote source” to be a playlist source separate from the remote control device.

## **VII. ANALYSIS OF PRIOR ART**

### **A. Berman**

14. I have been asked my opinion as to whether one of ordinary skill in the art would find that, although the Berman reference does not explicitly disclose a wireless remote control, it does disclose the replication of the GUI of the user display on a remote control device at 13:60-64. In my opinion, it would have been obvious that the remote control device could be implemented as a handheld wireless device. Because nearly all the remote control devices used with home audio systems since at least the 1980s have been wireless, it is my opinion that one of skill in the art would easily understand that the Berman remote control device could be wireless.

### **B. Janik '558 In Combination With Janik '902**

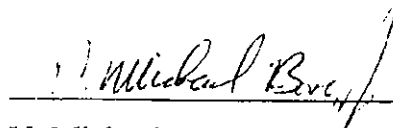
15. I have also been asked my opinion as to whether one of ordinary skill in the art would have found it obvious that the personal computer in the Janik '558 reference could be selected for audio playback using webpad 92, in light of the Janik '902 reference. I note that one of ordinary skill in the art would have understood that both references relate to the same overall system, which includes a wireless remote control that displays playlists, and thus would have found it obvious to combine features of one reference with those of the other. I note also that FIG. 3 of the Janik '558 reference shows that the speakers of the PC can be

selected as a destination for audio playback through a graphical user interface (GUI) operating on the PC. This reference does not explicitly disclose selecting the PC for audio playback using the disclosed webpad. However, the Janik '902 reference (at [0069]) does disclose the ability of its webpad to make a selection from among different locations as a playback destination for audio. Accordingly, it is my opinion that it would have been obvious to one of ordinary skill in the art to provide this playback device selection capability, including the capability to select the PC speakers, on the remote of Janik '558 as well as on the PC in that reference, replicating the capability on the PC's GUI. This would further increase the operating convenience of the system by allowing for remote control via the webpad even when listening through the PC.

\* \* \*

I 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 that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code.

Dated: September 19, 2013

  
V. Michael Bove, Jr.

Last updated June 2013

Massachusetts Institute of Technology  
School of Architecture and Planning Personnel Record  
Victor Michael Bove, Jr.  
Media Arts and Sciences Program

*Date of Birth*  
23 December 1960

*Citizenship*  
United States of America

*Education*  
M.I.T., S.B. Electrical Engineering, June 1983  
M.I.T., S.M. Visual Studies, September 1985  
M.I.T., Ph.D. Media Technology, June 1989

*Title of Thesis for Most Advanced Degree*  
V. M. Bove, Jr., *Synthetic Movies Derived from Multi-Dimensional Image Sensors*, Ph.D. thesis, M.I.T., June 1989.

*Principal Fields of Interest*  
Applications of machine analysis to media-related applications (adding intelligence to live interpersonal communications and authored content), advanced user interfaces for consumer electronics, novel imaging hardware (in particular holographic television)

*Non-M.I.T. Experience*  
R.C.A. Microcomputer Products Division, Summer Student Employee, May 1980-Aug. 1980  
Co-Founder and Technical Advisor, WatchPoint Media, Inc., 1999-2003

*History of M.I.T. Appointments*  
Technical Assistant, May 1983-Sept. 1983  
Graduate Research Assistant, Sept. 1983-April 1989  
Postdoctoral Research Associate, April 1989-July 1989  
Assistant Professor of Media Technology, July 1989-July 1993  
Associate Professor of Media Technology, July 1993-July 1997

Principal Research Scientist, MIT Media Laboratory, July 1997-present

*Consulting Record*

Aware, Inc., July-Sept. 1991

Bell Northern Research, August 1991, August-Sept. 1995

Plaza Investment Managers, Inc., July-August 1992

World Book Publishing (encyclopedia revisions), March 1993

Van Nostrand Reinhold (book manuscript reviewing), April 1994-present

Analog Devices, Inc., July-August 1994

Blackside Productions, Inc. (consultant for the TV series "Breakthrough: People of Color in American Science"), October-December 1994

Axiom Venture Partners, Nov. 1995-March 1996

Data Translation Inc./Kenyon and Kenyon (consultant on patent case), March 1996

Naval Undersea Warfare Center, June 1996

Copyright Clearance Center, Inc., Sept. 1996-Sept. 1997

Artech House Publishers (book manuscript reviewing), 1996-2002

Research Grants Council of Hong Kong (proposal evaluator), Feb. 1997-present

Hughes Electronics (expert witness before International Trade Commission), Feb. 1997-July 1997

Mercury Computer, May 1997

Thomson Consumer Electronics (expert witness before International Trade Commission), June 1997-August 1998

Swedish Research Council for Engineering Sciences (proposal evaluator), August 1997

Texas Instruments, 1998-2003

Cirrus Logic, Inc., Dec. 1998-Jan. 2000

Ezenia!, Inc., Jan. 1999-Aug. 2000

Thomson Consumer Electronics (expert witness), Nov. 2000-Feb. 2002; 2007-2008.

Intel, Jan. 2001-April 2001

Bain and Co., Jan. 2001-April 2001

DirecTV, Inc. (expert witness), 2002-2009

DRTV Systems Ltd., April 2002

Pause Technology (expert witness), 2003

Polycom (expert witness), 2003

Forney Corporation (expert witness), 2003-2005

IPIX Corp. (expert witness), 2005  
Motorola, Inc. (expert witness), 2006-2008, 2011-present  
Scientific Atlanta (expert witness), 2006-2008  
Technical Advisor, One Laptop Per Child, 2006-present  
Technical Advisor, TDVision Systems, 2006-present  
Eastman Kodak (expert witness), February 2007-January 2008  
EchoStar (expert witness), 2007-2008  
Funai (expert witness), 2007-2010  
Kyocera Sanyo Telecom and Palm, Inc. (expert witness) 2009-2010  
Thomson Licensing, 2010  
Research in Motion, Ltd. (expert witness), 2011-present  
Twentieth Century Fox Home Entertainment (expert witness), 2011-2012  
HTC, (expert witness), 2011-present

*Department and Institute Committees, Other Assigned Duties*

School of Architecture and Planning Committee on Academic Computing Needs, 1989-1990

Freshman advisor and seminar leader, 1990-present

*The Tech* advisory board, 1991-present

Independent Activities Period Policy Committee, 1991-1994, 1995-1997

Media Arts & Sciences Program IAP Coordinator, 1992-present

Media Arts & Sciences Departmental Committee on Graduate Students, 1994-1997, 2005-2006 (acting head, spring semester 1996)

Committee on the Undergraduate Program Subcommittee on Freshman Advising, 1998-1999

Media Arts & Sciences Undergraduate Officer, 1996-present

Founder and Director, Media Arts & Sciences Freshman Program, 1999-present

*Government and Other Committees, Service, etc.*

Committee on Open High-Resolution Systems, 1990-1991

Federal Communications Commission Advisory Committee on Advanced Television Service, Planning Subcommittee Working Party 4, 1992

Local Arrangements Chair, IEEE International Conference on Multimedia Computing and Systems, 1994

Conference Co-Chair, SPIE Conference on Integration Issues in Large Commercial Media Delivery Systems, 1995, 1996

Board of Editors, SMPTE Journal, 1995-present

Conference Co-Chair, SPIE Conference on Reconfigurable Technology for Rapid Product Development and Computing, 1996  
General Chair, ACM Multimedia Conference, 1996  
Organizer, Objects of Communication Symposium, 1996  
Conference Co-Chair, SPIE Conference on Multimedia Networks and Applications, 1997, 1998, 1999, 2000  
Conference Co-Chair, SPIE Conference on Media Processors, 1999, 2000, 2001, 2002, 2003, 2004, 2005  
Manuscript reviewer for six journals and three book publishers  
Associate Editor, *Optical Engineering*, 2004-present  
ARDA Exploratory Program Executive Committee member, 2004-2006  
Technical Advisory Panel, Council for Research Excellence, 2005-present  
General Chair, IEEE Consumer Communications and Networking Conference 2006  
Emmy Advanced Media Committee, National Academy of Television Arts and Sciences, 2006-present  
Board of Governors, National Academy of Media Arts and Sciences, 2007-present  
Conference co-chair, SPIE Practical Holography conference, 2011, 2012, 2013  
Conference co-chair, International Symposium on Display Holography, 2012  
Co-Chair, Optical Society of America 3D Display Technology, Perception, and Application Incubator Meeting, 2012

#### *Awards Received*

I.B.M. Communications Doctoral Fellowship, 1986 and 1987  
Sony Corporation Career Development Professorship, 1991-1995  
IEEE ASIC '93 (Conference on Application Specific Integrated Circuits) Speaker's Award, 1993  
IEEE Computer Society Certificate of Appreciation, 1994  
Alex W. Dreyfoos, Jr. Career Development Professorship, 1995-1997  
Marquis Who's Who in Science and Engineering, 1996-1997; Who's Who in the East, 1997, 1998; Who's Who in Entertainment, 1997; Who's Who in America, 2001  
ACM Recognition of Service Award, 1997  
Distinguished Alumnus Award, John Piersol McCaskey High School, Lancaster PA, 1997  
Fellow, IC<sup>2</sup> Institute, University of Texas at Austin, 2001  
Fellow, SPIE, 2002

INDEX: Design to Improve Life Award (as member of team that designed OLPC XO laptop), 2007

Effic Award (bronze) for work on Sprite Slam Dunk Competition, 2013

### *Current Organization Membership*

American Institute of Physics

Association for Computing Machinery (ACM)

Institute of Electrical and Electronic Engineers (IEEE)

Optical Society of America (OSA)

Society of Photo-Instrumentation Engineers (SPIE) (Fellow, 2002-present; Associate Editor, *Optical Engineering*, 2004-2011)

Society of Motion Picture and Television Engineers (SMPTE) (Manager, New England Section, 1993-1995; Board of Editors, 1995-present)

### *Patents*

1. U.S. Patent 4,673,981, "Unrecordable Video Signals," (co-inventors Andrew Lippman and Jerome Wiesner)
2. U.S. Patent 5,185,852, "Antialiasing Apparatus and Method for Computer Printers," (co-inventor Christopher Mayer)
3. U.S. Patent 5,946,425, "Method and Apparatus for Automatic Alignment of Volumetric Images Containing Common Subject Matter," (co-inventor Tamas Sandor)
4. U.S. Patent 6,022,648, "Bistable, Thermochromic Recording Materials for Rendering Color and Gray Scale," (co-inventor Joseph Jacobson).
5. U.S. Patent 6,642,940, "Management of Properties for Hyperlinked Video," (co-inventors Edmond Chalom, Jonathan Dakss, and Nuno Vasconcelos).
6. U.S. Patent 6,816,628, "Methods for Outlining and Filling Regions in Multi-Dimensional Arrays," (co-inventors Karen Sarachik, Jonathan Dakss, and Joshua Wachman).
7. U.S. Patent 6,879,720, "Methods for Outlining and Filling Regions in Multi-Dimensional Arrays," (co-inventors Karen Sarachik, Jonathan Dakss, and Joshua Wachman).
8. U.S. Patent 6,944,228, "Method and Apparatus for Encoding Video Hyperlinks," (co-inventors Jonathan Dakss and Daniel Katcher).
9. U.S. Patent 6,978,053, "Single-Pass Multilevel Methods for Applying Morphological Operators in Multiple Dimensions," (2 co-inventors).
10. U.S. Patent 7,117,517, "Method and Apparatus for Generating Data Structures for a Hyperlinked Television Broadcast," (4 co-inventors).
11. U.S. Patent 7,120,924, "Method and Apparatus for Receiving a Hyperlinked



- Television Broadcast," (5 co-inventors).
12. U.S. Patent 7,249,367, "Method and Apparatus for Switching Between Multiple Programs by Interacting with a Hyperlinked Television Broadcast," (3 co-inventors).
  13. U.S. Patent 7,367,042, "Method and Apparatus for Hyperlinking in a Television Broadcast," (6 co-inventors).
  14. U.S. Patent 7,636,365, "Smart Digital Modules and Smart Digital Wall Surfaces Combining the Same," (3 co-inventors).
  15. U.S. Patent 8,010,986, "Synchronization and Automation in an ITV Environment," (4 co-inventors).
  16. U.S. Patent 8,149,265, "Holographic Video Display System," (3 co-inventors).
  17. U.S. Patent 8,356,329, "Method and Apparatus for Interaction with Hyperlinks in a Television Broadcast," (8 co-inventors).
  18. U.S. Patent applied for 2001, "Program Stream Switching in a Hyperlinked Video Broadcast," (2 co-inventors).
  19. U.S. Patent applied for 2007, "Self-Refreshing Display Controller for a Display Device in a Computational Unit," (3 co-inventors).
  20. U.S. Patent applied for 2009, "Tangible Social Network," (1 co-inventor).
  21. U.S. Patent applied for 2010, "Methods and Apparatus for Holographic Animation," (2 co-inventors).
  22. U.S. Patent applied for 2012, "Methods and Apparatus for Accessing Peripheral Content," (2 co-inventors).
  23. U.S. Patent applied for 2013, "Force-Sensing Net," (3 co-inventors).
  24. U.S. Patent applied for 2013, "Context-Aware Omnidirectional Projector," (4 co-inventors).

*Teaching Experience of V. Michael Bove, Jr.*

FT89, 4.994, Media Arts and Sciences Doctoral Proseminar, taught unit on signals and systems (3 weeks), 10 students  
ST90, 4.998, Digital Image Processing for Hard Copy, 12 students  
FT90, 4.890, Signals and Systems for Media Technology, one of four instructors, 12 students  
FT90, 4A05 (freshman advising seminar), Case Studies in Visual Communications, 9 students  
ST91, 4.964, Digital Image Processing for Hard Copy, 6 students  
FT91, 4.890, Signals and Systems for Media Technology, one of four instructors, 12 students  
FT91, 4A05 (freshman advising seminar), Case Studies in Visual Communications, 9 students  
ST92, 4.964, Digital Image Processing for Hard Copy, 9 students  
FT92, 4.890, Signals and Systems for Media Technology, one of two instructors, 13 students  
FT92, 4A05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
IAP93, "Ernie Kovacs"  
ST93, 4.964, Digital Image Processing for Hard Copy, 8 students  
FT93, MAS101/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 20 students  
FT93, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
IAP94, "A Look Back at Colorization"  
ST94, MAS814, Digital Image Processing for Hard Copy, 8 students  
FT94, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
FT94, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 16 students  
IAP95, "Dimensional Transcendence." one of three instructors  
ST95, MAS814, Digital Image Processing for Hard Copy, 5 students  
FT95, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 7 students  
FT95, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 15 students  
ST96, MAS961, On Being Meta, one of three instructors, 14 students  
FT96, MASA05 (freshman advising seminar), Case Studies in Visual Commu-

nications, 8 students  
 FT96, MAS160/MAS510, Signals, Systems, and Information for Media Technology, sole instructor, 19 students  
 ST97, MAS814, Digital Image Processing for Hard Copy, 7 students  
 ST97, MAS961, On Being Meta, one of three instructors  
 FT97, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
 FT97, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 10 students  
 ST98, MAS816, On Being Meta, one of three instructors  
 FT98, MASA05 (freshman advising seminar), Case Studies in Visual Communications, 8 students  
 ST99, MAS814, Digital Image Processing for Hard Copy, 12 students  
 ST99, MAS111, Introduction to Doing Research in Media Arts and Sciences, 12 students  
 FT99, MASA09 (freshman advising seminar), Television, Inside and Out, 8 students  
 ST00, MAS111, Introduction to Doing Research in Media Arts and Sciences, 15 students  
 ST00, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 24 students  
 FT00, MASA09 (freshman advising seminar), Television, Inside and Out, 8 students  
 ST01, MAS111, Introduction to Doing Research in Media Arts and Sciences, 25 students  
 ST01, MAS814, Digital Hard Copy, 6 students  
 FT01, MASA09 (freshman advising seminar), Television, Inside and Out, 9 students  
 FT01, MAS160/MAS510, Signals, Systems, and Information for Media Technology, one of two instructors, 14 students  
 ST02, MAS111, Introduction to Doing Research in Media Arts and Sciences, 25 students  
 ST02, MAS890, Workshop in Community-Maintainable Online Collaborative Spaces, 20 students  
 FT02, MASA09 (freshman advising seminar), Television, Inside and Out, 9 students  
 ST03, MAS111, Introduction to Doing Research in Media Arts and Sciences, 15 students  
 FT03, MASA18 (freshman advising seminar), Engineering: the Good, the Bad,

and the Ugly, 10 students

FT03, MAS160/MAS510/MAS511, Signals, Systems, and Information for Media Technology, one of two instructors, 24 students

ST04, MAS111, Introduction to Doing Research in Media Arts and Sciences, 15 students

FT04, MASA18 (freshman advising seminar), Engineering: the Good, the Bad, and the Ugly, 7 students

ST05, MAS111, Introduction to Doing Research in Media Arts and Sciences, 15 students

FT05, MAS160/MAS510/MAS511, Signals, Systems, and Information for Media Technology, 14 students

ST06, MAS111, Introduction to Doing Research in Media Arts and Sciences, 10 students

FT06, MASA18 (freshman advising seminar), Engineering: the Good, the Bad, and the Ugly, 11 students

ST07, MAS111, Introduction to Doing Research in Media Arts and Sciences, 10 students

FT07, MASA18 (freshman advising seminar), Engineering: the Good, the Bad, and the Ugly, 10 students

FT07, MAS160/MAS510/MAS511, Signals, Systems, and Information for Media Technology, 12 students

FT07, MAS110, Fundamentals of Computational Media Design, 25 students

ST08, MAS111, Introduction to Doing Research in Media Arts and Sciences, 18 students

FT08, MAS110, Fundamentals of Computational Media Design, 25 students

ST09, MAS111, Introduction to Doing Research in Media Arts and Sciences, 9 students

ST09, MAS963, New Media Storytelling, 10 students

FT09, MAS110, Fundamentals of Computational Media Design, 25 students

FT09, MASA19 (freshman advising seminar), Designing Consumer Electronics, 9 students

ST10, MAS111, Introduction to Doing Research in Media Arts and Sciences, 21 students

ST10, MAS963, New Media Storytelling, 9 students

FT10, MAS110, Fundamentals of Computational Media Design, 28 students

FT10, MASA19 (freshman advising seminar), Designing Consumer Electronics, 10 students

ST11, MAS111, Introduction to Doing Research in Media Arts and Sciences, 12

students

FT11, MAS110, Fundamentals of Computational Media Design, 30 students

FT11, MASA19 (freshman advising seminar), Designing Consumer Electronics,  
10 students

ST12, MAS111, Introduction to Doing Research in Media Arts and Sciences, 20  
students

ST12, MAS160/MAS510/MAS511, Signals, Systems, and Information for Me-  
dia Technology, 6 students

FT12, MAS110, Fundamentals of Computational Media Design, 30 students

FT12, MASA19 (freshman advising seminar), Designing Consumer Electronics,  
10 students

ST13, MAS111, Introduction to Doing Research in Media Arts and Sciences, 20  
students

## Publications of V. Michael Bove, Jr.

### Books

(for book chapters see Other Major Publications)

1. S. A. Benton and V. M. Bove, Jr., *Holographic Imaging*, Wiley, 2008.

### Papers in Refereed Journals

1. V. M. Bove, Jr., "A Probabilistic Method for Integrating Multiple Sources of Range Data," *Journal of the Optical Society of America A*, 7, Dec. 1990, pp. 2193-2198.
2. V. M. Bove, Jr. and A. B. Lippman, "Scalable Open Architecture Television," *SMPTE (Society of Motion Picture and Television Engineers) Journal*, 101, Jan. 1992, pp. 2-5.
- <sup>o</sup> 3. A. Singh and V. M. Bove, Jr., "Multidimensional Quantizers for Scalable Video Compression," *IEEE Journal on Selected Areas in Communications*, 11, Jan. 1993, pp. 36-45.
4. V. M. Bove, Jr., "Entropy-Based Depth from Focus," *Journal of the Optical Society of America A*, 10, Apr. 1993, pp. 561-566.
- <sup>o</sup> 5. K. Tsunashima, J. B. Stampleman, and V. M. Bove, Jr., "A Scalable Motion-Compensated Subband Image Coder," *IEEE Transactions on Communications*, 42, Apr. 1994, pp. 1894-1901.
6. V. M. Bove, Jr. and J. A. Watlington, "Cheops: A Reconfigurable Data-Flow System for Video Processing," *IEEE Transactions on Circuits and Systems for Video Technology*, 5, Apr. 1995, pp. 140-149.
7. V. M. Bove, Jr., "Object-Oriented Television," *SMPTE Journal*, 104, Dec. 1995, pp. 803-807.
8. V. M. Bove, Jr., "Multimedia Based on Object Models: Some Whys and Hows," *IBM Systems Journal*, 35, 1996, pp. 337-348.
9. V. M. Bove, Jr., "Beyond Images," *Convergence: The Journal of Research into New Media Technologies*, 2, Autumn 1996, pp. 30-46.
- <sup>o</sup> 10. J. A. Watlington and V. M. Bove, Jr., "Stream-Based Computing and Future Television," *SMPTE Journal*, 106, April 1997, pp. 217-224.
- <sup>o</sup> 11. J. A. Watlington and V. M. Bove, Jr., "A System for Parallel Media Processing," *Parallel Computing*, 23:12 December 1997, pp. 1793-1809.
- <sup>o</sup> 12. S. Agamanolis and V. M. Bove, Jr., "Multilevel Scripting for Responsive Multimedia," *IEEE Multimedia*, 4:4 October-December 1997, pp. 40-50.
- <sup>o</sup> 13. V. M. Bove, Jr., J. Dakss, S. Agamanolis, E. Chalom, "Adding Hyperlinks to Digital Television," *SMPTE Journal*, 108, November 1999, pp. 795-801.
14. V. M. Bove, Jr. and W. Butera, "The Coding Ecology: Image Coding Via

<sup>o</sup>Outgrowths of supervised theses or research projects.

Competition among Experts," *IEEE Transactions on Circuits and Systems for Video Technology*, 10, October 2000, pp. 1049-1058.

<sup>0</sup> 15. V. M. Bove, Jr., J. Dakss, E. Chalom, and S. Agamanolis, "Hyperlinked Television Research at the MIT Media Laboratory," *IBM Systems Journal*, 39, 2000, pp. 470-478.

<sup>0</sup> 16. S. Agamanolis and V. M. Bove, Jr., "Viper: a Framework for Responsive Television," *IEEE Multimedia*, 10:3, July-Sept. 2003, pp. 88-98.

<sup>0</sup> 17. V. M. Bove, Jr. and Wilfrido Sierra, "Personal Projection," *SMPTE Motion Imaging Journal*, 113, Jan. 2004, pp. 17-21.

<sup>0</sup> 18. V. M. Bove, Jr. and J. Mallett, "Collaborative Knowledge Building by Smart Sensors," *BT Technology Journal*, 22:4, Oct. 2004, pp. 45-51.

<sup>0</sup> 19. D. Butler, V. M. Bove, Jr., and S. Sridharan, "Real-Time Adaptive Foreground/Background Segmentation," *EURASIP Journal on Applied Signal Processing*, 14:11, Aug. 2005, 2292-2304.

<sup>0</sup> 20. W. Plesniak, M. Halle, V. M. Bove, Jr., J. Barabas, and R. Pappu, "Reconfigurable Image Projection (RIP) Holograms," *Optical Engineering*, 45:11, Nov. 2006.

21. V. M. Bove, Jr., "Holographic Television: What and When?" *SMPTE Motion Imaging Journal*, 120:4, May/June 2011, pp. 36-40.

22. V. M. Bove, Jr., "Engineering for Live Holographic TV" *SMPTE Motion Imaging Journal*, 120:8, November/December 2011, pp. 56-60.

23. V. M. Bove, Jr., "Display Holography's Digital Second Act," *Proceedings of the IEEE*, 100:4, April 2012, pp. 918-928.

<sup>0</sup> 24. S. Jolly, D. E. Smalley, J. Barabas, and V. M. Bove, Jr., "Direct Fringe Writing Architecture for Photorefractive Polymer-Based Holographic Displays: Analysis and Implementation," *Opt. Eng.* 52:5, 055801, 2013, doi: 10.1117/1.OE.52.5.055801

<sup>0</sup> 25. D. E. Smalley, Q. Y. J. Smithwick, V. M. Bove, J. Barabas and S. Jolly, Anisotropic leaky-mode modulator for holographic video displays, *Nature*, 498, 20 June 2013, pp. 313 - 317.

#### *Papers in Referreed Conferrence Journals*

1. V. M. Bove, Jr., "Pictorial Applications for Range Sensing Cameras," in *SPIE Vol. 901: Image Processing, Analysis, Measurement, and Quality*, Society of Photo-Optical Instrumentation Engineers, Bellingham WA, 1988, pp. 10-17.

2. B. Girod, V. M. Bove, Jr., A. B. Lippman, "Automatic 3-D Scene Modeling from Range and Motion," *Proc. Second International Workshop on 64kbit/s Coding of Moving Video*, Hannover Germany, 1989.

3. V. M. Bove, Jr., "Discrete Fourier Transform Based Depth-from-Focus," *OSA Technical Digest Series Vol. 14: Image Understanding and Machine Vision*, Optical Society of America, Washington DC, 1989, pp. 118-121.

4. V. M. Bove, Jr. and A. B. Lippman, "Open Architecture Television Receivers and Extensible/Intercompatible Digital Video Representations," *Proc. IEEE ISCAS (International Symposium on Circuits and Systems)*, New Orleans LA, 1990, pp. 1294-1297.
5. V. M. Bove, Jr., "Scalable, Spatiotemporal Resolution-Independent Digital Image Format," *Proc. Picture Coding Symposium*, Cambridge MA, 1990, pp. 4.6.1-4.6.4.
6. V. M. Bove, Jr. and A. B. Lippman, "Open Architecture Television," in *A Television Continuum - 1967 to 2017*, SMPTE, White Plains NY, 1991, pp. 210-218.
7. W. R. Neuman, A. N. Crigler, V. M. Bove, Jr., "Television Sound and Viewer Preference," *Proc. AES 9th International Conference*, Detroit MI, 1991.
8. V. M. Bove, Jr. and J. A. Watlington, "Chcops: A Modular Processor for Scalable Video Coding," in *SPIE Vol. 1605*, Society of Photo-Optical Instrumentation Engineers, Bellingham WA, 1991, pp. 886-893.
9. I. J. Shen and V. M. Bove, Jr., "Minimization of Aliasing Artifacts During Partial Subband Reconstruction with Wiener Filters," in *SPIE Vol. 1657*, Society of Photo-Optical Instrumentation Engineers, Bellingham WA, 1992, pp. 14-23.
10. V. M. Bove, Jr. and J. A. Watlington, "Experiments in Hardware and Software for Real-Time Image Sequence Processing," *Proc. IEEE Workshop on Visual Signal Processing and Communications*, Raleigh NC, 1992, pp. 98-103.
11. V. M. Bove, Jr. and E. Chalom, "Open Architecture Television for Motion-Compensated Coding," in *SPIE Vol. 1818*, Society of Photo-Optical Instrumentation Engineers, Bellingham WA, 1992, pp. 1088-1091.
12. V. M. Bove, Jr., "Hardware and Software Implications of Representing Scenes as Data" (invited paper), *Proc. ICASSP-93*, Minneapolis MN, 1993, pp. I-121-I-124.
13. V. M. Bove, Jr., B. D. Granger, and J. A. Watlington, "Real-Time Decoding and Display of Structured Video," *Proc. IEEE ICMCS '94*, Boston MA, 1994, pp. 456-462.
14. V. M. Bove, Jr. and J. A. Watlington, "Structured Video Display on a Data-Flow Processor," *Proc. IEEE Workshop on Visual Signal Processing and Communications*, New Brunswick NJ, 1994, pp. 8-12.
15. V. M. Bove, Jr., "Object-Oriented Television," *Proc. 136th SMPTE Technical Conference*, Los Angeles CA, 1994, paper 136-3.
- <sup>0</sup> 16. J. A. Watlington, M. Lucente, C. J. Sparrell, V. M. Bove, Jr., and I. Tamitani, "A Hardware Architecture for Rapid Generation of Electro-Holographic Fringe Patterns," *Proc. SPIE Practical Holography IX, 2406*, 1995, pp. 172-183.

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<sup>0</sup>Outgrowths of supervised theses or research projects.



- <sup>0</sup> 17. S. Becker and V. M. Bove, Jr., "Semiautomatic 3-D Model Extraction from Uncalibrated 2-D Camera Views," *Proc. SPIE Image Synthesis*, 2410, 1995, pp. 447-461.
- <sup>0</sup> 18. E. Chalom and V. M. Bove, Jr., "Segmentation of Frames in a Video Sequence using Motion and Other Attributes," *Proc. SPIE Digital Video Compression: Algorithms and Technologies*, 2419, 1995, pp. 230-241.
- <sup>0</sup> 19. J. A. Watlington and V. M. Bove, Jr., "Stream-Based Computing and Future Television," *Proc. 137th SMPTE Technical Conference*, New Orleans LA, 1995, pp. 69-79.
- <sup>0</sup> 20. E. K. Acosta, V. M. Bove, Jr., J. A. Watlington, and R. A. Yu, "Reconfigurable Processor for a Data-Flow Video Processing System," *Proc. SPIE FPGAs for Fast Board Development and Reconfigurable Computing*, 2607, 1995, pp. 83-91.
- <sup>0</sup> 21. T. Chang and V. M. Bove, Jr., "Experiments in Real-Time Decoding of Layered Video," *Proc. SPIE Integration Issues in Large Commercial Media Delivery Systems*, 2615, 1995, pp. 99-106.
- <sup>0</sup> 22. E. Chalom and V. M. Bove, Jr., "Segmentation of an Image Sequence using Multi-Dimensional Image Attributes," *Proc. IEEE ICIP-96*, Lausanne, 1996, pp. II-525 - II-528.
23. V. M. Bove, Jr., "Algorithms and Systems for Modeling Moving Scenes," *Proc. EUSIPCO-96 (European Signal Processing Conference)*, Trieste, 1996, pp. 1685-1688.
24. V. M. Bove, Jr., "The Impact of New Multimedia Representations on Hardware and Software Systems," (invited paper) *Proc. SPIE Multimedia Hardware Architectures 1997*, 3021, 1997, pp. 34-39.
- <sup>0</sup> 25. J. Wong, J. Watlington, and V. M. Bove, Jr., "The H-Bus: A Media Acquisition Bus Optimized for Multiple Streams," *Proc. SPIE Multimedia Hardware Architectures 1997*, 3021, 1997, pp. 40-50.
- <sup>0</sup> 26. J. Newbern and V. M. Bove, Jr., "Generation of Blue Noise Arrays by Genetic Algorithm," *Proc. SPIE Human Vision and Electronic Imaging II*, 3016, 1997, pp. 441-450.
- <sup>0</sup> 27. J. A. Watlington and V. M. Bove, Jr., "A System for Parallel Media Processing," *Proc. Workshop on Parallel Processing and Multimedia, IEEE International Parallel Processing Symposium*, Geneva, 1997, pp. 59-74.
- <sup>0</sup> 28. S. Agamanolis and V. M. Bove, Jr., "Reflection of Presence: Toward More Natural and Responsive Telecollaboration," *Proc. SPIE Multimedia Networks*, 3228, 1997, pp. 174-182.
29. V. M. Bove, Jr., "Object-Based Media and Stream-Based Computing," (invited paper) *Proc. SPIE Multimedia Hardware Architectures 1998*, 3311, 1998, pp. 24-29.
30. V. M. Bove, Jr., J. Dakss, S. Agamanolis, E. Chalom, "Adding Hyperlinks to Digital Television," *Proc. 140th SMPTE Technical Conference*, 1998, pp 395-

405.

31. J. Dakss, S. Agamanolis, V. M. Bove, Jr., E. Chalom, "Hyperlinked Video," *Proc. SPIE Multimedia Systems and Applications*, 3528, 1998, pp. 2-10.
32. V. M. Bove, Jr., "Media Processing with Field-Programmable Gate Arrays on a Microprocessor's Local Bus," *Proc. SPIE Media Processors*, 3655, 1999.
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34. A. Westner and V. M. Bove, Jr., "Applying Blind Source Separation and Deconvolution to Real-World Acoustic Environments," *Proc. 106th Audio Engineering Society Convention*, 1999.
35. V. M. Bove, Jr. and W. J. Butera, "The Coding Ecology: Image Coding via Competition among Experts," *Proc. 1999 Picture Coding Symposium*, 1999, pp. 403-406.
36. V. M. Bove, Jr., "Will Anyone Really Need a Web Browser in Five Years?" *Proc. Montreux World Television Forum*, 2000.
37. V. M. Bove, Jr. and S. Agamanolis, "Responsive Television," *Proc. International Broadcasting Convention*, 2000, pp. 622-626.
38. W. Butera and V. M. Bove, Jr., "Literally Embedded Processors," *Proc. SPIE Media Processors*, v. 4313, 2001, pp. 29-37.
39. V. M. Bove, Jr. and W. Butera, "Extremely Distributed Multimedia," *Proc. 6th Eurographics Workshop on Multimedia*, 2001.
- <sup>0</sup>40. V. M. Bove, Jr. and J. Mallett, "Eye Society: Collaborative Problem Solving by Intelligent Mobile Cameras," *Proc. First GSFC/JPL Workshop on Radical Agent Concepts*, 2001.
- <sup>0</sup>41. W. Butera, V. M. Bove, Jr. and J. McBride, "Extremely Distributed Media Processing," *Proc. SPIE Media Processors*, v. 4674, 2002, pp. 37-41.
- <sup>0</sup>42. V. M. Bove, Jr. and W. Sierra, "Personal Projection," *Proc. SMPTE 144th Technical Conference*, 2002.
- <sup>0</sup>43. D. Butler, S. Sridharan, and V. M. Bove, Jr., "Real-Time Adaptive Video Segmentation," *Proc. ICASSP 2003*, 2003.
- <sup>0</sup>44. V. M. Bove, Jr. and W. Sierra, "Personal Projectors Based on VCSEL Arrays," *Proc. SPIE Projection Displays IX*, v. 5002, 2003, pp. 1-6.
- <sup>0</sup>45. V. M. Bove, Jr. and W. Sierra, "Personal Projection, or How to Put a Large Screen in a Small Device," *Proc. SID 2003 International Symposium, XXXIV*, 2003.
- <sup>0</sup>46. J. Mallett and V. M. Bove, Jr., "Eye Society," *Proc. IEEE ICME 2003*, 2003.
47. V. M. Bove, Jr., "Media Processing Ecologies," *Proc. IEEE ITRE 2003*, 2003.
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A Computationally-Enhanced Modular Textile System," *Proc. UBICOMP '04*, 2004.

<sup>049.</sup> T. Quentmeyer, W. J. Plesniak, and V. M. Bove, Jr., "Computing Real-Time Holographic Video Content with Off-the-Shelf PC Hardware," *Proc. OSA Frontiers in Optics/Laser Science Meeting*, 2004.

<sup>050.</sup> V. M. Bove, Jr., W. J. Plesniak, T. Quentmeyer, and J. Barabas, "Real-Time Holographic Video Images with Commodity PC Hardware," *Proc. SPIE Stereoscopic Displays and Applications*, 5664A, 2005.

<sup>051.</sup> B. C. Dalton and V. M. Bove, Jr., "Audio-Based Self-Localization for Ubiquitous Sensor Networks," *Proc. 118th Audio Engineering Society Convention*, 2005.

<sup>052.</sup> D. E. Smalley, Q. Y. J. Smithwick, and V. M. Bove, Jr., "Holographic Video Display Based on Guided-Wave Acousto-Optical Devices," *Proc. SPIE Practical Holography XXI*, 6488, 2007.

<sup>053.</sup> V. M. Bove, Jr., D. E. Smalley, and Q. Y. J. Smithwick, "Making Holographic Television a Consumer Product," (invited paper) *Proc. OSA Topical Meeting on Digital Holography and Three-Dimensional Imaging*, 2007.

<sup>054.</sup> Q. Y. J. Smithwick, D. E. Smalley, V. M. Bove, Jr., and J. Barabas, "Progress in Holographic Video Displays Based on Guided-Wave Acousto-Optical Devices," *Proc. SPIE Practical Holography XXII*, 6912, 2008.

<sup>055.</sup> B. T. Taylor and V. M. Bove, Jr., "The Bar of Soap: A Grasp Recognition System Implemented in a Multi-Functional Handheld Device," *Proc. ACM CHI*, 2008.

<sup>056.</sup> J. J. Kalanithi and V. M. Bove, Jr., "Connectibles: Tangible Social Networks," *Proc. 2nd Intl. Conf. on Tangible and Embedded Interaction (TEI'08)*, 2008.

<sup>056.</sup> Q. Y. J. Smithwick, J. Barabas, D. E. Smalley, and V. M. Bove, Jr., "Real-Time Shader Rendering of Holographic Stereograms," *Proc. SPIE Practical Holography XXIII*, 7233, 2009.

<sup>057.</sup> B. T. Taylor and V. M. Bove, Jr., "Graspables: Grasp-Recognition as a User Interface," *Proc. ACM CHI*, 2009.

<sup>058.</sup> V. M. Bove, Jr., Q. Y. J. Smithwick, J. Barabas, and D. E. Smalley, "Is 3-D TV Preparing the way for Holographic TV?" *Proc. 8th International Symposium on Display Holography*, 2009.

<sup>059.</sup> A. L. Santos and V. M. Bove, Jr., "uCom: Spatial Displays for Visual Awareness of Remote Locations," *Proc. ACM CHI 2010*, 2010.

<sup>060.</sup> J. Barabas, Q. Y. J. Smithwick, and V. M. Bove, Jr., "Evaluation of Rendering Algorithms for Presenting Layered Information on Holographic Displays," *Proc. SID 10 Digest*, 2010.

<sup>61.</sup> V. M. Bove, Jr., "What is Holographic Television, and Will it Ever be in My Living Room?" *Proc. 2010 SMPTE International Conference on Stereoscopic*

*3D for Media and Entertainment*, 2010.

<sup>062.</sup> J. Barabas, S. Jolly, D. E. Smalley, and V. M. Bove, Jr., "Diffraction Specific Coherent Panoramagrams of Real Scenes," *Proc. SPIE Practical Holography XXV*, 7957, 2011.

<sup>63.</sup> V. M. Bove, Jr., "Live Holographic TV: From Misconceptions to Engineering," *Proc. 2011 SMPTE International Conference on Stereoscopic 3D for Media and Entertainment*, 2011.

<sup>064.</sup> E. Portocarrero, D. Cranor, and V. M. Bove, Jr., "Pillow-Talk: Seamless Interface for Dream Priming Recalling and Playback," *Proc. TEI '11*, 2011.

<sup>065.</sup> D. Cranor, A. Peyton, A. Persaud, R. Bhatia, S. Kim, and V. M. Bove, Jr., "ShakeOnIt: An Exploration Into Leveraging Social Rituals for Information Access," *Proc. TEI '11*, 2011.

<sup>066.</sup> J. Barabas, S. Jolly, D. E. Smalley, and V. M. Bove, Jr., "Depth Perception and User Interface in Digital Holographic Television," *Proc. SPIE Practical Holography XXVI*, 8281, 2012.

<sup>067.</sup> S. Jolly and V. M. Bove, Jr., "Direct Optical Fringe Writing of Diffraction Specific Coherent Panoramagrams in Photorefractive Polymer for Updatable Three-Dimensional Holographic Display," *J. Phys.: Conf. Ser.* 415, 012054, 2013.

<sup>068.</sup> D. Smalley, Q. Smithwick, J. Barabas, V. M. Bove, Jr., S. Jolly, and C. Della Silva, "Holovideo for Everyone: a Low-Cost Holovideo Monitor," *J. Phys.: Conf. Ser.* 415, 012055, 2013.

<sup>069.</sup> J. Barabas and V. M. Bove, Jr., "Visual Perception and Holographic Displays," *J. Phys.: Conf. Ser.* 415, 012056, 2013.

<sup>070.</sup> S. Jolly, D. E. Smalley, J. Barabas, and V. M. Bove, Jr., "Progress in Updatable Photorefractive Polymer-Based Holographic Displays via Direct Optical Writing of Computer-Generated Fringe Patterns," *Proc. SPIE Practical Holography XXVII*, 8644, 2013.

#### *Other Major Publications*

1. W. Bender, V. M. Bove, Jr., A. Lippman, L. Liu, J. Watlington, "High Definition Systems in the 1990s: Open Architecture and Computational Video," *HDTV World Review*, 1:3, Summer 1990, pp. 11-15.

2. V. M. Bove, Jr., "Advanced TV should be Open Architecture" (opinion column), *TV Technology*, August 1992, p. 7.

3. A. Lippman and V. M. Bove, Jr., "ATV Profile: Contribution to the Requirements Discussion," ISO/IEC JTC1/SC29/WG11 MPEG92/759, 1992.

4. V. M. Bove, Jr., "Scalable (Extensible, Interoperable) Digital Video Representations" (book chapter), A. B. Watson, ed., *Digital Images and Human*

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<sup>0</sup>Outgrowths of supervised theses or research projects.

- Vision*, MIT Press, Cambridge MA, 1993, pp. 23-34.
5. V. M. Bove, Jr., "What's Wrong with Today's Video Coding?" (opinion column), *TV Technology*, February 1995, p. 7.
  6. V. M. Bove, Jr. and A. B. Lippman, "Television," *World Book Encyclopedia*, Vol. 19, World Book, Chicago IL, 1995, pp. 124-128.
  7. N. Negroponte and V. M. Bove, Jr., "Object Oriented Television," *Wired*, July 1996, p. 188.
  8. V. M. Bove, Jr., *et al.*, Comment on FCC 96-207, Fifth Further Notice of Proposed Rule Making in the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, 1996.
  9. V. M. Bove, Jr., N. Miyaho, and D. A. Harris, introductory chapter, *Multimedia Communication Networks: Technologies and Services*, M. Tatipamula and B. Khasnabish, eds., Artech House, Norwood MA, 1997.
  10. V. M. Bove, Jr., "Online to the Future" (opinion column), *The Sunday Times* (London), October 4, 1998.
  11. V. M. Bove, Jr., "Communication," *The New Book of Knowledge*, Grolier, Bethel CT, 2000, pp. 462-471.
  12. V. M. Bove, Jr., "Astronauts and Mosquitos" (opinion column), *Communications of the ACM*, March 2001, p. 48.
  13. V. M. Bove, Jr., "Connected by Media" (opinion column), *IEEE Multimedia*, Oct. 2001.

#### *Invited Lectures and Seminars*

1. "Model Building Cameras," National Computer Graphics Association, Philadelphia PA, April 18, 1989.
2. "Extensible/Intercompatible Digital Video Representations," EIA Digital Advanced Television Workshop, Washington DC, November 7, 1989.
3. "Television of Tomorrow," ILP Symposium on Telecommunications Technology and Policy for the 21st Century, M.I.T., April 24, 1990.
4. "Open Architecture Television," Symposium on the Media Laboratory 5th Anniversary, M.I.T., October 2, 1990.
5. "Open Architecture Television," EIA/IEEE Second International Workshop on Digital Video Communications, Cambridge MA, November 26, 1990.
6. "Scalable Video Representations for Visual Information Services," National Engineering Consortium Information Networking ComForum, Orlando FL. December 14, 1990.
7. "Scalable (Extensible, Interoperable) Video Coding," National Research Council Visual Factors in Electronic Image Communications Conference, Woods Hole MA, July 22, 1991.
8. "Scalability and Open Architecture," Digital Television Symposium, M.I.T.,

May 21, 1992.

9. "A Future Model for HDTV," Production '93, Montreal, May 26, 1993.
10. "Hardware and Software Implications of Representing Scenes as Data," (banquet address) IEEE Conference on Application Specific Integrated Circuits '93, Rochester NY, September 29, 1993.
11. "Some Thoughts on Image Representations, Scene Representations, and Hardware/Software Architectures," IEEE International Conference on Computer Design '93, Cambridge MA, October 4, 1993.
12. "Image and Scene Representations and System Architectures," EIA Digital Advanced Television Workshop, Cambridge MA, October 14, 1993.
13. "Machines Behind the Scenes: Computation and Structured Video," Perspectives Lecture Series, M.I.T., April 26, 1994.
14. "Object-Oriented Television," Joint New England SIGGRAPH/New England SMPTE Meeting, Cambridge MA, October 27, 1994.
15. "Object-Oriented Television," Symposium on The Digital Revolution and its Effect on Japanese Industry (sponsored by Kodansha Publishing), Tokyo, March 15, 1995.
16. "Multimedia Computing: Parallelism without Pain," IEEE Workshop on Multimedia Processors (part of ICMCS '95), Washington DC, May 19, 1995.
17. "Stream-Based Computing and Future Television," EIA/IEEE-CES Digital Television Workshop, Philadelphia, October 5, 1995.
18. "Eyes, Cameras, Objects," Symposium on the Media Laboratory 10th Anniversary, M.I.T., October 10, 1995.
19. "Future Television: Why We Need All Those MIPS and Where We're Going to Get Them," Princeton University Dept. of Electrical Engineering, October 24, 1995.
20. "The Likely Convergence of Multimedia, Video, Communications, and Computing" (panel discussion), Photonics East '95, Philadelphia, October 24, 1995.
21. "Trends to Watch For in Consumer (and Professional) Multimedia," CommExpo, Houston TX, January 11, 1996.
22. "Multimedia Trends," Texas Instruments National Sales Meeting, Dallas TX, April 23, 1996.
23. "Object-Based Multimedia," Objects of Communication Symposium, M.I.T., May 22, 1996.
24. "Object-Based Media and Why It's a Good Problem," Bell Laboratories, Murray Hill NJ, August 28, 1996.
25. "The Future of Electronic Visual Communications," Medientage München, Munich, October 17, 1996.
26. "Hardware and Software Impacts of New Media Representations," ACM Workshop on Media Processors (part of ACM MM'96), Boston, November 19,

1996.

27. "Convergence in the 21st Century" (panel discussion), SPIE International Symposium on Voice, Video and Data Communications, Boston, November 20, 1996.
28. "Object-Based Media," Hewlett-Packard Laboratories, Palo Alto CA, February 11, 1997.
29. "Stream-Based Media Computing: What, How, and Why," University of California at Berkeley Dept. of EECS, January 30, 1998.
30. "Responsive Object-Based Media," Greater Boston ACM, February 19, 1998.
31. "Stream-Based Media Processing," American Physical Society Symposium on the Physics of Imaging, Rochester NY, April 24, 1998.
32. "The Future of Media is Object-Based," Southeastern Mass. MIT Alumni Club, New Bedford MA, May 20, 1998.
33. "Object-Based Media and Stream-Based Computing," First International Workshop on Advanced Graphics and Multimedia Systems, Naples Italy, November 17, 1998.
34. "The Object-Based Media Group," Mitsubishi Electric Research Laboratory, Cambridge MA, December 11, 1998.
35. "The Object-Based Media Group," Stanford University Computer Science Dept., January 29, 1999.
36. "Hyperlinked Television as an E-Commerce Portal," Vanguard Technology Transfer Institute, Cambridge MA, May 17, 1999.
37. "Video and the Internet: TV or not TV?" American Museum of the Moving Image, New York, December 8, 1999.
38. "Will Anyone Really Need a Web Browser in Five Years?" Canadian Institute for Telecommunication Research annual meeting, Ottawa, August 28, 2000.
39. "Imaging at the MIT Media Lab" (plenary speaker), IS&T PICS 2001, Montreal, April 23, 2001.
40. "The Future" (panel discussion), ITV Content E-mergency, Columbia University, New York, July 17, 2001.
41. "Responsive Media: The Intersection between Broadcast and Personalization," The Interactive TV Show USA, New York, August 16, 2001.
42. "Development of Technology from Unlikely Sources," Canadian Undergraduate Technology Conference, Toronto, January 17, 2002.
43. "Sharing and Playing Well with Others: Everything We Need to Know about the Future. We Learned in Kindergarten," (keynote) IDC Imaging Convergence Forum, New York, August 7, 2002.
44. "Really Smart Cameras and Sugar-Cube-Sized Video Projectors," MIT

- Family Weekend, Cambridge MA, October 18, 2003.
45. "Computational Ecosystems," Ubi-Comp Symposium on Ubiquitous Computing, Seoul, December 10, 2003.
  46. "Really Smart Cameras and Sugar-Cube-Sized Video Projectors," MIT Alumni Club of RI, Warwick RI, April 13, 2004.
  47. "The Consumer Electronics Laboratory at the MIT Media Laboratory," GSPx, Santa Clara CA, September 29, 2004.
  48. "Really Smart Cameras and Sugar-Cube-Sized Video Projectors," MIT Alumni Club of Cape Cod, Hyannis MA, November 17, 2004.
  49. "Consumer Electronics Research at the MIT Media Lab," Harvard Business School Entrepreneurship Conference, March 3, 2005.
  50. "Changing Dynamic in Consumer Electronics," 2005 Perspective Forum, Berkeley CA, March 9, 2005.
  51. "View from the Consumer Electronics Laboratory," 2005 North American Broadcasters Association General Meeting, Toronto, May 18, 2005.
  52. "Musings – and a Few Facts – about 3-D TV," MIT CIPS Workshop on Advanced Television, Cambridge, January 21, 2009.
  53. "Holographic Video and 3-D Television," "Photons, Neurons and Bits: Holography for the 21st Century," Cambridge MA, March 7, 2009.
  54. "From 3-D TV to Holographic TV," Microsoft Hardware Day, Redmond WA, August 5, 2009.
  55. "Debunking Hollywood's Holograms," MIT Museum, Cambridge MA, December 11, 2009.
  56. "Moving Holographic TV from the Lab to Your Living Room," New England Section, Optical Society of America, Cambridge MA, 20 October 2010.
  57. "Hollywood's Holograms (and MIT's)" and "Pattern Recognition is Everywhere." (2 lectures), Connecticut Science Education Conference, Hamden CT, 30 October 2010.
  58. "A Look Back – and Forward – at Holographic TV," New England SID and SMPTE joint meeting, Needham MA, 18 January 2012.
  59. "Holographic Video and How it Might Become Part of the 3D Ecosystem," Third Workshop on 3D Cinematography (part of CVPR 2012), Providence RI, 16 June 2012.
  60. "A Look Back – and Forward – at Holographic TV," IEEE Photonics Laser Workshop, Lexington MA, 7 November 2012.

### *Research Funding*

Television of Tomorrow Consortium, 1989-1996

Digital Life Consortium, 1997-present

Intel Digital Expression Project, 2000-2002



*Although one of several researchers on the above two contracts, I accounted for a major portion of the research volume. On Television of Tomorrow, for example, I typically supported six research assistants and five UROP students as well as a \$150,000 fabricated equipment budget annually. I was responsible for approximately a third of the \$2M annual research volume.*

Movies of the Future Consortium, 1989-1994, (supported one research assistant annually)

DARPA Contract DAAD 05-90-C-0333, "Scalable Video," 1990-1993, (supported one research assistant annually)

Bell Northern Research, "Video Coding Testbed," \$30,000 annually, 1991-1993

NASA SRC-B093-93-043, "High Speed Research," (subcontractor to Honeywell Technology Center), project approved to begin in 1995 but funds were never released by NASA

Broadcasting Special Interest Group, Principal Investigator, 1999-2002

NASA Hierarchical Learning Networks, Principal Investigator, \$250,000 annually, 2002-2005

"Smart Architectural Surfaces," ICU/Korean Ministry of Information and Communications, 2003-2004

CELab (consumer electronics research program), Principal Investigator, 2004-present

Center for Future Storytelling, co-director, 2008-present

Office of the Director of National Intelligence (ODNI), Intelligence Advanced Research Projects Activity (IARPA), through the AFRL contract FA8650-10-C-7034, 2010-2012

### *Theses Supervised by V. Michael Bove, Jr.*

#### *SB Theses*

Chun, Jang H., *Decoding Data in the NTSC Chrominance Channel*, EECS SB, June 1990.

Davis, Desmond O., *Encoding Digital Data in the NTSC Chrominance Channel*, EECS SB, June 1990.

Lee, David S., *Compression of Images Using Zero Crossings of Bandpass Signals*, EECS SB, June 1990.

Blount, Alan W., *Display Manager for a Video Processing System*, EECS SB, June 1991.

Mitchell, Michael D., *X Windows for an Intelligent Display*, EECS SB, June 1991.

Tewari, Rajeev, *The Cheops Input Module: A Real Time Digitizing and Filtering Engine*, EECS SB, June 1991.

Chackerian, Mark, *A Motion-Estimating Board for the Cheops Imaging System*, EECS SB, May 1992.

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Nanayakkara, Prasath S. W., *Communication Protocol for a Digital Video Processor*, EECS SB, May 1992.

Evanco, Kathleen L., *A Compiler for an Object-Oriented Parallel Stream Processing Language*, EECS SB, May 1993.

O, Cholwon, *Motion Compensation Decoder for Cheops Imaging System*, EECS SB, May 1993.

Yu, Jung, *Real-Time Image Morphing, Motion Compensation, and Hidden Surface Removal*, EECS SB, May 1994.

Hsieh, P. Angela, *Solutions for Bus Bandwidth Limitations in a Network Printing Environment*, EECS SB, May 1994.

Sung, Julie, *Image Segmentation using Multi-Dimensional Attributes*, Physics SB, May 1997.

#### SM Theses

Liu, Lin L., *Digital Intermediate Format for Video Frame Rate Conversion*, EECS SM, September 1990.

Mayer, Christopher M., *Antialiasing Methods for Laser Printers*, EECS SM, June 1991.

Woo, Peter H., *An Accumulating Frame Buffer Architecture for a High-Performance Graphics Engine*, EECS SM, June 1991.

Firestone, Scott S., *VideoChannel: A Real Time Window Processor*, EECS SM, February 1992.

Eldridge, Creighton L., *A Smart Memory for Processing Images*, EECS SM, May 1992.

Shen, Irene J., *Real-Time Resource Management for Cheops: A Configurable, Multi-Tasking Image Processing System*, EECS SM, September 1992.

Hewlett, Gregory J., *Scalable Video in a Multiprocessing Environment*, MAS SM, February 1993.

Lawai, Adnan H., *Scalable Coding of HDTV Pictures Using the MPEG Coder*, EECS SM, May 1994.

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Acosta, Edward K., *A Programmable Processor for the Cheops Image Processing System*, EECS SM, June 1995.

- Chang, Christopher I., *Handwriting Recognition on a Programmable Digital Signal Processor*, EECS SM, June 1995.
- Chang, Tzu-Yun, *Real-Time Decoding and Display of Layered Structured Video*, EECS M. Eng., June 1995.
- Mikkelson, Chad, *An Implementation of the MPEG-2 Audio Decoding Specification*, EECS M. Eng., June 1995.
- Inguilizian, Araz V., *Building a Better "Picture": Synchronized Structured Sound*, MAS SM, September 1995.
- Evanco, Kathleen L., *Personalized Video Synthesis for an Information System*, MAS SM, February 1996.
- Agamanolis, Stefan, *High-Level Scripting Environments for Interactive Multimedia Systems*, MAS SM, February 1996.
- Davison, Brian C., *Image Enhancements for Low-Bitrate Videocoding*, EECS M. Eng., May 1996.
- Lin, Eugene S., *Recovery of 3-D Shape of Curved Objects from Multiple Views*, EECS M. Eng., May 1996.
- Newbern, Jeffrey L., *Global Optimization of Dither Arrays*, EECS M. Eng., May 1996.
- Suryadevara, Rajesh, *Visual Perception Based Bit Allocation for Low Bitrate Video Coding*, EECS M. Eng, May 1996.
- Wong, Jeffrey, *Hoover Bus: An Input Bus Optimized for Multiple Real-Time Data Streams*, EECS M. Eng, September 1996.
- Yu, Ross A., *A Field Programmable Gate Array Based Stream Processor for the Cheops Imaging System*, EECS M. Eng, September 1996.
- Belostotsky, Eugene B., *Secure SNMP*, EECS M. Eng., February 1997.
- Chuang, Erika Shu-Ching, *Design and Implementation of a Real-Time Video and Graphics Scaler*, EECS M. Eng., May 1997.
- Swamidoss, Kamal S., *Optimizing a Reed-Solomon Decoder for the Texas Instruments TMS320C62x DSP*, EECS M. Eng., May 1998.
- Lau, Simon, *Adaptive Degradation of Images in Network Applications*, EECS M. Eng., May 1998.
- Lee, Mark, *A Data Servicing Subsystem for the Chidi Reconfigurable Processor*, EECS M. Eng., August 1998.
- Liu, Yuan-Min, *A 1394 Bus Interface for the Chidi Processor*, EECS M. Eng., August 1998.
- Slowe, Thomas E., *People Objects: 3-D Modeling of Heads in Real-Time*, MAS SM, August 1998.
- Westner, Alexander G., *Object-Based Audio Capture: Separating Acoustically-Mixed Sounds*, MAS SM, October 1998.
- Zhang, Xiaozhen, *Implementing IS-95, the CDMA Standard, on TMS320C6201*

DSP, EECS M. Eng., May 1999.

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Mallett, Jacky, *Kami: An Anarchic Approach to Distributed Computing*, MAS SM, September 2000.

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Murithi, Kirimania, *IP Multicast in Digital Television Transmission Infrastructure*, EECS M. Eng., June 2001.

Li, Yi, *VoiceLink: A Speech Interface for Responsive Media*, MAS SM, Sept. 2002.

Patel, Surjit, *MediaConnector: A Gestalt Media Sharing System*, MAS SM, Sept. 2002.

Sierra Hernandez, Wilfrido, *Micro Laser Personal Projector*, MAS SM, May 2003.

Vora, Parul, *Simulacrum: Situated Memory for Architectural Space*, MAS SM, Sept. 2003.

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Hill, Samuel L., *Scalable Multi-view Stereo Camera Array for Real World Real-Time Image Capture and Three-Dimensional Displays*, MAS SM, May 2004.

Pilprc, Arnaud, *Self-\* Properties of Multi-Sensing Entities in Smart Environments*, MAS SM, May 2005.

Dalton, Benjamin C., *Audio-Based Localization for Ubiquitous Sensor Networks*, MAS SM, May 2005.

Nanda, Gauri, *Accessorizing with Networks: the Possibilities of Building with Computational Textiles*, MAS SM, Sept. 2005.

Hirsh, Diane E., *Piecing Together the Magic Mirror: a Software Framework to Support Distributed, Interactive Applications*, MAS SM, Sept. 2006.

Barabas, James, *Sensor Planning for Novel View Generation by Camera Networks*, MAS SM, Sept. 2006.

Smalley, Daniel E., *Integrated Optics for Holographic Video*, EECS MEng, Sept. 2006.

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de Araujo Santos, Ana Luisa, *uCom: Spatial Displays for Visual Awareness of*

*Remote Locations*, MAS SM, Sept. 2009.

Alfaro, Santiago, *SurroundVision: A Handheld Screen for Accessing Peripheral Content Around the TV*, MAS SM, Sept. 2010.

Portocarrero, Edwina, *Inside/Out: Mirrors for Reflective, Creative Thinking*, MAS SM, Sept. 2011.

Cranor, David, *Prototouch: A System for Prototyping Ubiquitous Computing Environments Mediated by Touch*, MAS SM, Sept. 2012.

Jolly, Sundeep, *An Updatable Three-Dimensional Display via Direct Optical Fringe Writing of Computer-Generated Holographic Stereograms in Photorefractive Polymer*, MAS SM, Sept. 2012.

Bardagjy, Andrew, *Low Dimensionality Spectral Sensing for Low Cost Material Discrimination and Identification*, MAS SM, Feb. 2013.

#### *Doctoral Theses, Supervisor*

Becker, Shawn, *Vision-Assisted Modeling for Model-Based Video Representations*, MAS PhD, February 1997.

Chalom, Edmond, *Image Segmentation Using Multi-Dimensional Attributes*, EECS PhD, February 1998.

Agamanolis, Stefan, *Isis, Cabbage, and Viper: New Tools and Strategies for Designing Responsive Media*, MAS PhD, June 2001.

Kung, Ling-Pei, *Obtaining Performance and Programmability Using Configurable Hardware for Media Processing*, MAS PhD, February 2002.

Butera, William, *Paintable Computing*, MAS PhD, February 2002.

Mallett, Jacqueline, *The Role of Groups in Smart Camera Networks*, MAS PhD, Feb. 2006.

#### *Doctoral Theses, Reader*

St. Hilaire, Pierre, *A Parallel Approach to Holographic Video Scanning*, MAS PhD, September 1994.

Polley, Michael O., *Efficient Channel Coding for HDTV Terrestrial Broadcasting*, EECS PhD, February 1996.

Halle, Michael, *Image Synthesis for Multi-Perspective Spatial Displays*, MAS PhD, September 1997.

Love, Nicole S., *Recognition of 3D Compressed Images and its Traffic Monitoring Applications*, EECS PhD, June 2004.

Karahalios, Kyratso G., *Social Catalysts: Enhancing Communication in Mediated Spaces*, MAS PhD, August 2004.

# **EXHIBIT 5**



US008214873B2

(12) **United States Patent**  
Weel

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(45) **Date of Patent:** \*Jul. 3, 2012

(54) **METHOD, SYSTEM, AND COMPUTER-READABLE MEDIUM FOR EMPLOYING A FIRST DEVICE TO DIRECT A NETWORKED AUDIO DEVICE TO RENDER A PLAYLIST**

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This patent is subject to a terminal disclaimer.

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See application file for complete search history.

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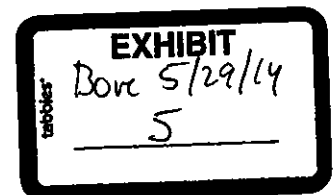
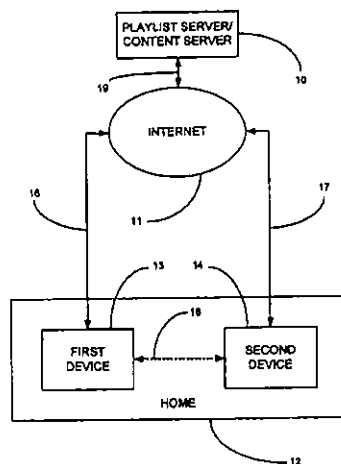
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(57) **ABSTRACT**

A method for playing music includes displaying a list of playlists names, selecting one of the displayed playlists names, sending at least one attribute of a playlist corresponding to the selected playlist name to a playlist server, receiving a playlist from the playlist server wherein the received playlist corresponds to the attribute(s), selecting at least one song from the received playlist, sending information representative of the selected song to a content server, receiving the selected song from the content server, and playing the selected song(s). Requesting a playlist on the first device based on attributes, sending the same attributes to a second device having the second device request the playlist and start playing.

46 Claims, 8 Drawing Sheets



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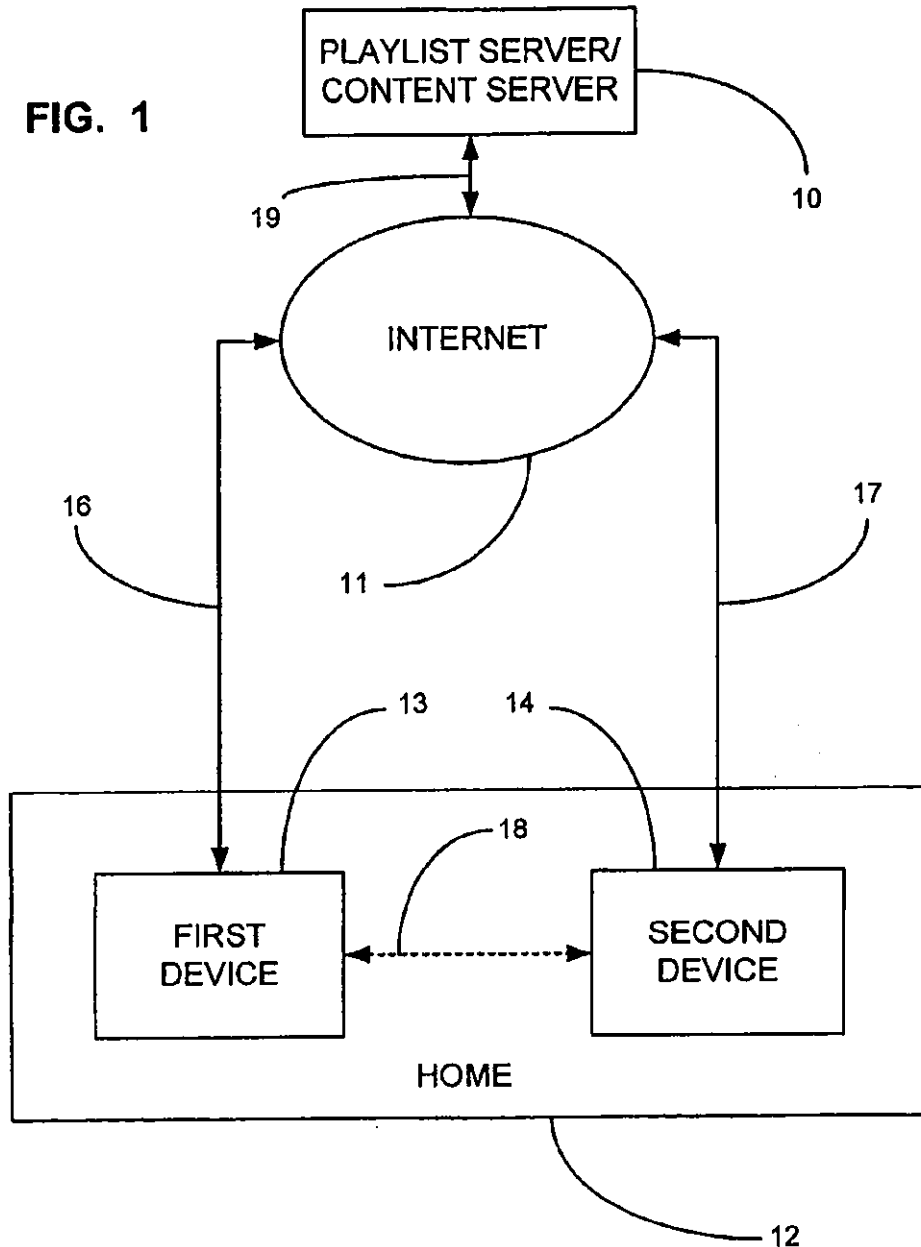


FIG. 2

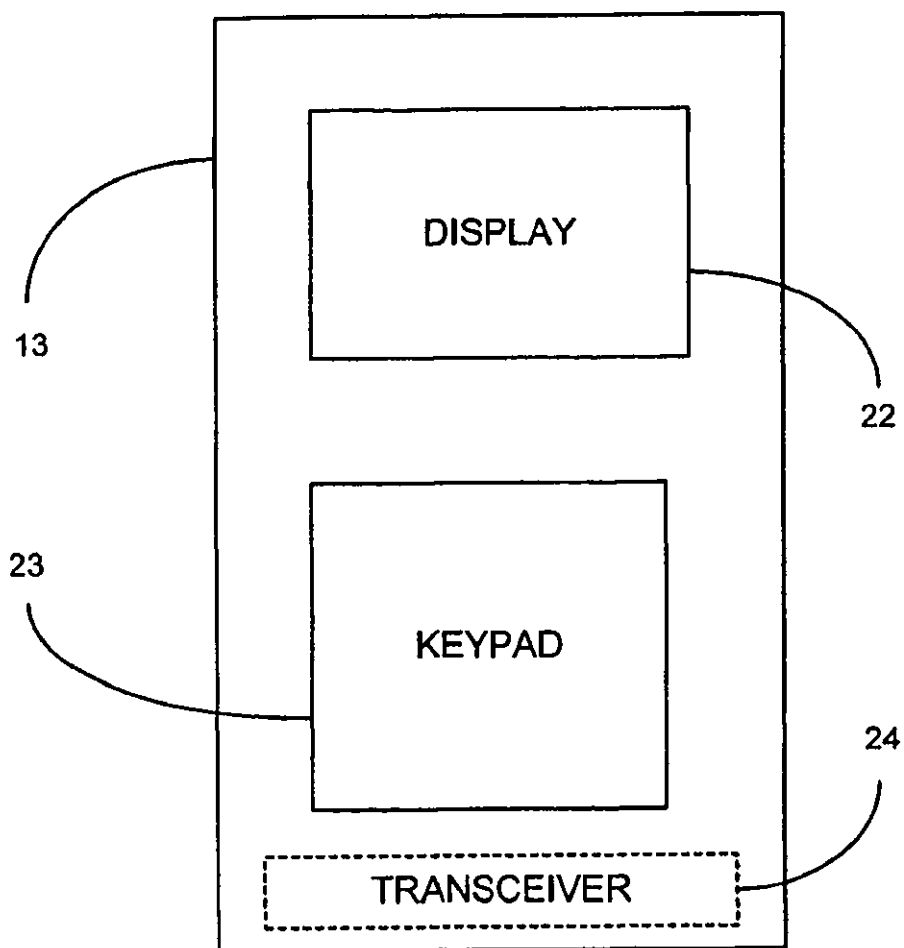


FIG. 3

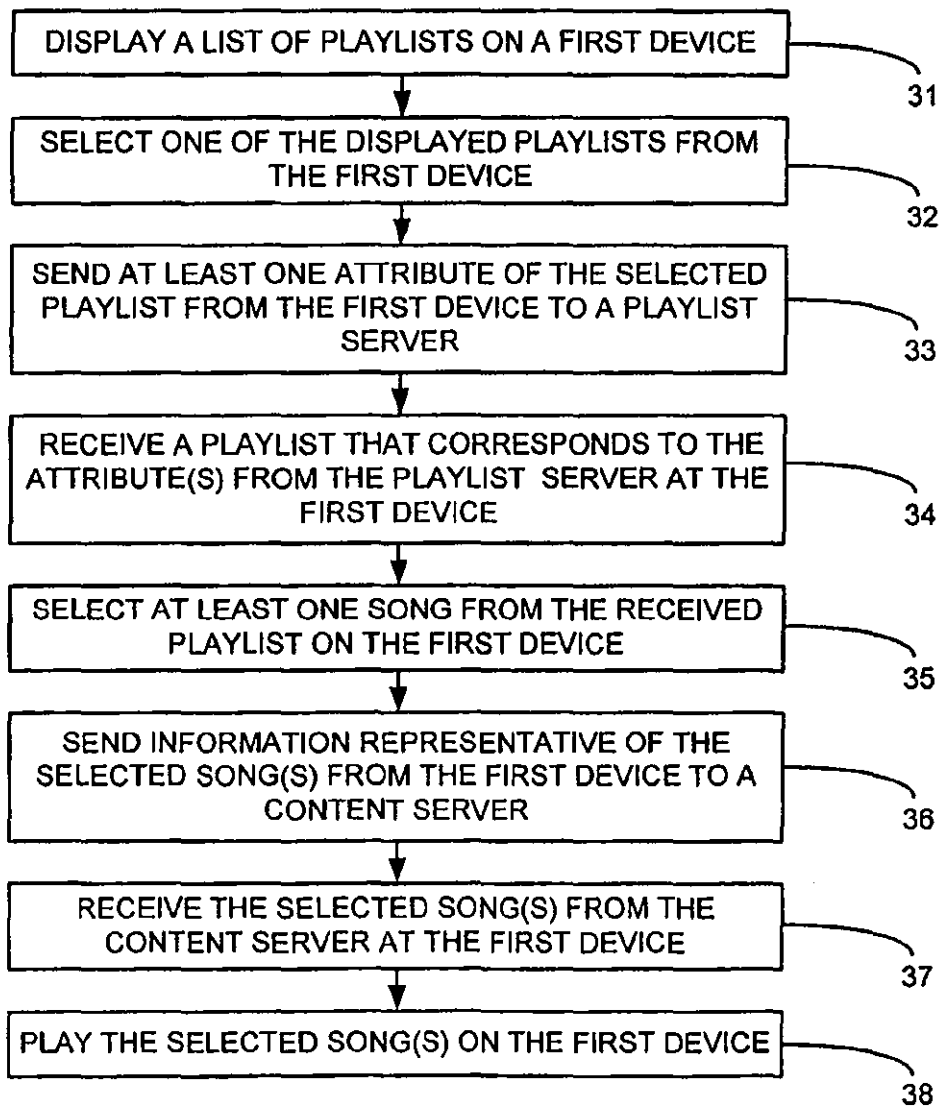


FIG. 4

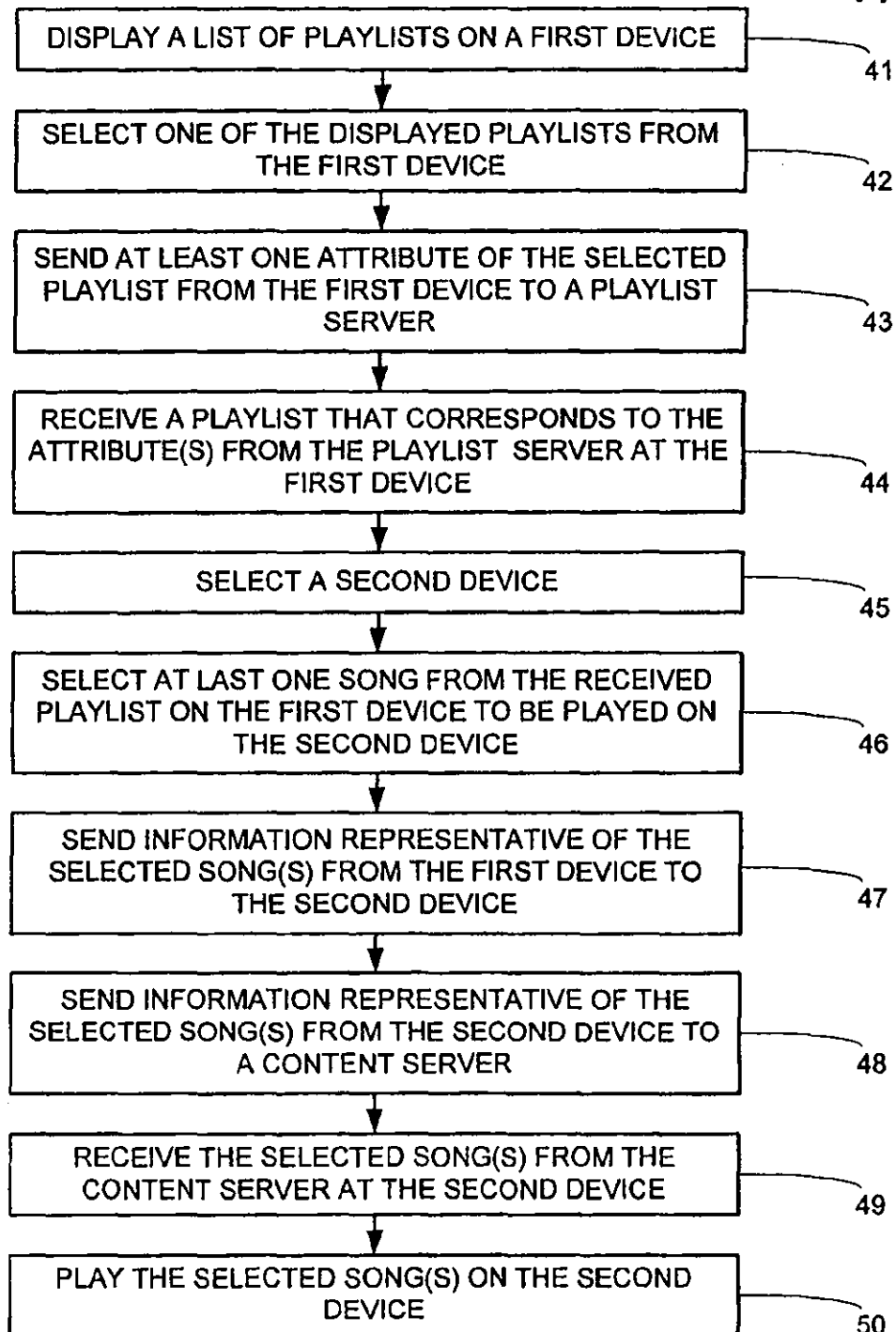
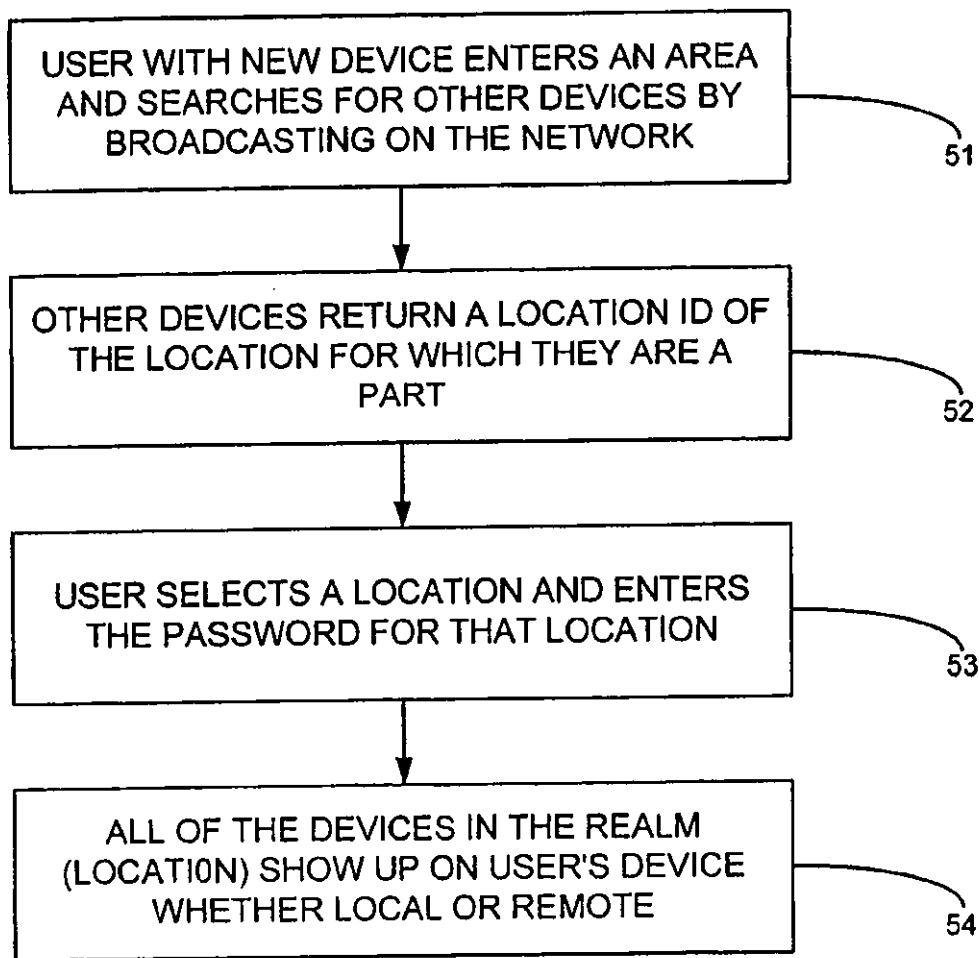
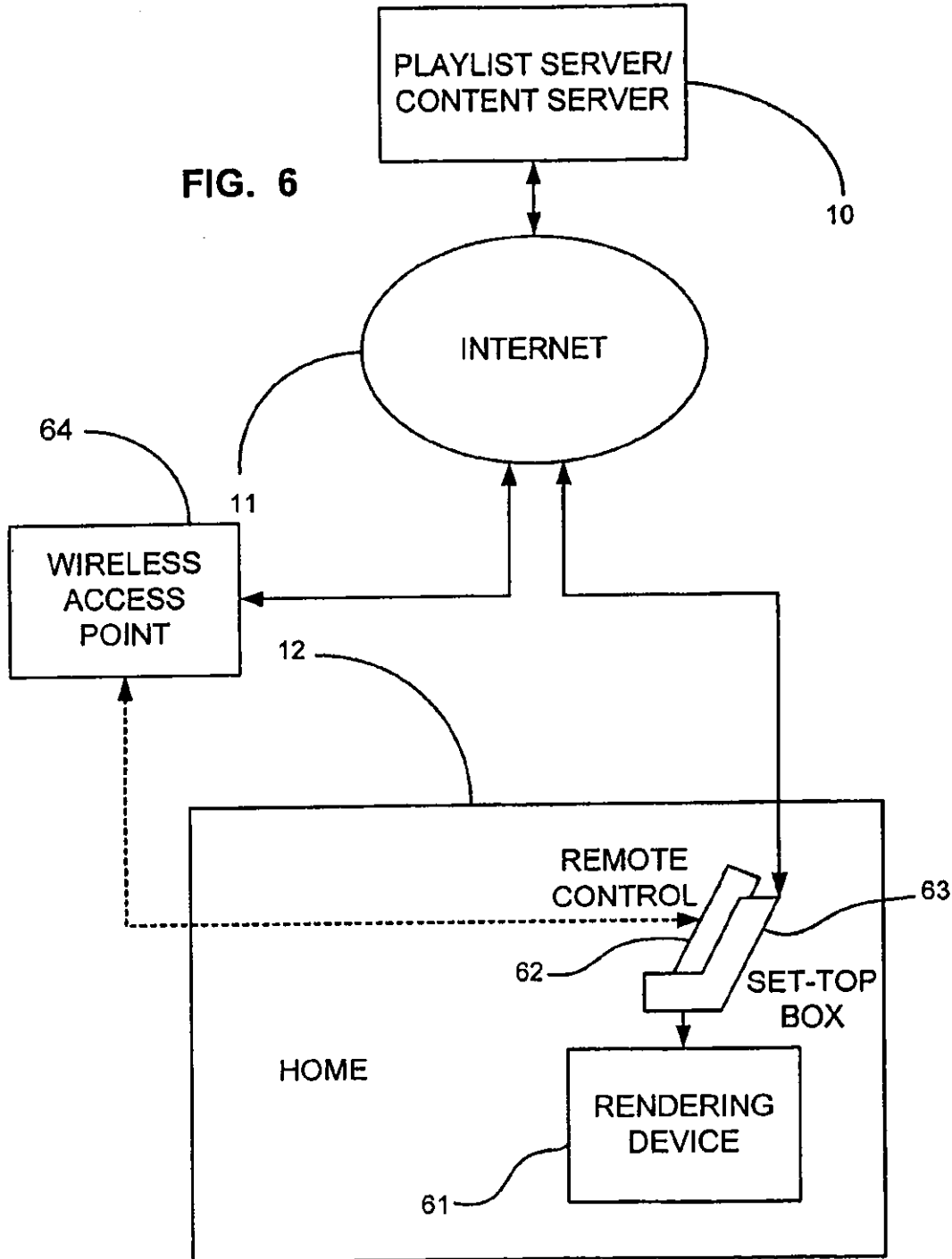


FIG. 5





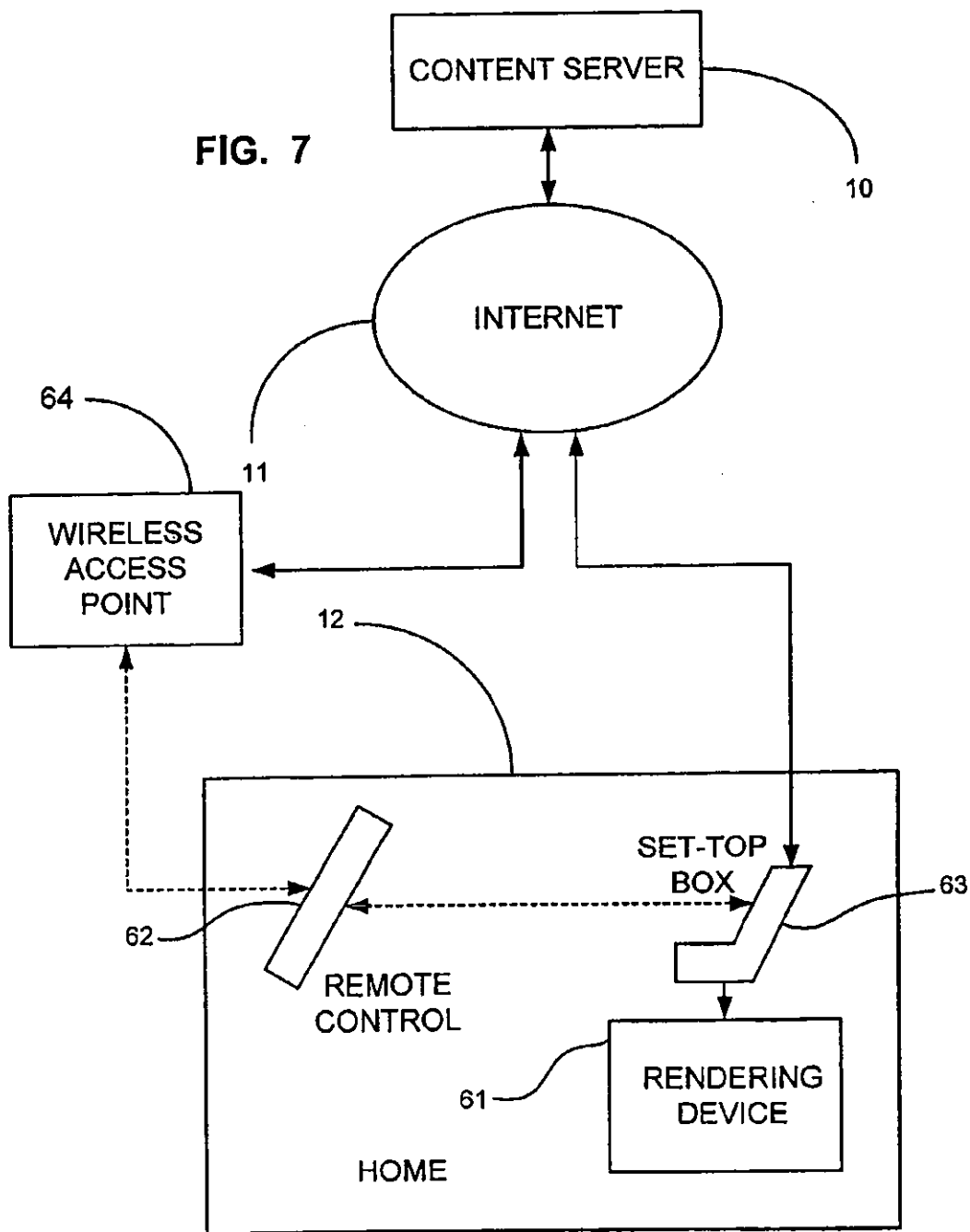
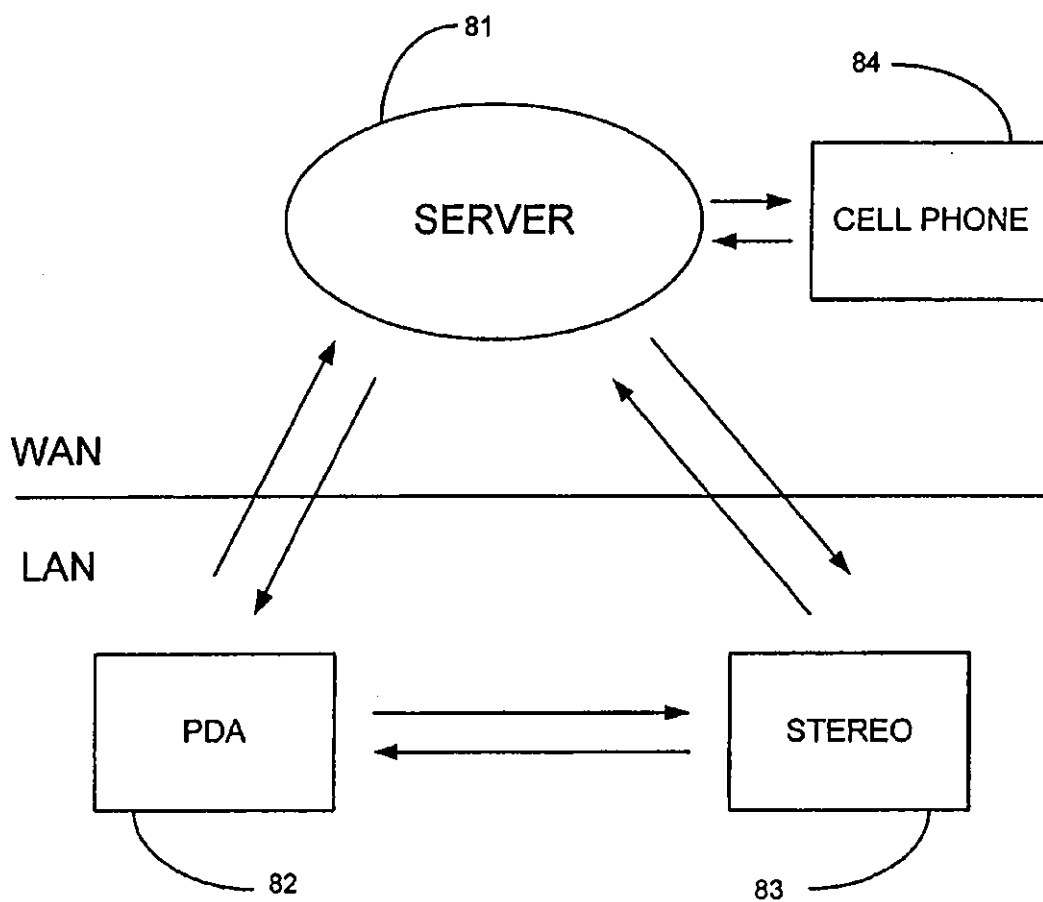


FIG. 8





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**METHOD, SYSTEM, AND  
COMPUTER-READABLE MEDIUM FOR  
EMPLOYING A FIRST DEVICE TO DIRECT A  
NETWORKED AUDIO DEVICE TO RENDER  
A PLAYLIST**

CROSS-REFERENCE TO RELATED  
APPLICATION

The present application is a continuation of U.S. patent application Ser. No. 10/840,109, filed May 5, 2004, now U.S. Pat. No. 8,028,323, entitled "PLAYLIST DOWNLOADING FOR DIGITAL ENTERTAINMENT NETWORK," which is hereby incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

The present invention relates generally to a method and system for playing music. The present invention relates more particularly to a digital entertainment network wherein playlists are obtained by communicating attributes of the playlists to a playlist server and wherein songs are obtained by communicating information representative of the songs to a content server.

BACKGROUND OF THE INVENTION

Traditionally, music has been provided to listeners by either a broadcast method or a purchase method. According to the broadcast method, music is broadcast to listeners by such means as radio and cable systems. The owners of the music are typically compensated by the broadcaster via either the American Society of Composers, Authors and Publishers (ASCAP) or Broadcast Music Incorporated (BMI). These two agencies monitor the playing of music by broadcasters, collect royalties from the broadcasters, and distribute the royalties to the copyright owners of the music.

However, according to the broadcast method the listener has little or no control over which selections are played. Generally, a listener must tune in to a radio station or select a cable channel that plays the type of music that the listener enjoys with the expectation that songs that the listener enjoys will occasionally be played. Too frequently, these songs are not played as often as the listener would prefer.

According to the purchase method, a listener purchases prerecorded music stored on media such as compact discs (CDs). The listener may then play the songs as many times as desired. Copyright owners are paid royalties out of the purchase price of the music.

However, the purchase method requires that a substantial price be paid for the music, at least in part because of the virtually unlimited use associated therewith. Listeners appear to be becoming less willing to pay the purchase price for such prerecorded music, particularly as alternative methods for obtaining music become more popular.

The purchase method suffers from the additional disadvantage of requiring that media containing the desired songs be utilized. Such media is somewhat bulky, particularly when a large number of selections are desired. In some instances, it may not be practical to carry all of the songs desired because of the volume and/or weight of the media required. Such media is also undesirably subject to degradation due to use and mishandling. For example, scratches on a CD may inhibit its use.

A newer method of providing music to listeners is becoming increasingly popular. It is this method of providing music that is apparently making listeners less willing to pay the purchase price for music that is prerecorded on media. According to this newer method of providing music, the

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music is downloaded from the Internet or otherwise obtained (such as by trading with friends), as a data file. One popular example of such a data file is an MP3 file. MP3 is short for Moving Picture Experts Group 1, audio layer 3.

Although music embodied in data files can be obtained legitimately, such as via such services like iTunes (a trademark of Apple Computer, Inc.), the opportunity to download or trade music data files for free has heretofore hampered this legitimate method of obtaining music.

As such, although the prior art has recognized, to a limited extent, the problem of distributing music, the proposed solutions have, to date, been ineffective in providing a satisfactory remedy. Therefore, it is desirable to provide a method for distributing music that is convenient, does not involve the use of media, and which provides for the payment of royalties.

BRIEF SUMMARY OF THE INVENTION

While the apparatus and method has or will be described for the sake of grammatical fluidity with functional explanations, it is to be expressly understood that the claims, unless expressly formulated under 35 USC 112, are not to be construed as necessarily limited in any way by the construction of "means" or "steps" limitations, but are to be accorded the full scope of the meaning and equivalents of the definition provided by the claims under the judicial doctrine of equivalents, and in the case where the claims are expressly formulated under 35 USC 112 are to be accorded full statutory equivalents under 35 USC 112.

The present invention specifically addresses and alleviates the above mentioned deficiencies associated with the prior art. More particularly, according to one aspect the present invention comprises a method for playing music, wherein the method comprises displaying a list of playlists names, selecting one of the displayed playlist names, sending at least one attribute of a playlist corresponding to the selected playlist name to a playlist server, receiving a playlist from the playlist server wherein the received playlist corresponds to the attribute(s), selecting at least one song from the received playlist, sending information representative of the selected song(s) to a content server, receiving the selected song(s) from the content server and playing the selected song(s).

According to one method of operation, the playlist names are displayed on a first device, a playlist name is selected on the first device, the attribute(s) are sent from the first device, the playlist is received by the first device, a song is selected from the first device, and the song is played on the first device.

According to another method of operation, the playlist names are displayed on a first device, a playlist name is selected on the first device, the attribute(s) are sent from the first device, the playlist is received by the first device, a song is selected from the first device, and the song is played on a second device.

The method of the present invention optionally comprises selecting the second device. In this instance, the playlist names are displayed on a first device, the playlist name is selected on the first device, the attribute(s) are sent from the first device, the playlist is received by the first device, the song is selected from the first device, and the song is played on the selected second device. Preferably, the second device is selected from the first device.

Preferably, the first device comprises a handheld portable device. For example, the first device may comprise a palm-top computer, an MP3 player, or a remote control for a second device.

Thus, the first device may comprise a remote control for a second device wherein the second device comprises a music rendering device. In this instance, songs are typically played upon the second device, although songs may also be played upon the first device.

Preferably, selecting one of the displayed playlist names and selecting a song from the playlist are performed using a touchscreen. If a second device is selected from the first device, the second device is also preferably selected using the touchscreen.

Preferably, communicating attributes of a playlist to a playlist server comprises communicating a name of a playlist to a playlist server. Communicating attributes of a playlist to a playlist server may comprise communicating to the playlist server at least one attribute such as a type of music listened to, at least one artist, at least one selection, at least one instrument, at least one record company, a region, a country, a state, a city, a school, and/or an ethnicity. The playlist server may then either locate or make a playlist that conforms to the attribute(s) of the requested playlist.

Sending at least one attribute of a playlist to a playlist server and receiving a playlist from the playlist server preferably comprises communicating the attribute(s) and the playlist via a network, preferably a wide area network such as the Internet.

Selecting at least one song from the playlist optionally comprises selecting a plurality of songs from the playlist and playing the selected song(s) then comprises playing the plurality of songs. The songs may be played in the order selected, in random order, or in any other desired order.

According to one aspect of the present invention, playlist recommendations based upon listening habits of a listener are automatically provided to the listener. Alternatively, the playlist recommendations may be based upon listening habits of another person. The playlist recommendations may comprise a list of currently popular songs within a single genre that is of interest to the listener.

Preferably, at least one parameter for a song that is being played on a second device can be adjusted from the first device. The parameters may include volume, tone, and/or balance.

According to one aspect, the present invention comprises a method for playing music, wherein the method comprises obtaining a playlist for a first device via the Internet, selecting a song from the playlist, and using the first device to cause a second device to play the selected song. The second device preferably obtains the song via the Internet.

According to one aspect, the present invention comprises a method for playing music, wherein the method comprises displaying a list of playlist names on a first device, selecting one of the displayed playlist names from the first device, sending at least one attribute of a playlist corresponding to the selected playlist name from the first device to a playlist server, receiving a playlist at the first device from the playlist server wherein the received playlist corresponds to the attribute(s), selecting at least one song from the playlist on the first device, sending information representative of the selected song from the first device to a content server, receiving the selected song at the first device from the content server, and playing the selected song(s) on the first device.

According to one aspect, the present invention comprises a method for playing music, wherein the method comprises displaying a list of playlist names on a first device, selecting one of the displayed playlist names from the first device, sending at least one attribute of a playlist corresponding to the selected playlist name from the first device to a playlist server, receiving at the first device a playlist from the playlist server wherein the received playlist corresponds to the attribute(s), selecting a second device, selecting at least one song from the playlist on the first device, sending information representative of the selected song from the first device to the second device, sending information representative of the selected song from the second device to a content server, receiving the selected song at the second device from the content server, and playing the selected song(s) on the second device.

According to one aspect, the present invention comprises a device for playing music, wherein the device comprises a display for displaying a list of playlist names and song names. The display is also for facilitating selection of playlists and songs. The device further comprises a network transceiver.

As used herein, the term network transceiver includes any circuit or device that facilitates communication via a network. Examples of network transceivers include Ethernet network interface cards (NICs) and circuits, as well as Bluetooth and WiFi cards and circuits.

The device is configured to facilitate displaying a list of playlist names on the display, selecting one of the displayed playlist names, sending at least one attribute of a playlist corresponding to the selected playlist name to a playlist server via the network transceiver, and receiving a playlist from the playlist server via the network transceiver. The received playlist corresponds to the attribute(s) sent to the playlist server. The device is further configured to facilitate selecting at least one song from the playlist, sending information representative of the selected song to a content server, receiving the selected song from the content server, and playing the selected song(s).

According to one aspect, the present invention comprises a device for playing music, wherein the device comprises a network transceiver. The device is configured to facilitate receiving information representative of a song from another device, sending of the information representative of the song to a content server via the network transceiver, receiving of the song from the content server, and playing of the song.

According to one aspect, the present invention comprises a playlist server comprising a memory within which a plurality of playlists are stored and a network transceiver. The playlist server is configured to facilitate receiving at least one attribute of a playlist via the network transceiver, identifying a playlist based upon the attribute(s), and sending of the playlist to a device via the transceiver.

Preferably, the playlist server is further configured to facilitate serving of content. Thus, the playlist server and the content server are effectively the same server. However, as those skilled in the art will appreciate, the playlist server and the content server may be two entirely different servers and may be located in diverse locations with respect to one another.

According to one aspect, the present invention comprises a method for providing music, wherein the method comprises receiving at least one attribute of a selected playlist at a playlist server and transmitting a playlist that corresponds to the attributes from the playlist server to a first device.

According to one aspect, the present invention comprises a system for playing music, wherein the system comprises a first device configured to display names of playlists and names of songs and to facilitate selection of the playlists and songs, a playlist server configured to receive at least one attribute of a playlist from the first device and to send a playlist corresponding to the received attribute(s) to the first device, and a content server configured to receive information representative of at least one song from the first device and to send corresponding songs to the first device. The present invention further comprises at least one second device configured to send attributes of a playlist to the playlist server, to send information representative of songs to the content server, to receive a playlist from the playlist server, and to receive songs from the content server.

According to one aspect, the present invention comprises a method for playing music, wherein the method comprises providing a first device that repeatedly wirelessly broadcasts a unique identification thereof and a password, and moving the first device into an area such that it can communicate wirelessly with at least one second device that repeatedly wirelessly broadcasts a unique identification thereof and a password. The first device displays names of the second

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device(s) for which the password is an authorized password for the first device, such that the first device can be used to select songs to be played on the second device(s). Each of the second devices displays the name of the first device when the password of the first device is an authorized password for the that second device, such that the second device can be used to select songs to be played on the first device.

According to one aspect, the present invention comprises a system for playing music, wherein the system comprises a playlist server in communication with the Internet wherein the playlist server has a plurality of playlists stored thereon, a content server in communication with the Internet wherein the content server has a plurality of songs stored thereon, a rendering device for playing songs, a set-top box in communication with the rendering device for facilitating communication of the songs from the content server to the rendering device via the Internet, and a remote control for controlling the set-top box.

The remote control is configured to obtain a playlist from the playlist server, facilitate selection of a song from the playlist, and control the set-top box so as to cause the set-top box to download the song and cause the song to play on the rendering device.

The remote control is preferably dockable to the set-top box. The remote control may be either in wired or wireless communication with the set-top box when docked thereto. The remote control is preferably in wireless communication with the set-top box when the remote control is not docked thereto. The remote control can preferably be used to control the set-top box whether the remote control is docked thereto or not.

The remote control preferably comprises a display and a keypad for facilitating control of the set-top box and consequently for facilitating control of the rendering device. The set-top box optionally comprises a display and a keypad for facilitating control thereof and consequently for facilitating control of the rendering device.

According to one aspect, the present invention comprises a method for providing content, wherein the method comprises selecting content from a remote control and providing the selected content to a media player via a network.

These, as well as other advantages of the present invention, will be more apparent from the following description and drawings. It is understood that changes in the specific structure shown and described may be made within the scope of the claims, without departing from the spirit of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention and its various embodiments can now be better understood by turning to the following detailed description of the preferred embodiments which are presented as illustrated examples of the invention defined in the claims. It is expressly understood that the invention as defined by the claims may be broader than the illustrated embodiments described below.

FIG. 1 is a block diagram showing an exemplary embodiment of the digital entertainment system of the present invention;

FIG. 2 is a block diagram showing further detail of an exemplary first device or remote control of FIG. 1;

FIG. 3 is a flow chart showing one way of operating a digital entertainment system of the present invention;

FIG. 4 is a flow chart showing another way of operating a digital entertainment system of the present invention;

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FIG. 5 is a flow chart showing operation of a discovery process wherein devices of the present invention recognize one another;

FIG. 6 is a block diagram showing an exemplary embodiment of the digital entertainment network of the present invention, wherein a set-top box has a removable remote control disposed within a cradle thereof;

FIG. 7 is a block diagram showing the digital entertainment network of FIG. 6, wherein the set-top box has the removable remote control disposed out of the cradle thereof; and

FIG. 8, is a block diagram showing the discovery process for both a local device and a remote device.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Many alterations and modifications may be made by those having ordinary skill in the art without departing from the spirit and scope of the invention. Therefore, it must be understood that the illustrated embodiment has been set forth only for the purposes of example and that it should not be taken as limiting the invention as defined by the following claims. For example, notwithstanding the fact that the elements of a claim are set forth below in a certain combination, it must be expressly understood that the invention includes other combinations of fewer, more or different elements, which are disclosed herein even when not initially claimed in such combinations.

The words used in this specification to describe the invention and its various embodiments are to be understood not only in the sense of their commonly defined meanings, but to include by special definition in this specification structure, material or acts beyond the scope of the commonly defined meanings. Thus if an element can be understood in the context of this specification as including more than one meaning, then its use in a claim must be understood as being generic to all possible meanings supported by the specification and by the word itself.

The definitions of the words or elements of the following claims therefore include not only the combination of elements which are literally set forth, but all equivalent structure, material or acts for performing substantially the same function in substantially the same way to obtain substantially the same result. In this sense it is therefore contemplated that an equivalent substitution of two or more elements may be made for any one of the elements in the claims below or that a single element may be substituted for two or more elements in a claim. Although elements may be described above as acting in certain combinations and even initially claimed as such, it is to be expressly understood that one or more elements from a claimed combination can in some cases be excised from the combination and that the claimed combination may be directed to a subcombination or variation of a subcombination.

Insubstantial changes from the claimed subject matter as viewed by a person with ordinary skill in the art, now known or later devised, are expressly contemplated as being equivalently within the scope of the claims. Therefore, obvious substitutions now or later known to one with ordinary skill in the art are defined to be within the scope of the defined elements.

The claims are thus to be understood to include what is specifically illustrated and described above, what is conceptually equivalent, what can be obviously substituted and also what essentially incorporates the essential idea of the invention.

Thus, the detailed description set forth below in connection with the appended drawings is intended as a description of the presently preferred embodiments of the invention and is not intended to represent the only forms in which the present invention may be constructed or utilized. The description sets forth the functions and the sequence of steps for constructing and operating the invention in connection with the illustrated embodiments. It is to be understood, however, that the same or equivalent functions may be accomplished by different embodiments that are also intended to be encompassed within the spirit of the invention.

The digital entertainment network of the present invention is preferably a fully integrated plug and play technology platform that delivers secure anytime, anywhere, on-demand multimedia content for digital home systems.

The digital entertainment network provides efficient and ubiquitous wireless and web-enabled control over digital home systems by enabling users to access and manage music content using a variety of control devices and by delivering such content to a wide variety of different rendering devices.

On-demand delivery of content, such as streaming music, is provided utilizing such user-friendly features such as customized playlists, collaboration, music management tools, and search capability.

The present invention preferably provides a plug and play control point that has the software intelligence that forms the basis for a truly integrated entertainment network system. This control point architecture delivers the ability to unify content, such as music or other types of multimedia content, with control applications that enable system users to access content from a variety of different remote control devices and deliver such content to a variety of rendering devices.

For example, the control point enables a digital entertainment network user to utilize a PDA or other device to browse for music on the Internet, then select and play a song on an MP3 player or the like, or even on stand-alone audio speakers. In another embodiment, the control point allows a user to choose a song via a set-top device, then play that music on a television, stereo system, or the like.

Preferably, the present invention comprises a web services based component that provides users with on-demand music streamed to a variety of devices, such as MP3 players, set-top boxes and home stereo systems. Thus, according to one aspect, the present invention is a web-based content and music management system that offers users a number of desirable features via a web browser.

These features preferably include web-based music catalog browsing via jukebox interface, search capability (to find artists and specific selections), the use of standard playlists, the use of custom playlists (created by each user), the ability to select different devices on which to play songs, the ability to view a user's activity over a given time period or in real-time with the activity streamer, collaboration, the ability to find buddies with the same music preferences you have in your playlists, the ability to share playlists with buddies, the ability to view buddies' activity based on various time periods, instant messaging for chatting among users, and the use of a set top box to facilitate the use of playlists and the streaming of content.

According to one aspect, the digital entertainment network of the present invention comprises a set-top box that provides users with on-demand music streamed to a variety of devices. The set-top box is a web-based content and music management system that offers users a list of features including the need for little or no setup (plug into Ethernet and video out, audio out), content catalog browsing, search capability (to find artists and specific selections), the use of standard play-

lists, the use of custom playlists (created by each user), the ability to select different devices on which to play songs, the ability to view your activity over a given time period or in real-time with the activity streamer, collaboration, the ability to find buddies with the same music preferences you have in your playlists, the ability to share playlists with buddies, the ability to view buddies' activity based on various time periods, and instant messaging for chatting among users.

The digital entertainment network of the present invention comprises control devices that allow users to communicate with the control point and give commands to render music/multimedia content on various different rendering devices. Examples of control devices include the personal digital assistant (PDAs) and set-top boxes.

According to one aspect of the present invention, a FDA based control application allows users to roam the house and play music content that is accessed via the PDA and is available via an Internet based service. According to one aspect, the content is played via set-top boxes, i.e., rendering devices, which may be located throughout the home.

The digital entertainment network also includes rendering devices that receive instructions from the control point and thereby render music/multimedia content. Rendering device examples include the set-top devices, home stereo systems and televisions. A variety of different types of rendering devices are possible. Audio content, such as music, may be rendered on audio rendering devices such as speakers, a stereo, and a television. Similarly, audio/video content, such as movies and television shows, may be rendered on televisions, stand alone monitors, and computer monitors. Indeed, either audio or audio/video content may be rendered on a variety of other types of devices, such as cellular telephones, PDAs, and laptop computers.

According to one aspect of the present invention, a set-top device is a key rendering device that plays music content on other rendering devices, such as televisions and stereo systems, throughout the home.

The digital entertainment network of the present invention optionally comprises a billing application for handling the financial transaction activities associated with streaming content payment and usage. The billing application preferably performs functions such as transaction and usage logging for billing processing, automated billing of customers, automated notification of the inability to charge a credit card on file (exception handling), and automated calculation and wire transfer of funds to content providers.

The present invention is illustrated in FIGS. 1-8, which depict presently preferred embodiments thereof.

Referring now to FIG. 1, a preferred embodiment of the present invention comprises a playlist server/content server 10 that is in communication with a network, preferably a wide area network such as the Internet 11. Also in communication with the network are a first device 13 and a second device 14, which are both typically located within a common structure, such as a home or office 12. The first device 13 generally assumes the function of the control point, although the second device 14 may have this functionality, as well.

The playlist server/content server 10 may be a single server. Alternatively, the playlist server and the content server may be two separate servers. Indeed, the playlist server may comprise a plurality of separate servers and/or the content server may similarly comprise a plurality of different servers.

The playlist server/content server is in bi-directional communication with the Internet 11, as indicated by arrow 19. The first device 13 is in bi-directional communication with the

Internet 11, as indicated by arrow 16. The second device 14 is in bi-directional communication with the Internet 11, as indicated by arrow 17.

The first device is in communication with the second device, as indicated by arrow 18. The first device may be in either unidirectional or bi-directional communication with the second device 14.

The first device 13 may comprise any of a plurality of different types of devices. For example, the first device 13 may comprise a handheld portable device such as a personal digital assistant (PDA), a palmtop computer, an MP3 player, a telephone, or a remote control for a music rendering device. The first device may alternatively comprise a non-portable device, such as a desktop computer, a television, or a stereo.

The second device 14 may comprise the same type of device as the first device 14 or may alternatively comprise a different type of device with respect thereto. Thus, the first and second devices may comprise portable devices, non-portable devices, or any combination thereof.

The second device may also comprise one or more smart speakers. As defined herein, standalone smart speakers are speakers that are not connected to a device such as a stereo, television, or computer. Smart speakers are typically in communication with a network and can thus receive content therefrom. Typically, smart speakers comprise dedicated signal conditioning circuitry such as audio amplifiers.

According to one embodiment of the present invention, the first device 13 comprises a remote control for the second device 14. Thus, the second device may comprise a music rendering device such as a stereo, a television, or a home computer and the first device may comprise a handheld remote control therefor.

Any desired number of first and second devices may be provided according to the present invention. For example, the first device may comprise a remote control that controls a plurality of second devices, such as a television, a DVD player, and a stereo system.

Referring now to FIG. 2, the first device 13 may comprise a handheld portable device that comprises a display 22, a keypad 23, and a network transceiver 24. The display 22 facilitates viewing and selection of playlist names, as well as viewing and selection of songs within a playlist, as discussed in detail below. The keypad 23 facilitates selection of playlist names and selection of songs, as also discussed in detail below.

The display 22 may optionally comprise a touchscreen display and the keypad may optionally be omitted. In this instance, all selection may be performed via the touchscreen display.

The network transceiver 24 preferably comprises a wireless network transceiver, such network transceiver conforming to the Bluetooth (a trademark of Bluetooth SIG, Inc.) standard and/or conforming to the Wi-Fi (a trademark of the WiFi Alliance) standard.

The device shown in FIG. 2 may also be the second device 14 according to one aspect of the present invention. However, for explanatory purposes it may sometimes be beneficial to think of the first device as a small handheld portable device such as a PDA or dedicated remote control that can function to control the second device and it may similarly sometimes be beneficial to think of the second device as a larger music rendering device such as a stereo, television, or personal computer. Of course, such embodiments of the present invention are by way of example only, and not by way of limitation.

Having described the general structures of the present invention, the general operation thereof will next be described with reference to FIGS. 3 and 4. In operation, the digital

entertainment network of the present invention provides convenient access to a very large database of music without requiring that the music be stored and kept by the listener on media such as CDs. This convenient access is provided by maintaining the database of music at a remote location, i.e., in an Internet based content server 10.

That is, the present invention generally does not attempt to store songs within the music rendering devices themselves, but rather generally downloads songs via a network, as needed. Such operation simplifies the construction and operation of the music rendering devices by eliminating the need for large storage capacities. The elimination of the need for large storage capacities results in a cost savings for manufacturing and purchasing the music rendering devices.

Downloading the music on an as-needed basis provides access to a very large database of songs that contains many more selections than can be stored on contemporary music rendering devices. Downloading the music on an as-needed basis also facilitates the payment of royalties to the music owners in a manner that is fair to both listeners and music owners.

One exception to downloading of music on an as-needed basis according to the present invention is optionally the use of caching. Songs that are played repeatedly may be cached, so as to mitigate the need for a network connection and thus mitigate the need for the bandwidth associated therewith. The playing of cached songs can be reported via the network and royalties paid as though the song had been downloaded strictly on an as-needed basis.

Preferably, the present invention comprises a first device that may operate in two different ways. According to a first way of operation, as shown in FIG. 3 and discussed in detail below, a listener selects a song to be played from a playlist on the first device and the song is then played on the first device.

According to a second way of operation, as shown in FIG. 4 and discussed in detail below, a listener selects a song to be played from a playlist on the first device and the song is then played on another device, e.g., a second device.

Referring now to FIG. 3, the first way of operation of the first device is illustrated. A list of playlists is displayed on the first device as shown in block 31. The list of playlist is a list of playlist names, numbers, or other indicia indicative of individual playlists. For example, the list of playlists may include graphic symbols or icons in addition to or in place of other indicia. As used herein, the term playlist name includes any indicia that are uniquely representative of a playlist.

Each item on the list of playlists is representative of a particular playlist. Each playlist may come from any one of a variety of sources. For example, a playlist may be compiled by a user, a playlist may be obtained from someone else, or a playlist may be formed by a computer using an algorithm that attempts to identify songs that will suit the tastes of the listener.

The playlists are stored on a playlist server and are downloaded to the first device and the second device as requested by the listener. As mentioned above, the playlist server may be the same server as the content server.

Optionally, playlists as well as songs may be cached on the first device and/or the second device.

The list of playlists may be displayed upon the display 22 of the first device or may be displayed in any other desired manner. For example, the list of playlists may be displayed on the monitor of another device.

One of the displayed playlists is selected by the listener as shown in block 32. The selected playlist is a playlist that is expected to contain one or more songs that the listener would like to listen to. For example, the displayed list of playlists

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may contain a playlist named rock favorites, a playlist named country favorites, and a playlist named classical favorites. If the listener wants to listen to classical music that is on the playlist named classical favorites, the playlist named classical favorites is selected.

The desired playlist may be selected by using a touchscreen display of the first device 13, may be selected using the keypad 23, or may be selected by any other desired means.

At least one attribute of the selected playlist is sent from the first device to a playlist server as shown in block 33. The attribute(s) may comprise, for example, the name of a playlist, the number of a playlist, and/or any other unique identifier of a playlist.

Alternatively, the attribute(s) may comprise one or more parameters that are indicative of the type of music that the listener would like to hear. For example, the attribute(s) may comprise a code that indicates that a list of the top ten country hits for the week that is to be returned. The user may preferably compile sets of such parameters so as to facilitate the retrieval of custom, up to date playlists from the playlist server. Such parameters may be compiled directly on the first device or on any other device, such as a personal computer.

A playlist that corresponds to the attribute(s) is sent from the playlist server and is received by the first device as shown in block 34. This playlist is a list of songs containing at least one song that the listener would like to hear.

The listener selects at least one song from the received playlist, as shown in block 35. Either a single song may be selected, or a plurality of songs may be selected. The song(s) may be selected by using a touchscreen display of the first device 13, may be selected using the keypad, or may be selected by any other desired means.

Information representative of the selected song(s) is sent to a content server 10. The information may comprise the name(s) of the songs, the number(s) of the songs, or any other unique identifier thereof.

The selected song(s) are communicated from the content server 10 to the first device 13 via the Internet 11 as shown in block 37. The format of the selected songs may be MP3, WAV, or any other desired format.

The selected songs are played by the first device 13 as shown in block 38. The selected songs may be played in the order selected, in random order, or in any other desired order. The order can preferably be changed at any time.

The songs may be played via one or more speakers that are part of the first device 13, by one or more speakers that are in communication with the first device 13 (such as via a wired or wireless connection), by headphones, by earphones, or by any other desired means.

The volume, tone, and balance of the songs is preferably adjustable via the first device 13, such as via the display 22 and/or keypad 23 thereof.

Referring now to FIG. 4, the second way of operation of the first device is illustrated. According to this second way of operation, a list of playlists is displayed as shown in block 41, one of the playlists is selected as shown in block 42, at least one attribute is sent to the playlist server as shown in block 43, and a playlist is received as shown in block 44, all in the same fashion as in the first way of operation discussed above.

According to the second way of operation, the song is played on a device other than the first device 13. Thus, a second device 14 typically must be selected as shown in block 45. A particular second device may be selected from a list of second devices that is displayed on the first device 13. For example, a listener's desktop computer may be selected from a list having the desktop computer, a television, and a stereo listed thereon.

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Preferably the list of second devices is dynamic and is automatically updated, such as via the use of a device discovery, process that is described in detail below. Alternatively, the list of second devices may be pre-configured by the listener and then manually updated, as desired.

At least one song is selected from the playlist as shown in block 46 and as discussed above.

Information representative of the selected song(s) is sent from the first device 13 to the second device 14. This information tells the second device 14 what song(s) are to be played. However, the second device does not typically have the selected songs stored therein. In some instances the selected songs may be cached within a memory of the second device 14, as discussed above.

The second device 14 sends information representative of the selected song(s) to a content server. Optionally, the second device also sends at least one attribute of the playlist from which the song(s) were selected on the first device 13 to the playlist server, as well.

The selected song(s) are received from the content server by the second device as shown in block 44 and are ready for playing. Optionally, the same playlist that is presently available for display on the first device is received from the playlist server, such that it is also available for display on the second device.

Generally, songs may be selected and played from the second device 14, as well as from the first device 13, such that it is beneficial to display the playlist on the second device 14. Even if songs cannot be selected and displayed from the second device 14, it may still be beneficial to view the playlist thereon.

The selected song is played on the second device 14 as shown in block 50 and discussed above. Parameters of the song such as volume, tone, and balance are optionally controllable from the first device 13.

Optionally, playlist and/or songs are cached in the first device 13 and/or the second device 14. Caching is particularly beneficial when the same songs and/or playlist are used repeatedly.

Although playlists and/or songs may be cached so as to mitigate the need for repeated downloading thereof from the playlist/content server 10, the memory requirements of the first device 13 and second device 14 are substantially reduced. This is true because the first device 13 and the second device 14 of the present invention do not store a substantial quantity of playlists or songs thereon.

That is, the first device 13 and the second device 14 of the present invention do not have to store all of the songs that a listener wishes to hear thereon. Rather, any such storage is generally incidental. Typically, a large number of the songs played by the first device 13 and the second device 14 are stored on the content server 10 and are communicated via the Internet 11 to the first device 13 and/or the second device 14 as needed.

Of course, such remote storage reduces the need for memory for the first device 13 and the second device 14, thereby desirably reducing the cost and size thereof and also enhancing the reliability thereof.

Referring now to FIG. 5, according to one aspect of the present invention all of the devices within an area, such as the area within which the devices can receive each other's wireless broadcast signals, are aware of one another and communicate with one another. When a new device enters the area, the existing devices become aware of the new device and the new device becomes aware of the existing devices via a discovery process.

According to this discovery process, all devices may periodically broadcast an identification code and a password. The identification code uniquely identifies the device. The password authorizes the device to communicate with other devices within the area.

When a new device enters the area, the new device and the existing devices communicate with, one another. This may be done either directly or via a server, as discussed in detail below. The new device recognizes any of the other devices that have an acceptable password and displays a list of the other devices on its list of available devices, so that the other devices may be selected as second devices for playing of songs, as discussed above.

Similarly, the devices already in the area recognize the new device if the new device has an acceptable password, and the devices already in the area display the new device in their list of available devices so that the new device may be selected as a second device for the playing of songs, if desired.

Alternatively, when a user enters a place with a new device, he can search for other devices by broadcasting on the network (whether wired or wireless), as shown in block 51. The other devices will return a location ID for the location or realm of which they are a part, as shown in block 52. The user can then select a desired one of the locations and enter the correct password for that location, as shown in block 53. Once this is done, then all of the devices in that realm will show up regardless of whether they are local or remote, as shown in block 54. The user is then free to do whatever the user wants to do with the other devices, if the security is set up to allow other users to control the other devices. For example, the user may play a song through another device or download a song therefrom.

Referring now to FIG. 8, the discovery process is described in further detail. Preferably, a device can obtain a list of other devices in one of two different ways. According to a first way of obtaining lists of other devices, the lists are obtained through a server whether the device obtaining the lists is a local device or a remote device. According to a second way of obtaining lists of other devices, the lists are obtained directly from the other devices themselves, as long as the device obtaining the lists and the other devices are all local devices.

A local device is a device that is on the same local area network (LAN) as the other devices. That is, devices are considered to be local with respect to one another if they are all on the same local area network. A remote device is a device that is not on the same local area network as the other devices.

According to the first way of obtaining device lists, server 81, preferably on a wide area network such as the Internet, facilitates communication of a list of devices to a new device. The server may be the same server as the playlist server/content server 10 of FIGS. 1, 6, and 7 or may be a different server.

For example, if PDA 82 is a new device entering the area of a wireless local area network, a user may enter a user name or ID, a location identifier, and a password into the PDA 82. The user name or ID identifies the user to the rest of the local area network. An example of a user name or ID would be Joes PDA.

The location entry identifies the network that the user wants to become part of. For example, a network at Joe's house may be conveniently named Joes House.

The password is typically necessary to be part of the local area network. That is, the local area network will typically not allow a new device to log thereon without the correct password. The use of passwords may optionally be omitted, if desired.

Once the appropriate ID, location, and password have been entered, then the PDA 82 communicates with the server 81, such as via a wireless access point. The server 81 maintains a list of the devices on the local area network and communicates this list to the new device, i.e., the PDA 82.

The PDA 82 may then be used to select and control another device on the local area network, such as stereo 83. That is, the user may select the stereo 83 from the list of devices on the local area network and then may command the stereo to play a song or playlist of songs on the playlist of the PDA 82. The PDA 82 may also be used to control parameters of the song being played on the stereo 83, such as volume, tone, and balance. The PDA 82 may also be used to control the order in which the songs are played.

The PDA 82 may directly control the stereo 83, as indicated by the arrows therebetween. Alternatively, the PDA 82 may control the stereo through the server 81, particularly in those instances wherein communication directly between the PDA 82 and the stereo 83 are not adequately facilitated, such as when the distance therebetween is too great or when an obstruction (such as a wall or a larger piece of furniture) blocks the signal between the PDA 82 and the stereo 83.

When a new device can become part of the local area network, as described above, then the new device is a local device. However, in some instances a remote device may similarly be used to control a device on the network, such as the stereo 83, even though the remote device is not part of the local area network.

For example, the cell phone 84 is a remote device because it is not part of the local area network that the stereo 83 is on. However, the cell phone 84, may still communicate with the server 81, so as to obtain the list of devices on the local area network therefrom. It is still necessary for the cell phone user to enter an ID, location, and password into the cell phone, as was done with the PDA.

The remote device, i.e., cell phone 84, may similarly be used to control the stereo. However, the control signal will be communicated from the cell phone 84 to the server 81 through the server, since direct communication between the cell phone 84 and the stereo is typically not facilitated. Thus, the server 81 functions as a gateway for the remote device to communicate with devices on the local area network.

Preferably, the list of devices communicated from the server 81 to a new device, e.g., PDA, contains an indication as to whether devices on the list are local or remote with respect to the local area network. Thus, the new device knows whether commands to other devices must go through the server 81 or not.

According to the second way of obtaining a list of devices, instead of obtaining the list from the server 81, each device continuously broadcasts its presence, so as to facilitate auto-detection thereof. Thus, each device individually compiles its own list of other devices by monitoring the broadcasts therefrom. Preferably, a user must enter an ID, location, and password, as discussed above.

According to either method for obtaining a list of devices, a particular physical location, such as a coffee shop for example, may contain a plurality of logical locations or realms. Thus, a user may select a particular logical location to log onto. For example, one group of people at the coffee shop may be logged onto a location or local area network named Joes Coffee Group, while another group of people is logged onto a different location or local area network named Bills Coffee Group. A person newly entering the physical location, i.e., the coffee shop, may choose which group to join.

However, the new person must have the correct password for the logical location that he wishes to join. The password



may be obtained by requesting it from someone in the logical location. Logging on to the logical location causes a list of devices (or users) to be communicated to the new user's device and also causes the new user's device to be added to the device lists of the other users, as discussed above.

According to one embodiment of the present invention, the first device comprises a remote control for a set-top box and the second device comprises a rendering device that receives signals from the set-top, such as a television or stereo. This embodiment of the present invention is illustrated in FIGS. 6 and 7 and is described in detail below.

Referring now to FIG. 6, one embodiment of the present invention comprises a set-top box 63 that provides a signal to a rendering device, such as a television or stereo 61. The set-top box is in communication with the Internet 11. A playlist server/content server 10 is also in communication with the Internet, as described above.

Optionally, the set-top box functions as a cable television box in addition to functioning as a portion of the digital entertainment network of the present invention.

A remote control 62 for the set-top box 63 preferably fits into a cradle defined by at least a portion of the set-top box. The remote control 62 communicates wirelessly with the set-top box to control operation of the rendering device 61.

The remote control 62 is in wireless communication with the Internet 11, such as via a wireless access point or wireless router 64.

The remote control 62 defines a first device, as described in detail above. The set-top box, in combination with the rendering device 61, defines a second device as also described in detail above.

Thus, playlists can be requested by the remote control 62 and downloaded from the playlist server 10 via the Internet 11 thereto. Similarly, songs may be downloaded to the remote control 62. The songs may be played on the remote control 62 or may be played on the rendering device 61 in its role as a second device as described above.

For example, a song may be previewed on the remote control 62, even while another song is being played on the rendering device 61. A song may be listened to solely on the remote control 62 as the remote control is carried about at home. Such listening may be via one or more speakers built into the remote control 62 or may be via earphones.

Optionally, the set-top box comprises a display, so that playlists and songs can be selected therefrom. Playlists and songs are downloaded to the set-top box in its role as a second device, as discussed above.

The remote control 62 may be used while cradled by the set-top box 63, as shown in FIG. 6. Alternatively, the remote control 62 may be used while removed from the set-top box 63, as shown in FIG. 7.

Chat is preferably provided by the first 13 and/or second 14 devices of the present invention. Chat may be used for collaboration among listeners, such as for the compilation and/or exchange of playlists. Such chat may be implemented as voice chat or as text chat in a fashion similar to Internet Relay Chat (IRC), Microsoft Instant Messenger (IM), or AOL Instant Messenger (IM).

According to one aspect of the present invention, playlist recommendations may be provided to a listener. These playlist recommendations may be provided by the playlist server and may be based upon the listening habits of the listener or upon previous playlist requests. The listening habits of the listener may be determined from playlist and/or song downloads from the playlist server and/or the content server. That is, a playlist recommendation of a playlist of the top ten contemporary songs may be made by the playlist server to a listener who continually listens to several of the songs on this playlist. Similarly, a playlist recommendation of a playlist of

the top ten country songs may be made to a listener who has requested playlists containing country songs.

The playlist server may also provide playlist recommendations based upon the playlists of others. That is, the playlist server may be configured to recognize when two or more people appear to have similar listening habits and may then recommend the playlists of one of these people to others of the same group.

The wireless communications discussed herein may be effected via a network, such as a network conforming to the Bluetooth (a trademark of Bluetooth SIG, Inc.) standard and/or conforming to the WiFi (a trademark of the WiFi Alliance) standard.

Communications between the first and second devices may be either via a network or via dedicated non-network communications devices such as those utilizing any desired form of wireless data transfer, including those using infrared (IR) and radio frequency (RF).

Although the content described herein is music, those skilled in the art will appreciate that other types of content, including both audio and non-audio content, are likewise subject to use by the present invention. For example, the content may comprise talks, speeches, comedy sketches, stories or books that are read aloud, pictures, video, software, or data.

It is understood that the exemplary digital entertainment network described herein and shown in the drawings represents only presently preferred embodiments of the invention. Indeed, various modifications and additions may be made to such embodiments without departing from the spirit and scope of the invention. Thus, various modifications and additions may be obvious to those skilled in the art and may be implemented to adapt the present invention for use in a variety of different applications.

What is claimed is:

1. A method for facilitating the presentation of media, the method comprising:
  - displaying, on a first device, at least one device identifier identifying a second device;
  - receiving user first input selecting the at least one device identifier;
  - receiving, on the first device, a playlist, the received playlist comprising a plurality of media item identifiers;
  - receiving user second input selecting at least one media item identifier from the received playlist; and
  - directing, from the first device, the second device to receive a media item identified by the at least one media item identifier from a content server, without user input via the second device.
2. The method as recited in claim 1, wherein the first device comprises a handheld portable device.
3. The method as recited in claim 1, wherein the first device comprises a palmtop computer.
4. The method as recited in claim 1, wherein the first device comprises an MP3 player.
5. The method as recited in claim 1, wherein the first device comprises a mobile phone.
6. The method as recited in claim 1, wherein the first device comprises a remote control operative to control the second device.
7. The method as recited in claim 1, wherein the first device comprises a remote control operative to control the second device and the second device comprises a media rendering device.
8. The method as recited in claim 7, wherein the first device is operative to adjust a volume parameter on the second device.
9. The method as recited in claim 7, wherein the first device is operative to adjust a tone parameter on the second device.



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10. The method as recited in claim 7, wherein the first device is operative to adjust a balance parameter on the second device.

11. The method as recited in claim 1, further comprising displaying a plurality of device identifiers on the first device, wherein each of the plurality of device identifiers identifies a corresponding device, and wherein receiving the user first input selecting the at least one device identifier further comprises receiving the user first input selecting the at least one device identifier from the plurality of device identifiers.

12. The method as recited in claim 1, wherein the user second input selects the plurality of media item identifiers from the received playlist in a first order; and wherein directing the second device to receive the media item identified by the at least one media item identifier from the content server further comprises directing the second device to receive a plurality of media items identified by the plurality of media item identifiers from the content server in the first order.

13. The method as recited in claim 1, wherein the user second input selects the plurality of media item identifiers from the received playlist in a first order; and wherein directing the second device to receive the media item identified by the at least one media item identifier from the content server further comprises directing the second device to receive a plurality of media items identified by the plurality of media item identifiers from the content server in an order other than the first order.

14. The method as recited in claim 1, further comprising automatically providing a recommendation of a playlist name based upon listening habits of a listener.

15. The method as recited in claim 1, wherein directing the second device to receive the media item identified by the at least one media item identifier from the content server further comprises directing the second device to download the media item identified by the at least one media item identifier from the content server.

16. The method as recited in claim 1, wherein directing the second device to receive the media item identified by the at least one media item identifier from the content server further comprises directing the second device to stream the media item identified by the at least one media item identifier from the content server.

17. A method for obtaining a song, the method comprising: obtaining a playlist on a first device over a network, the playlist comprising a plurality of song identifiers; displaying on the first device at least one device identifier identifying a second device; selecting, responsive to user first input at the first device, the at least one device identifier; selecting, responsive to user second input at the first device, a song identifier from the playlist; and directing, from the first device, the second device to obtain a song identified by the song identifier without user input via the second device.

18. The method of claim 17, further comprising: requesting, by the second device, the song identified by the song identifier from a content server; and downloading the song from the content server to the second device.

19. The method of claim 17, further comprising: requesting, by the second device, the song identified by the song identifier from a content server; and streaming the song from the content server to the second device.

20. The method of claim 17, wherein the network comprises the Internet.

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21. The method of claim 17, wherein the network comprises a local area network.

22. The method of claim 17, further comprising affecting a volume of the song on the second device from the first device.

23. A device for selecting a media item, the device comprising:

a display for displaying at least one device identifier; and a network transceiver for facilitating communication between the device and at least one second device on a network, wherein the device is configured to facilitate: displaying on the display the at least one device identifier identifying the at least one second device; receiving user first input selecting the at least one device identifier;

receiving a playlist via the network transceiver; receiving user second input selecting at least one media item name from the playlist; and

directing the at least one second device to send information representative of the at least one media item name to a content server without user input via the second device, and to receive a media item corresponding to the at least one media item name from the content server.

24. The device of claim 23, wherein the device comprises a remote control device that is not capable of playing the media item corresponding to the at least one media item name.

25. A method for obtaining media, the method comprising: displaying, on a first device, at least one device identifier identifying a second device;

selecting, responsive to user first input at the first device, the at least one device identifier;

displaying, on the first device, a plurality of playlist names; selecting, responsive to user second input at the first device, one of the plurality of playlist names;

sending at least one attribute of a playlist corresponding to the selected playlist name to a playlist server;

receiving, on the first device, the playlist from the playlist server, the received playlist corresponding to the at least one attribute and comprising a plurality of media item identifiers;

selecting, responsive to user third input at the first device, at least one media item identifier from the received playlist; and

directing the second device, without user input via the second device, to receive a media item identified by the at least one media item identifier from a content server and to play the media item.

26. A method for obtaining media, the method comprising: displaying, on a first device, a plurality of device identifiers;

receiving user first input selecting one of the plurality of device identifiers, wherein the one of the plurality of device identifiers identifies a second device;

sending at least one attribute of a playlist corresponding to a selected playlist name to a playlist server;

receiving, on the first device, the playlist from the playlist server, the received playlist corresponding to the at least one attribute and comprising a plurality of media item identifiers;

selecting at least one media item identifier from the received playlist; and

directing, from the first device, the second device to receive a media item identified by the at least one media item identifier from a content server without user input via the second device and to play the media item.

27. A method of directing a second device from a first device, the method comprising:

displaying, on the first device, a plurality of device identifiers;

receiving user first input identifying one of the plurality of device identifiers, wherein the one of the plurality of device identifiers identifies the second device;

sending, from the first device, at least one attribute of a playlist corresponding to a selected playlist name to a playlist server;

receiving a playlist from the playlist server, the received playlist corresponding to the at least one attribute and comprising a plurality of media item identifiers;

receiving, at the first device, user second input identifying at least one media item identifier from the received playlist; and

directing, from the first device and without user input via the second device, the second device to obtain a media item identified by the at least one media item identifier from a content server and to play the media item.

28. The method as recited in claim 27, wherein directing the second device to obtain the media item identified by the at least one media item identifier from the content server and to play the media item further comprises directing the second device to download the media item identified by the at least one media item identifier from the content server and to play the media item.

29. The method as recited in claim 27, wherein directing the second device to obtain the media item identified by the at least one media item identifier from the content server and to play the media item further comprises directing the second device to stream the media item identified by the at least one media item identifier from the content server and to play the media item.

30. A device for selecting a media item, the device comprising:

a display for displaying at least one device identifier; and a network transceiver for facilitating communication between the device and at least one second device via a network, wherein the device is configured to facilitate:

displaying on the device the at least one device identifier identifying the at least one second device;

receiving user first input selecting the at least one device identifier;

receiving a playlist, the playlist comprising a plurality of media item identifiers;

receiving user second input selecting at least one media item identifier from the playlist; and

directing, from the device, the at least one second device to receive the media item identified by the at least one media item identifier from a content server, without user input via the second device.

31. The device as recited in claim 30, wherein the device comprises a handheld portable device.

32. The device as recited in claim 30, wherein the device comprises a palmtop computer.

33. The device as recited in claim 30, wherein the device comprises an MP3 player.

34. The device as recited in claim 30, wherein the device comprises a mobile phone.

35. The device as recited in claim 30, wherein the device comprises a remote control operative to control the at least one second device.

36. The device as recited in claim 30, wherein the device comprises a remote control operative to control the at least one second device, and the at least one second device comprises a media rendering device.

37. The device as recited in claim 36, wherein the device is operative to adjust a volume parameter on the second device.

38. The device as recited in claim 36, wherein the device is operative to adjust a tone parameter.

39. The device as recited in claim 36, wherein the device is operative to adjust a balance parameter.

40. The device as recited in claim 30, further comprising displaying a plurality of device identifiers on the first device, wherein each of the plurality of device identifiers identifies a corresponding device, and wherein receiving the user first input selecting the at least one device identifier further comprises receiving the user first input selecting the at least one device identifier from the plurality of device identifiers.

41. The device as recited in claim 30, wherein the user second input selects the plurality of media item identifiers from the playlist in a first order, and wherein directing the second device to receive the media item identified by the at least one media item identifier from the content server further comprises directing the second device to receive a plurality of media items identified by the plurality of media item identifiers from the content server in the first order.

42. The device as recited in claim 30, wherein the user second input selects the plurality of media item identifiers from the playlist in a first order, and wherein directing the second device to receive the media item identified by the at least one media item identifier from the content server further comprises directing the second device to receive a plurality of media items identified by the plurality of media item identifiers from the content server in an order other than the first order.

43. The device as recited in claim 30, further comprising automatically providing a recommendation of a playlist name based upon listening habits of a listener.

44. The device as recited in claim 30, wherein directing the at least one second device to receive the media item identified by the at least one media item identifier from the content server, without user input via the second device, comprises directing the at least one second device to download the media item identified by the at least one media item identifier from the content server, without user input via the second device.

45. The device as recited in claim 30, wherein directing the at least one second device to receive the media item identified by the at least one media item identifier from the content server, without user input via the second device, comprises directing the at least one second device to stream the media item identified by the at least one media item identifier from the content server, without user input via the second device.

46. A computer program product for facilitating the presentation of media, the computer program product stored on a non-transitory computer-readable storage medium and including instructions configured to cause a processor to carry out the steps of:

displaying, on a first device, at least one device identifier identifying a second device;

receiving user first input selecting the at least one device identifier;

receiving, on the first device, a playlist, the received playlist comprising a plurality of media item identifiers;

receiving user second input selecting at least one media item identifier from the received playlist; and directing, from the first device, the second device to receive a media item identified by the at least one media item identifier from a content server, without user input via the second device.

\* \* \* \* \*

# **EXHIBIT 6**



US008230099B2

(12) **United States Patent**  
**Weel**

(10) **Patent No.:** **US 8,230,099 B2**  
(45) **Date of Patent:** **Jul. 24, 2012**

- (54) **SYSTEM AND METHOD FOR SHARING PLAYLISTS**
- (75) **Inventor:** **Martin Weel, Modjeska, CA (US)**
- (73) **Assignee:** **Dryden Enterprises, LLC, Wilmington, DE (US)**
- (\* ) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 705 days.

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(21) **Appl. No.:** **12/114,286**

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(65) **Prior Publication Data**

US 2008/0208379 A1 Aug. 28, 2008

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**Related U.S. Application Data**

(62) Division of application No. 10/840,110, filed on May 5, 2004.

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(51) **Int. Cl.**  
**G06F 15/16** (2006.01)

*Primary Examiner* -- Mohamed Wasel

(52) **U.S. Cl.** ..... 709/231; 709/217; 709/218; 709/219

(74) *Attorney, Agent, or Firm* — Withrow & Terranova, PLLC

(58) **Field of Classification Search** ..... 709/231, 709/217-219

See application file for complete search history.

(57) **ABSTRACT**

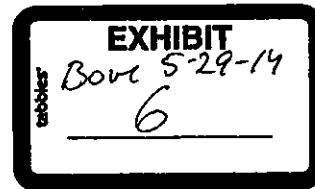
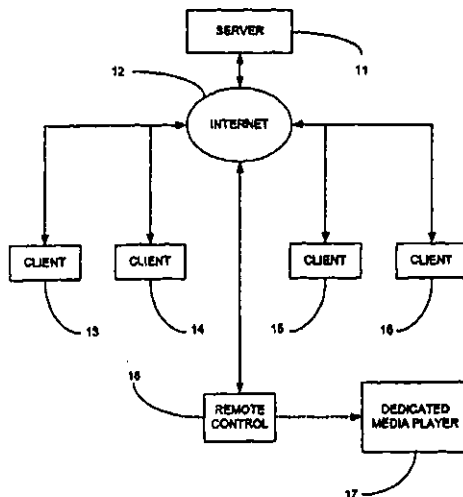
A system for sharing playlists utilizes a network, such as the Internet. A player device other than a general purpose computer, such as a dedicated media player or a remote control for a dedicated media player, is in communication with the server over the network. The player device is configured to receive a playlist, queue the playlist, display the playlist, and play a selection from the playlist. A user profile may be used to identify playlists that are likely to contain selections of interest to the user.

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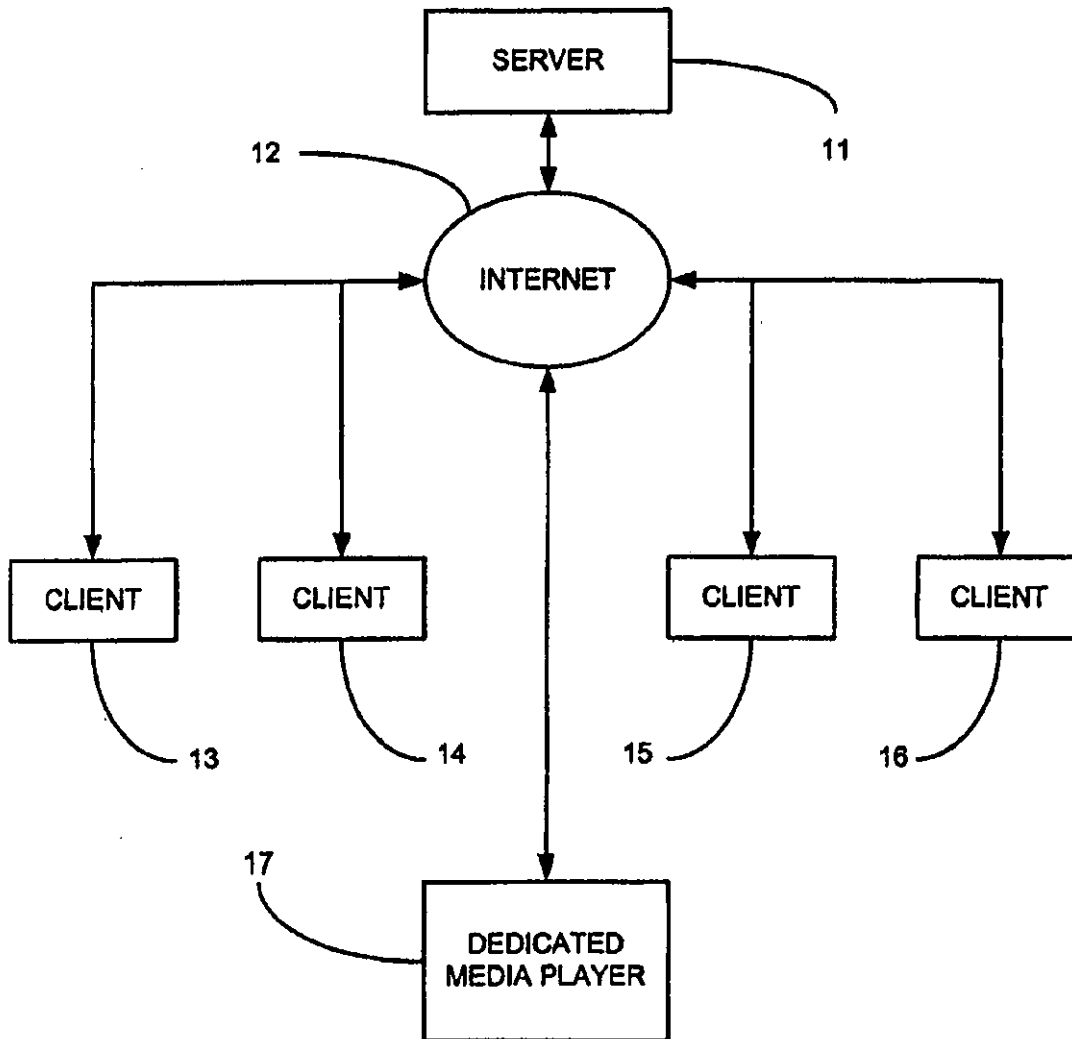


FIG. 1

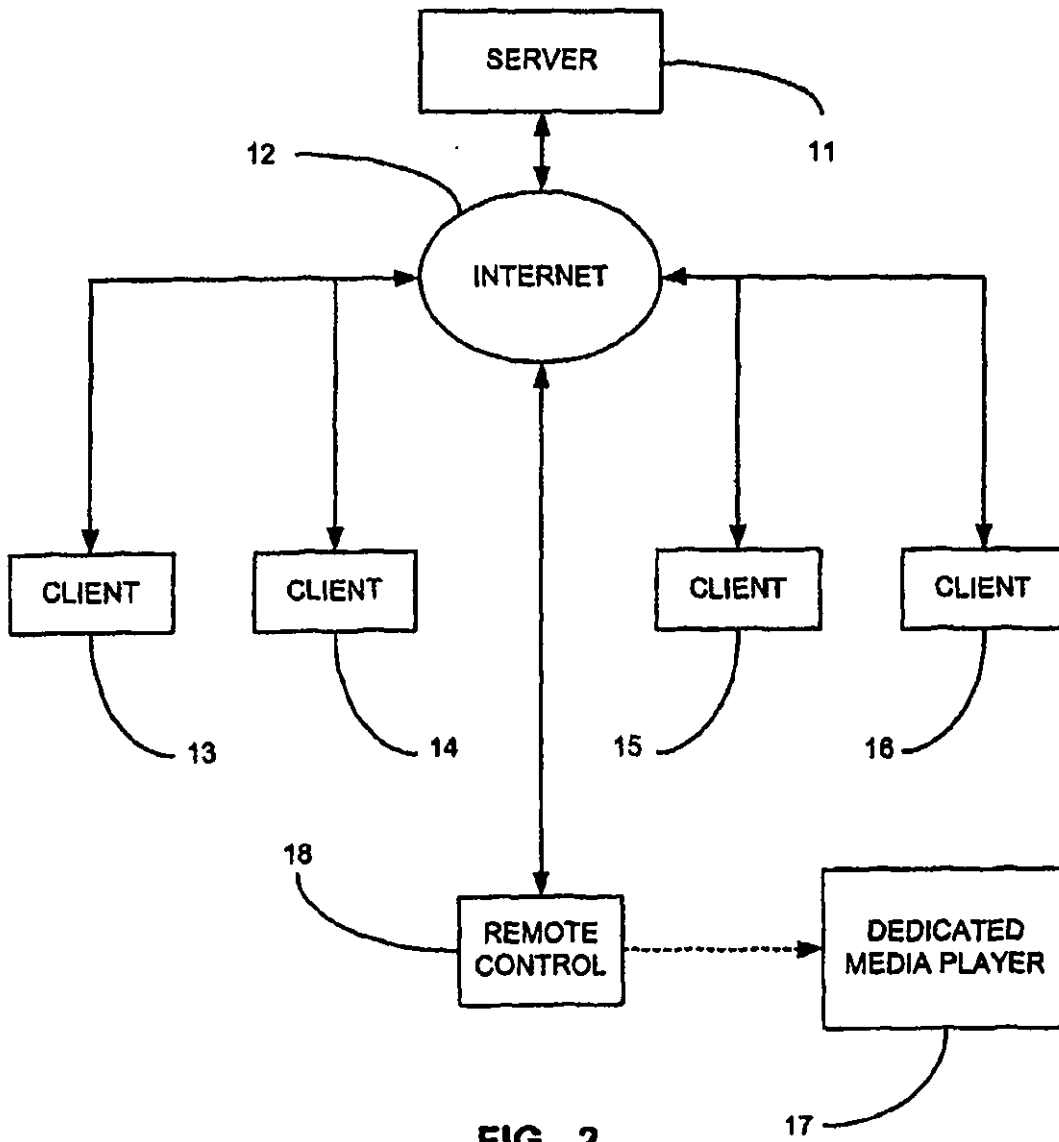


FIG. 2



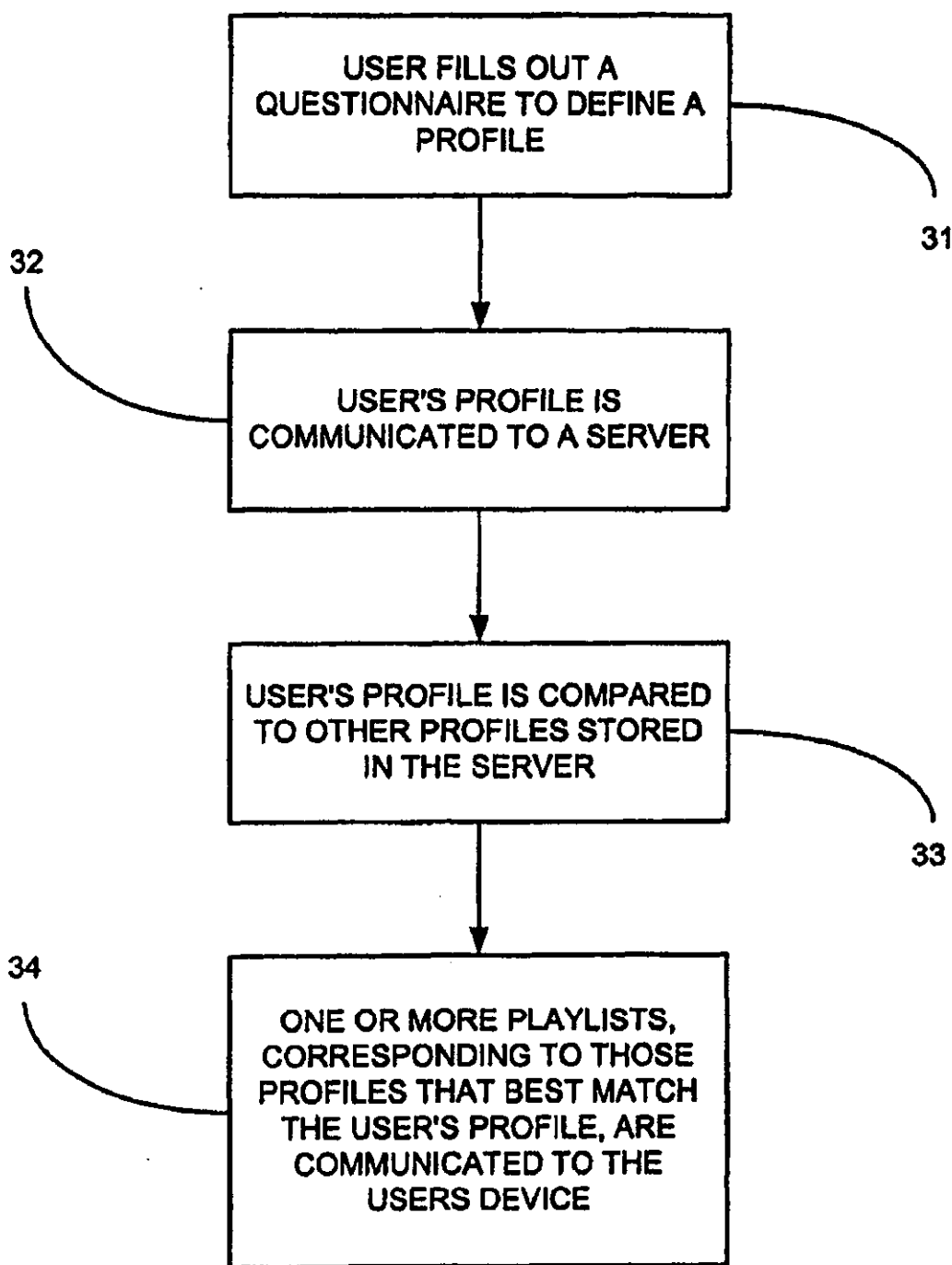


FIG. 3

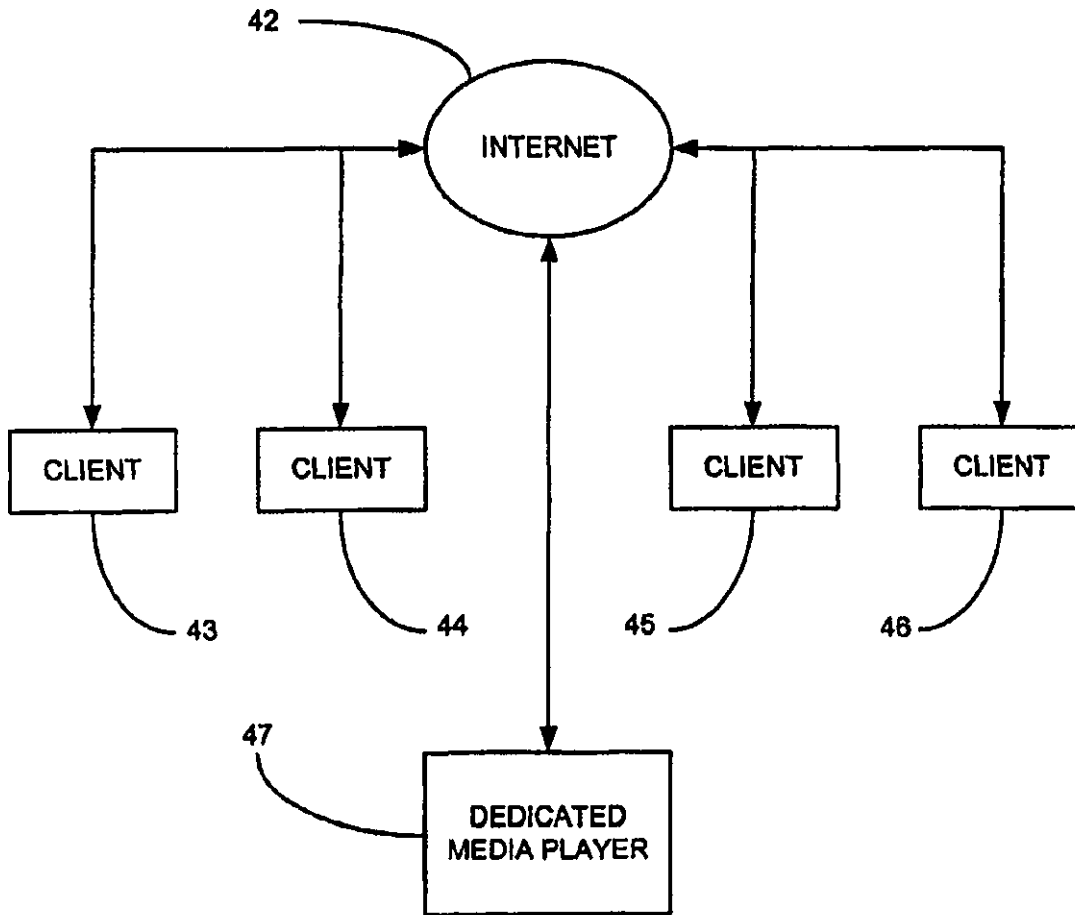


FIG. 4

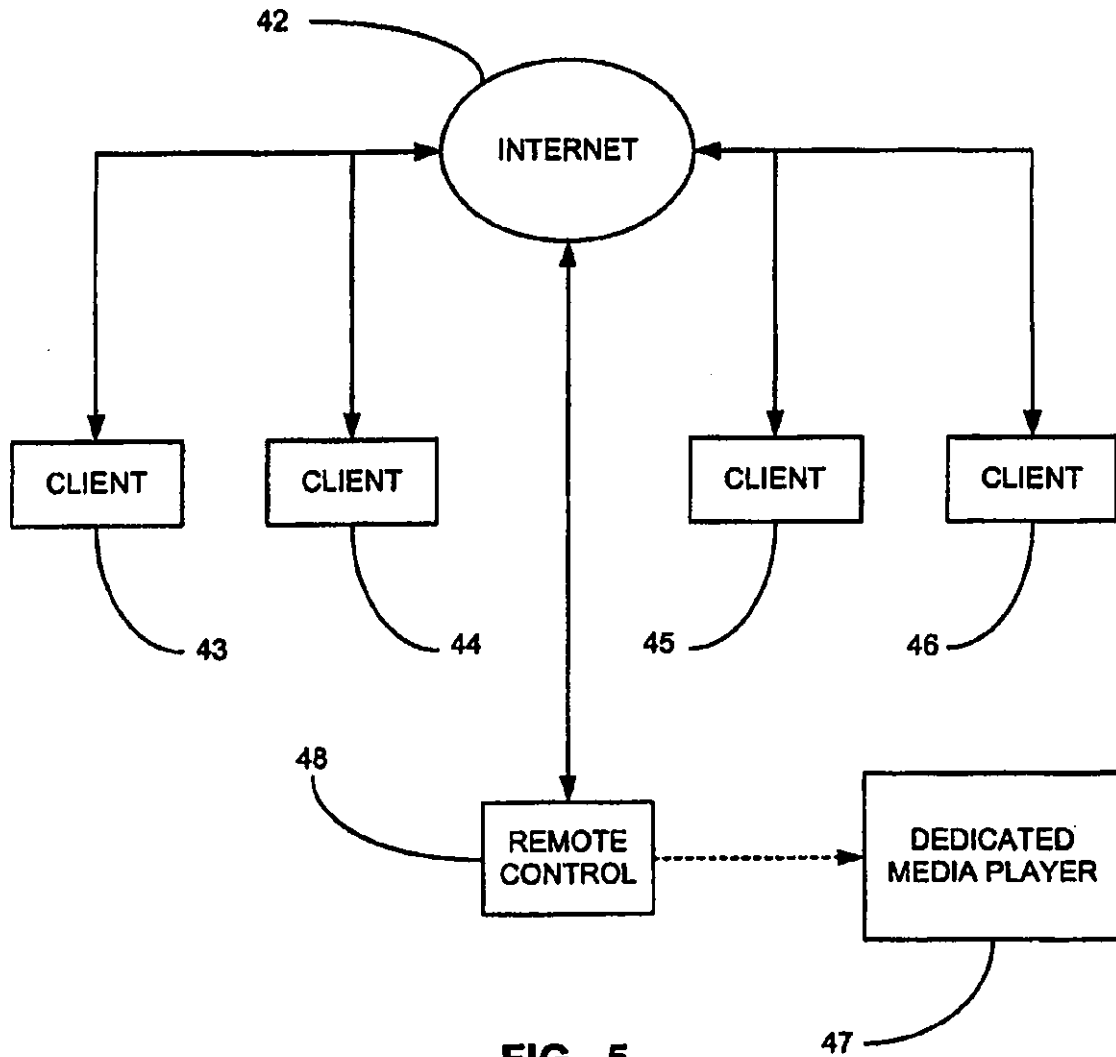
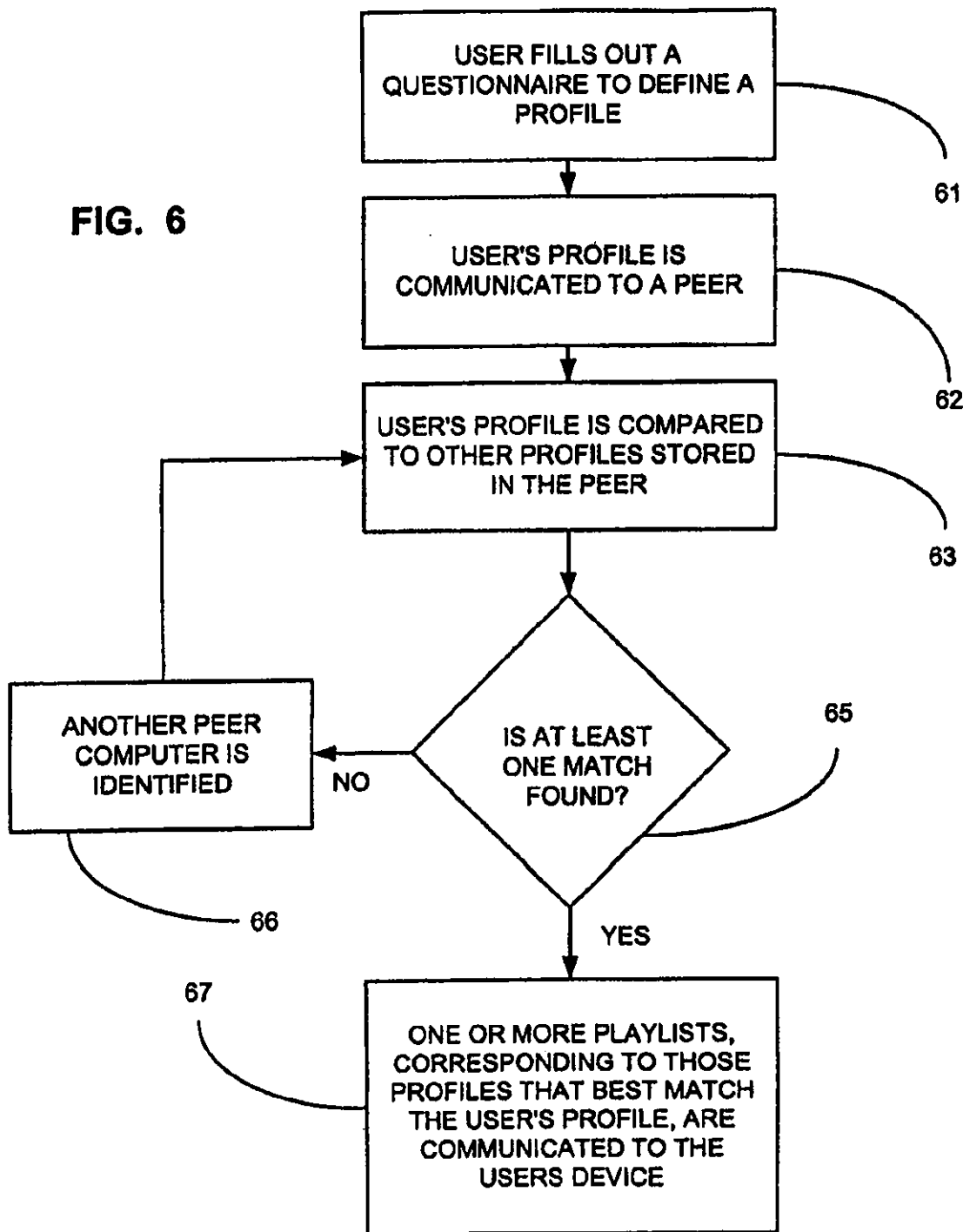


FIG. 5

FIG. 6



1

## SYSTEM AND METHOD FOR SHARING PLAYLISTS

### RELATED APPLICATIONS

This patent application is a Divisional of U.S. patent application Ser. No. 10/840,110, filed May 5, 2004, entitled "System and Method for Sharing Playlists," which is hereby incorporated herein by reference in its entirety. This patent application is also related to U.S. patent application Ser. No. 10/840,104, filed May 5, 2004, entitled "Hybrid Set-Top Box for Digital Entertainment Network"; U.S. patent application Ser. No. 10/840,109, filed May 5, 2004, entitled "Playlist Downloading for Digital Entertainment Network"; U.S. patent application Ser. No. 10/840,108, filed May 5, 2004, entitled "Device Discovery for Digital Entertainment Network"; and U.S. patent application Ser. No. 12/019,015, filed Jan. 24, 2008, entitled "Device Discovery for Digital Entertainment Network", which is a divisional of the above-referenced U.S. patent application Ser. No. 10/840,108, all of which are hereby incorporated by reference in their entireties.

### FIELD OF THE INVENTION

The present invention relates generally to the sharing of playlists. The present invention relates more particularly to a system and method for sharing playlists wherein a dedicated media player is configured to receive, store, and display playlists and to play selections from playlists.

### BACKGROUND OF THE INVENTION

Playlists for music and movies are well known. A playlist is a list of a user's favorite selections. Popular personal computer (PC) media playing programs, such as Windows Media Player (a trademark of Microsoft Corporation), offer the capability for a user to compile a playlist. The user may subsequently select items to be played from the playlist and the media playing program then plays the selected items. The use of such a playlist simplifies the selection process and thus makes listening to music or viewing movies easier and more enjoyable.

Typically, such selection is accomplished by viewing a playlist within the media playing program and by designating which selection is to be played. The selection to be played may be designated by clicking on it with a mouse, for example.

Playlists also facilitate the playing of a plurality of selections in a particular order. That is, the playlist may be compiled in an order in which the playing of selections therefrom is desired. The selections may then be automatically played sequentially from the playlist. Typically, selections may also be played randomly from a playlist.

Playlists are typically compiled by reviewing a list of selections available for play and then choosing those selections that the user would like to have on the playlist. Thus, a user may review songs that are stored on a personal computer's hard drive and compile a playlist therefrom, for example.

The playlist may subsequently be edited or updated as new selections become available and/or the user's preferences change. Thus, a user's playlist may reflect a group of selections that was compiled over an extended length of time, such as several years.

The sharing of playlists is also known. Popular file sharing programs, such as Kazaa (a trademark of Sharman Networks), facilitate the sharing of playlists. Using such systems, it is possible for a user to download a list of songs or movies

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that another individual has compiled. This list may then be used to make or modify a playlist for the user.

Although such playlists and playlist sharing systems have proven generally suitable for their intended purposes, they possess inherent deficiencies, which detract from their overall effectiveness and desirability. For example, according to contemporary methodology, playlists are only communicated to and used with general purpose computers, such as IBM compatible personal computers (PCs) and Apple computers.

Further, there is no contemporary system for easily identifying people who have similar interest, such that their playlist can be downloaded. Rather, according to contemporary methodology, playlists are obtained by searching on keywords, such as the titles of selections contained within the playlists. However, the mere fact that the person's playlist has a particular selection in it does not necessarily mean that the playlist contains other selections that a user may enjoy.

As such, although the prior art has recognized, to a limited extent, the problems of finding and using playlists, the proposed solutions have, to date, been ineffective in providing a satisfactory remedy. Therefore, it is desirable to provide a system and method for sharing playlists, wherein the playlists are communicated to, stored in, and displayed upon player devices other than general purpose computers. It is also desirable to provide a method for identifying playlists that are likely to contain selections that will be enjoyed by a user.

### BRIEF SUMMARY OF THE INVENTION

While the apparatus and method has or will be described for the sake of grammatical fluidity with functional explanations, it is to be expressly understood that the claims, unless expressly formulated under 35 USC 112, are not to be construed as necessarily limited in any way by the construction of "means" or "steps" limitations, but are to be accorded the full scope of the meaning and equivalents of the definition provided by the claims under the judicial doctrine of equivalents, and in the case where the claims are expressly formulated under 35 USC 112 are to be accorded full statutory equivalents under 35 USC 112.

The present invention specifically addresses and alleviates the above mentioned deficiencies associated with the prior art. More particularly, according to one aspect the present invention comprises a system for sharing playlists, wherein the system comprises a dedicated media player that is configured to receive a playlist and to display the playlist. Selections from the playlist may thus be chosen and played, as desired.

As used herein, a dedicated media player is defined as a media player other than a general purpose computer. Further details on the use of this term and examples of dedicated media players are provided below.

According to another aspect, the present invention comprises a system for sharing playlists, wherein the system comprises a network and a player device. The player device typically comprises either a dedicated media player or a remote control for a dedicated media player.

The player device is in communication with the network and the player device is configured to receive a playlist, store the playlist, display the playlist, and play a selection from the playlist.

The network may comprise any desired type of network. Preferably, the network comprises a wide area network (WAN), such as the Internet. However, the network may alternatively comprise a local area network (LAN).

Player devices include music players, video players, and remote controls for music players and video players. More

specific examples of player devices include MP3 players, cellular telephones, set top boxes, a stereos, televisions, car stereos, video monitors, and video storage player devices, as well as remote controls for any of these devices. One example of a video storage player device is TiVo (a trademark of TiVo, Inc.).

The player device may be a portable player device that is configured to receive streaming audio. The player device may also be a non-portable player device that is configured to receive streaming audio and/or a remote control therefor.

The player device may comprise a network adapter, such as an Ethernet card, to facilitate communication with a network. The player device may comprise either a wired or wireless network adapter. Examples of wireless network adapters include those that comply with the Bluetooth (a trademark of Bluetooth SIG, Inc.) standard and those that comply with the WiFi (a trademark of the WiFi Alliance) standard.

The player device preferably comprises an LCD display for displaying the playlist. However, any other suitable type of display may similarly be utilized.

The player device is preferably configured to facilitate searching for playlists. That is, the player device upon which the playlists are stored and displayed is preferably also capable of locating, requesting and retrieving playlists, preferably by merely pushing a button.

Alternatively, playlists may be located and requested via the use of a general purpose computer or the like. Playlists do not have to be requested by the same device that receives the playlist. For example, a general purpose computer may be used to request playlists that are then communicated from other general purpose computers or other dedicated media players to the user's player device.

According to one aspect, the present invention comprises a server upon which a plurality of playlists is stored and the player device is configured to receive playlists from the server. Thus, the player device may participate in the network as a client according to a client/server model of the network.

According to another aspect, the present invention does not include a server. Rather, the present invention comprises a plurality of other player devices and/or general purpose computers upon which a plurality of playlists are stored and the user's player device is configured to receive playlists from the other player devices and/or general purpose computers. Thus, the user's player device may participate in the network as a peer according to a peer-to-peer model of the network.

Preferably, the player device is configured to store a plurality of different playlists. Thus, the user may select a particular playlist according to the user's location, whom the user is with, the type of player device the selection is to be played upon, or the preference of the user based upon any objective or subjective criteria or merely based upon a whim.

According to another aspect, the present invention comprises a player device defined by a dedicated media player and/or a remote control for the media player, wherein the player device comprises a receiving circuit for receiving playlists and a display for displaying the playlists.

According to another aspect, the present invention comprises a server within which is stored a plurality of playlists. The server is configured to communicate the playlist to a player device that is not a general purpose computer.

According to another aspect, the present invention comprises a method for sharing playlists, wherein the method comprises communicating a playlist to a player device comprising a dedicated media player and/or a remote control for the dedicated media player.

According to another aspect, the present invention comprises a method for sharing playlists, wherein the method

comprises communicating a playlist to a player device that is not a general purpose computer.

Preferably, the method comprises defining a user profile for a recipient of the playlist and matching that user profile to a user profile of another person, wherein the communicated playlist is the playlist of the other person.

The profile preferably includes the type of music listened to, at least one artist, at least one selection, at least one instrument, at least one record company, a region, a country, a state, a city, a school, and/or an ethnicity. Thus, a user may enhance the likelihood of finding a playlist that contains selections enjoyed by another person living in the same city as the user and having the same ethnicity, for example.

According to another aspect, the present invention comprises a method of defining a playlist, wherein the method comprises defining a user profile and the user profile is used to determine selections that may be enjoyed by a user.

The user profile is preferably compared to user profiles of others to determine a match. Then, a playlist of the other person for which a match was determined is communicated to the user and used to at least partially define a playlist for the user.

Optionally, the user profile is used to define a statistical aggregate of other users and the playlist is determined by the statistical aggregate. Thus, the playlist represent an average of the selections enjoyed by a group of other people.

Optionally, the user profile comprises a list of selections enjoyed by the user and a frequency of which these selections are played. For example, the user profile may comprise a list of selections enjoyed by the user and a rating of the selections by the user.

The method optionally comprises defining a period of time and using the period of time to determine which selections were popular then. The playlist comprises at least some of these selections.

As one example, the method further comprises defining a playlist, which comprises at least some selections that were popular during approximately the last week. As a further example, the method further comprises defining a playlist, which comprises at least some selections that were popular during approximately the last month. As yet a further example, the method further comprises defining a playlist, which comprises at least some selections that were popular during approximately the last year.

Thus, a user may enhance the likelihood of finding a playlist that contains selections enjoyed by another person, wherein the selections were released within the last month, for example.

The playlist may optionally be edited to add or remove selections therefrom.

The user's playlist may optionally be updated by adding selections that have been added to the playlist of another. Similarly, the user's playlist may optionally be updated by removing selections that have been removed from the playlist of another. Such updating may optionally be performed automatically.

Optionally, selections may automatically be added to a playlist when those selections are played in excess of a predetermined rate by the player. Similarly, selections may automatically be deleted from a playlist when those selections are played less than a predetermined rate by the player.

Optionally, one or more selections on a playlist may be designated as private. Any selections on the playlist that are designated as private are not shared with others.

Optionally, any selections on the playlist that are not compatible with the player with which the playlist is associated are removed therefrom. Compatibility may be due to hard-

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ware limitations of the player. For example, an MP3 player may not be able to play other formats of audio and may not be able to play the audio tracks of a video selection (such as a movie). Therefore, if such material is included in a playlist, it may automatically be deleted therefrom. Optionally, such deletion may require user approval.

Further, a music player may have limitations that the user desires to be taken into account when a playlist is made or updated. For example, a portable audio player may not be able to adequately reproduce bass sounds. Thus, a user may prefer that a playlist for that device not contain selections for which good base reproduction is considered to be desirable. Therefore, if such material is initially included in a playlist, it may automatically be deleted therefrom. Optionally, such deletion may require user approval.

Further, the present invention may be configured so as to remove selections from a playlist that are not considered by the user to be compatible with the location. That is, some selections may not play well do to ambient acoustics. Further, some selections may not be appropriate for a given location. For example, selections that contain material that is not considered by the user to be suitable for minors may be omitted from a player that is located in a family area.

Either individual selections or categories of selections may be removed from a playlist in the above described manner. Thus, an entire genre may be removed from a playlist, if desired.

Optionally, one or more selections on a playlist may be designated as preferred, so as to indicate that the selections are particularly enjoyable for the user. Indeed, a user's playlist may contain only those selections that have been designated as preferred on the playlists of others.

According to the present invention, playlists may be made and used with a variety of different types of media players. For example, playlists comprising audio selections such as music, speeches, comedy routines, and the like may be made and used with audio players. Similarly, playlists comprising movies, filmstrips, videos, and the like may be made and used with video players.

Indeed, audio playlist may contain video selections and vice-versa. As those skilled in the art will appreciate, in some instances it may be desirable to the play the audio tracks of a movie on an audio player and it may similarly be desirable to play songs (without any accompanying video) on a video player. For example, it may be desirable to play the soundtrack from a movie on an audio player.

The present invention is not limited to audio and video selection. According to the present invention, playlists of games, software applications, or any other desired items or information might similarly be made and used. For example, lists of nightclubs or restaurants that have been enjoyed by others may be obtained by using profiles according to the present invention.

According to another aspect, the present invention comprises a method for managing media content on a network, wherein the method comprises using information about a user's previous playing to define a playlist and communicating the playlist to a player device other than a general purpose computer with which the playlist can be stored, displayed, and selections made for playing therefrom.

According to another aspect, the present invention comprises a method for defining a playlist, wherein the method comprises finding at least one other person with similar tastes and communicating a list of selections played by the other user to a player device other than a general purpose computer.

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The playlist may be updated by communicating an updated list of selections played by the other person to the player device.

According to another aspect, the present invention comprises a method for defining a playlist for a user, wherein the method comprises finding at least one other person with similar tastes by matching a profile of the user to a profile of the other person.

According to another aspect, the present invention comprises a data structure comprising a playlist defined by a method comprising communicating the playlist to a player device that is not a general purpose computer.

According to another aspect, the present invention comprises a data structure comprising a playlist defined by a method comprising defining a user profile and using the user profile to determine selections that may be enjoyed by a user.

According to another aspect, the present invention comprises a computer readable media having stored thereon a data structure comprising a playlist defined by a method comprising communicating the playlist to a player device that is not a general purpose computer.

According to another aspect, the present invention comprises a computer readable media having stored thereon a data structure comprising a playlist defined by a method comprising defining a user profile and using the user profile to determine selections that may be enjoyed by a user.

According to another aspect, the present invention comprises a computer readable media having stored thereon a method for defining a playlist, wherein the method comprises communicating the playlist to a player device that is not a general purpose computer.

According to another aspect, the present invention comprises a computer readable media having stored thereon a method for defining a playlist, wherein the method comprises defining a user profile and using the user profile to determine selections that may be enjoyed by a user.

These, as well as other advantages of the present invention, will be more apparent from the following description and drawings. It is understood that changes in the specific structure shown and described may be made within the scope of the claims, without departing from the spirit of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention and its various embodiments can now be better understood by turning to the following detailed description of the preferred embodiments which are presented as illustrated examples of the invention defined in the claims. It is expressly understood that the invention as defined by the claims may be broader than the illustrated embodiments described below.

FIG. 1 is a block diagram of an exemplary system for sharing playlists according to the present invention, wherein a server provides playlist to a dedicated media player and wherein the playlists have been obtained from client computers or other devices;

FIG. 2 is a block diagram of another exemplary system for sharing playlists according to the present invention, wherein a server provides playlist to a remote control of a dedicated media player and wherein the playlists have been obtained from client computers or other devices;

FIG. 3 is a flowchart showing an exemplary method for obtaining playlists, such as a method that may be practiced when using the systems of FIG. 1 or FIG. 2;

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FIG. 4 is a block diagram of another exemplary system for sharing playlists according to the present invention, wherein a peer provides a playlist to a dedicated media player without the use of a server;

FIG. 5 is a block diagram of another exemplary system for sharing playlists according to the present invention, wherein a peer provides a playlist to a remote control of a dedicated media player without the use of a server; and

FIG. 6 is a flowchart showing another exemplary method for obtaining playlists, such as a method that may be practiced when using the systems of FIG. 4 or FIG. 5.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Many alterations and modifications may be made by those having ordinary skill in the art without departing from the spirit and scope of the invention. Therefore, it must be understood that the illustrated embodiment has been set forth only for the purposes of example and that it should not be taken as limiting the invention as defined by the following claims. For example, notwithstanding the fact that the elements of a claim are set forth below in a certain combination, it must be expressly understood that the invention includes other combinations of fewer, more or different elements, which are disclosed herein even when not initially claimed in such combinations.

The words used in this specification to describe the invention and its various embodiments are to be understood not only in the sense of their commonly defined meanings, but to include by special definition in this specification structure, material or acts beyond the scope of the commonly defined meanings. Thus if an element can be understood in the context of this specification as including more than one meaning, then its use in a claim must be understood as being generic to all possible meanings supported by the specification and by the word itself.

The definitions of the words or elements of the following claims therefore include not only the combination of elements which are literally set forth, but all equivalent structure, material or acts for performing substantially the same function in substantially the same way to obtain substantially the same result. In this sense it is therefore contemplated that an equivalent substitution of two or more elements may be made for any one of the elements in the claims below or that a single element may be substituted for two or more elements in a claim. Although elements may be described above as acting in certain combinations and even initially claimed as such, it is to be expressly understood that one or more elements from a claimed combination can in some cases be excised from the combination and that the claimed combination may be directed to a subcombination or variation of a subcombination.

Insubstantial changes from the claimed subject matter as viewed by a person with ordinary skill in the art, now known or later devised, are expressly contemplated as being equivalently within the scope of the claims. Therefore, obvious substitutions now or later known to one with ordinary skill in the art are defined to be within the scope of the defined elements.

The claims are thus to be understood to include what is specifically illustrated and described above, what is conceptionally equivalent, what can be obviously substituted and also what essentially incorporates the essential idea of the invention.

Thus, the detailed description set forth below in connection with the appended drawings is intended as a description of the

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presently preferred embodiments of the invention and is not intended to represent the only forms in which the present invention may be constructed or utilized. The description sets forth the functions and the sequence of steps for constructing and operating the invention in connection with the illustrated embodiments. It is to be understood, however, that the same or equivalent functions may be accomplished by different embodiments that are also intended to be encompassed within the spirit of the invention.

Although generally discussed herein as being applicable to music and music players, those skilled in the art will appreciate that the system and method for sharing playlists of the present invention is likewise applicable to video and video players, as well as games and game players. Indeed, the system and method for sharing playlists of the present invention may find application in a wide variety of information, data, and software arenas. Thus, discussion herein as being applicable to music and music players is by way of example only, and not by way of limitation.

The present invention is illustrated in FIGS. 1-6, which depict presently preferred embodiments thereof. Referring now to FIG. 1, according to one aspect the present invention comprises a server 11 upon which a plurality of playlists from a plurality of different users is stored.

Each client 13-16 may communicate a playlist to the server via a network, such as the Internet 12. The clients 13-16 may be general purpose computers or may be devices other than general purpose computers. The clients 13-16 may be any combination of general purpose computers and devices other than general purpose computers. Thus, the clients 13-16 may be dedicated media players that are network compatible.

For example, the clients 13-16 may be dedicated music players that are configured according to the present invention so as to communicate with the Internet. In this instance, the clients are not general purpose computers. That is, their primary purpose is that of playing music and not of running a wide variety of different types of applications programs, such as is the case with general purpose computers.

As used herein, the term "dedicated" indicates the primary function of a device and the device typically does not perform any other of the functions that a general purpose computer may perform, such as word processing, general data base management and general Internet browsing. However, it is contemplated the a dedicated device may perform some such functions and still remain a dedicated device in the same sense that some cellular telephones facilitate some degree of general purpose computer functionality, such as limited Internet browsing and email, yet they remain primarily telephones and not general purpose computers.

Thus, examples of dedicated media players include music players such as MP3 players, video players such as set top boxes, video recording devices such as TiVo and game players such as X-Box (a trademark of Microsoft Corporation) and PlayStation (a trademark of Sony Computer Equipment, Inc.).

According to one aspect of the present invention, playlists are communicated via the network to a dedicated media player 17 and the dedicated media player 17 is not a general purpose computer. According to another aspect of the present invention, the media player 17 may be a general purpose computer and playlist are obtained by matching user profiles, as discussed in detail below.

After the playlist has been communicated to the dedicated media player 17, the playlist may be displayed thereon and thus used to choose which selection therefrom is to be played.



Referring now to FIG. 2, rather than communicating a playlist to the dedicated media player 17, the playlist may alternatively be communicated to a remote control 18 for the dedicated media player.

After the playlist has been communicated to the remote control 18, the playlist may be displayed thereon and thus used to choose which selection therefrom is to be played by the dedicated media player 17.

Optionally, playlists that were communicated to the dedicated media player 17 (as shown in FIG. 1) may be further communicated to a remote control therefore. This communication may be from the dedicated media player 17 or from any other source (such as from the server 11 via the Internet 12).

Similarly, playlists that were communicated to the remote control 18 (as shown in FIG. 2) may be further communicated to the dedicated media player 17 associated therewith. This communication may be from the remote control 18 or from any other source (such as from the server 11 via the Internet 12).

Thus, playlists may be stored in, displayed upon, and used to make selections from either the dedicated media player 17, the remote control 18, or both.

Of course, in some instances the dedicated media player 17 will not have a remote control. For example, portable media players, such as MP3 players, will not typically have a remote control. In such instances, the playlist is generally communicated only to the dedicated media player 17 itself. In any instance, other devices, including both dedicated devices and general purpose computers, may receive additional copies of the playlists.

Referring now to FIG. 3, a user preferably fills out a questionnaire so as to define a user profile as shown in block 31. The user profile contains information that will facilitate matching of the user to another user having similar tastes and interests, as discussed above.

The user's profile is communicated to a server (such as server 11 of FIGS. 1 and 2), as shown in block 32. At the server, the user's profile is compared to the profiles of other users as shown in block 33. An attempt is made to match the user's profile to the profile of one or more other users, so as to identify other users having similar tastes and interests.

The playlists of one or more other users, whose profiles best match the user's profile, are communicated to the user's device as shown in block 34. Any desired method or algorithm for such matching may be used. For example, each time the responses to two questionnaires match, a number could be added to a score for that particular matching process. The matching processes that result in the highest scores could be considered close enough matches to cause a playlist to be sent. Alternatively, any matching process that result in a score that exceeds a predetermined threshold value may be considered a match.

Optionally, the responses could be weighted such that some responses contribute more to the matching score than other responses. For example, it may be desirable to have matches for selections, artists, or style count more than matches for location or time.

The user's device may be, for example, the dedicated media player 17 of FIGS. 1 and 2 or may alternatively be the remote control 18 for FIG. 2. The playlist may be communicated to both the dedicated media player 17 and the remote control 18, as discussed above.

Both FIGS. 1 and 2 show an exemplary use of the present invention in a client/server network. However, the present invention may also be used in a peer-to-peer network, as discussed below.

Referring now to FIG. 4, a plurality of clients 43-46 communicates via a network, such as the Internet 42, with a dedicated media player 47. As before, the clients 43-46 may be either general purpose computers or devices other than general purpose computers.

Since there is no server in this instance, the dedicated player 47 must communicate with the clients 43-46 on a peer-to-peer basis. For example, the user's profile may be communicated to each of the clients 43-46 and when a match is found, the playlist of the client is communicated back to the user's dedicated media player 47, as shown in FIG. 4.

Alternatively, the dedicated media player 47 may poll each of a plurality of different clients to request their user profiles. The dedicated media player 47 may perform a comparison of the user profiles. Then, the playlists associated with the best matches of the user's profile to the profile of the clients 43-46 are requested and communicated to the dedicated media player.

Referring now to FIG. 5, rather than communicating a playlist to the dedicated media player 47, the playlist may alternatively be communicated to a remote control 48 for the dedicated media player. Thus, the clients 43-46 may communicate their user profiles to the remote control 48, where the comparison is performed and where playlists may be stored and used. As before, playlists may subsequently be forwarded to another device, such as the dedicated media player 47.

After the playlist has been communicated to the remote control 48, the playlist may be displayed thereon and thus used to choose which selection therefrom is to be played.

As before, playlists that were communicated to the dedicated media player 47 (as shown in FIG. 4) may optionally be further communicated to a remote control therefore. This communication may be from the dedicated media player 47 or from any other source (such as from one of the clients 43-46 via the Internet 42).

Similarly, playlists that were communicated to the remote control 48 (as shown in FIG. 5) may be further communicated to the dedicated media player 47 associated therewith. This communication may be from the remote control 48 or from any other source (such as from one of the clients 43-46 via the Internet 12).

Referring now to FIG. 6, one example of how a user's profile may be used to obtain playlists is shown. In a peer-to-peer network, such as those shown in FIGS. 4 and 5, a user again fills out a questionnaire as shown in block 61. However, this time the questionnaire is communicated to a peer as shown in block 62. The user's profile is compared to other profiles stored in the peer, as shown in block 63.

The process is continued until at least one match is found, as shown in block 65. The process may be continued until any desired number of matches are found or until it is determined that further searching is not likely to result in matches.

When it is desirable to continue the searching process, another peer is identified as shown in block 66 and the user's profile is compared to the other profiles as shown in block 63.

Thus, one or more playlists, corresponding to those profiles that best match the user's profile, are communicated to the user's device as shown in block 67.

The present invention provides the ability for non-computer devices to display and play playlists from a central computer running on the Internet. These playlists can be created on one device and shared or sent to another device immediately for playing.

People in the community can be found by comparing listening habits of the community. Once people are found in the

community to have similar tastes, playlist can then be shared between the users and then played on their own personal playing devices in real time.

Thus, the present invention provides a system and method for sharing playlists, wherein the playlists are communicated to, stored in, and displayed upon player devices other than general purpose computers. The present invention also provides a method for identifying playlists that are likely to contain selections that will be enjoyed by a user.

It is understood that the exemplary system and method for sharing playlists described herein and shown in the drawings represents only presently preferred embodiments of the invention. Indeed, various modifications and additions may be made to such embodiments. Thus, various modifications and additions may be obvious to those skilled in the art and may be implemented to adapt the present invention for use in a variety of different applications.

What is claimed is:

- 1. A method comprising:
  - receiving, at a wireless handheld remote control, a playlist from a remote source; and
  - presenting, at the wireless handheld remote control, the playlist to a first user associated with the wireless handheld remote control such that the first user is enabled to select at least one item from the playlist for playback by a media player device which is associated with and separate from the wireless handheld remote control.
- 2. The method of claim 1 wherein the playlist is further communicated from the remote source to the media player device.
- 3. The method of claim 1 further comprising communicating the playlist from the wireless handheld remote control to the media player device.
- 4. The method of claim 1 wherein the remote source stores a plurality of playlists including the playlist and the plurality of playlists is associated with a plurality of users, the method further comprising:
  - comparing each of a plurality of user profiles of the plurality of users with a target user profile of the first user associated with the wireless handheld remote control to select a matching user profile from the plurality of user profiles; and
  - effecting selection of a playlist of a matching user associated with the matching user profile from the plurality of user profiles as the playlist to be communicated to the wireless handheld remote control.
- 5. The method of claim 4 wherein the matching user profile is one of the plurality of user profiles most similar to the target user profile.
- 6. The method of claim 1 wherein the remote source is a central server.

7. The method of claim 1 wherein the remote source is a peer-to-peer network formed by a plurality of user devices, and receiving the playlist comprises receiving the playlist from one of the plurality of user devices.

8. The method of claim 7 wherein each of the plurality of user devices forming the peer-to-peer network is a user device selected from a group consisting of: the media player device and the wireless handheld remote control.

9. The method of claim 1 wherein the remote source is the media player device.

10. A wireless handheld remote control comprising:

- a communication interface communicatively coupling the wireless handheld remote control to a remote source via a network; and
- a control system associated with the communication interface and adapted to:
  - receive a playlist from the remote source; and
  - present the playlist to a first user associated with the wireless handheld remote control such that the first user is enabled to select at least one item from the playlist for playback by a media player device which is associated with and separate from the wireless handheld remote control.

11. A method comprising:

- receiving, at a media player device, a playlist from a remote source; and
- communicating the playlist from the media player device to a wireless handheld remote control associated with and separate from the media player device, wherein, at the wireless handheld remote control, the playlist is presented to a first user associated with the wireless handheld remote control and used by the first user to select at least one item from the playlist for playback by the media player device.

12. A media player device comprising:

- a communication interface communicatively coupling the media player device to a remote source via a network; and
- a control system associated with the communication interface and adapted to:
  - receive a playlist from the remote source; and
  - communicate the playlist from the media player device to a wireless handheld remote control which is associated with and separate from the media player device, wherein, at the wireless handheld remote control, the playlist is presented to a first user associated with the wireless handheld remote control and used by the first user to select at least one item from the playlist for playback by the media player device.

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User Name: J0SB93S

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**Document(1)**

1. Becham v. Synthes USA, 482 Fed. Appx. 387

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-None-

choice-of-law provision when the application of foreign law would violate Georgia's public policy.

Labor & Employment Law > ... > Employment Contracts > Conditions & Terms > General Overview

Labor & Employment Law > ... > Conditions & Terms > Trade Secrets & Unfair Competition > General Overview

**HN4** Before November 2010, Georgia's public policy on restrictive covenants was clear. Georgia's courts refused to enforce a choice-of-law clause when it would validate a restrictive covenant that was invalid under Georgia law.

Labor & Employment Law > Wrongful Termination > Public Policy

**HN5** In Georgia, constitutions and statutes are declarations of public policy and are the sources that are first to be considered and that often may be conclusive in determining that public policy.

Labor & Employment Law > ... > Employment Contracts > Conditions & Terms > General Overview

Labor & Employment Law > Wrongful Termination > Public Policy

**HN6** See O.C.G.A. § 13-8-53(d) (repealed and reenacted 2011).

Governments > Legislation > General Overview

**HN7** In Georgia, a statute's constitutionality is tested at the time it was passed.

Governments > Legislation > General Overview

**HN8** In Georgia, the only way to revive an unconstitutional statute is to reenact that statute.

Labor & Employment Law > ... > Employment Contracts > Conditions & Terms > General Overview

**HN9** The reasonableness of a restrictive covenant is generally a question of law for the court.

**Counsel:** For WILLIAM J. BECHAM, JR., CROSSLINK ORTHOPAEDICS, LLC, Plaintiffs - Appellees: Robert Jason D'Cruz, Brian Harris, Morris Manning & Martin, LLP, ATLANTA, GA, Jeffrey B. Hanson, Julia H. Magda, Sell & Melton, LLP, MACON, GA.

For SYNTHES USA, SYNTHES SPINE COMPANY LP, NORIAN CORPORATION, SYNTHES MAXILLOFACIAL INC., SYNTHES SPINE INC., SYNTHES NORTH AMERICA INC., SYNTHES USA, LLC, SYNTHES USA PRODUCTS, LLC, SYNTHES USA SALES, LLC, Defendants - Appellants: Anthony B. Haller, William R. Cruse, Larry Roger Wood, Jr., Blank Rome, LLP, PHILADELPHIA, PA; Matthew T. Gomes, Michelle Wilkins Johnson, Nelson Mullins Riley & Scarborough, LLP, ATLANTA, GA.

**Judges:** Before CARNES, WILSON, and COX, Circuit Judges.

## Opinion

[\*388] PER CURIAM:

The Defendants (collectively "Synthes") appeal the district court's grant of summary judgment to Plaintiff William J. Becham, Jr. The court concluded that each of the restrictive covenants in Becham's employment contract was unenforceable under Georgia law. We reach the same conclusion albeit for different reasons. Thus, we affirm.

### I. FACTS

#### A. Georgia's Law on Restrictive [\*2] Covenants

Georgia's law on restrictive covenants is central to the issues raised by Synthes. We discuss this law first.

Before 2011, Georgia law disfavored restrictive covenants. See Convergys Corp. v. Keener, 276 Ga. 808, 582 S.E.2d 84, 85-86 (Ga. 2003). Georgia's constitution also forbade the state's legislature, the General Assembly, from authorizing restrictive covenants. See Jackson & Coker, Inc. v. Hart, 261 Ga. 371, 405 S.E.2d 253, 254 (Ga. 1991).

But, the law can change. In 2009, the General Assembly approved HR 178, which placed a constitutional amendment on the November 2010 ballot. This amendment granted the General Assembly the power "to authorize and provide by general law for judicial enforcement of contracts or agreements restricting or regulating [certain] competitive activities . . ." H.R. Res. 178, 150th Gen. Assemb., Reg. Sess. (Ga. 2009). Perhaps due to oversight, the General Assembly omitted an effective date for this amendment.

Anticipating that Georgia's citizens would approve the constitutional amendment, the General Assembly enacted HB 173. See 2009-1 Ga. Code Ann. Adv. Legis. Serv. 145 (LexisNexis). This act purported to authorize previously unlawful restrictive covenants. For example, [\*3] HB 173 permitted courts to reform overly broad restrictive covenants so that they could be enforced. See Ga. Code Ann. § 13-8-54(b) (repealed 2011). HB 173 also deemed the duration of certain covenants to be presumptively [\*389] reasonable. See Ga. Code Ann. § 13-8-56 (repealed 2011).

Because the General Assembly did not yet have the power to enact HB 173, it made the act's effective date contingent upon ratification of the constitutional amendment. Specifically, HB 173 said it would become

and his manager emailed Becham the terms of his separation. Relevant here, Synthes promised to compensate Becham until the end of the [\*\*7] year and to pay him \$20,521.28 in commissions on January 15, 2011. In exchange, Synthes asked Becham to honor the Restrictive Covenants. Becham emailed his acceptance of Synthes's terms on December 1, 2010.

But, Synthes did not pay Becham his commissions on January 15. Instead, the parties continued in negotiations, and Becham, allegedly, made a new promise to honor the Restrictive Covenants in January 2011. Synthes eventually paid Becham the \$20,521.28 in commissions on January 31.

Less than a month later, Becham filed this suit. He sought a declaration that the Restrictive Covenants are unenforceable. The next week, Becham started work for Synthes's competitor CrossLink Orthopaedics, LLC. Becham then moved for summary judgment on his claims. In September 2011, the district court decided that Georgia's law governs the Restrictive Covenants, and that these covenants are unenforceable. It granted summary judgment to Becham. Following final judgment, Synthes appeals.

## II. DISCUSSION

**HN1** "We review a grant of summary judgment *de novo*, applying the same legal standards that bind the district court." Midrash Sephardi, Inc. v. Town of Surfside, 366 F.3d 1214, 1222-23 (11th Cir. 2004) (citation omitted).

[\*\*8] **HN2** "[A] federal court sitting in diversity will apply the choice of law rules for the state in which it sits." Manuel v. Convergys Corp., 430 F.3d 1132, 1139 (11th Cir. 2005) (citing Klaxon Co. v. Stentor Elec. Mfg. Co., 313 U.S. 487, 496, 61 S. Ct. 1020, 1021, 85 L. Ed. 1477 (1941)).

In this case, the district court was bound to apply Georgia's choice-of-law rules. We can affirm on any basis supported by the record. United States v. \$121,100.00 in U.S. Currency, 999 F.2d 1503, 1507 (11th Cir. 1993) (citation omitted).

Synthes first contends that the district court applied the wrong law. The district court applied Georgia law.

Becham's employment contract chooses Pennsylvania law. **HN3** A choice-of-law clause is generally [\*\*391] enforceable in Georgia. See Carr v. Kupfer, 250 Ga. 106, 296 S.E.2d 560, 562 (Ga. 1982). But, a Georgia court will not enforce a choice-of-law provision when the application of foreign law would violate Georgia's public policy. See Nasco, Inc. v. Gimbert, 239 Ga. 675, 238 S.E.2d 368, 369 (Ga. 1977)

**HN4** Before November 2010, Georgia's public policy on restrictive covenants was clear. Georgia's courts refused to enforce a choice-of-law clause when it would validate a restrictive covenant that was invalid under Georgia law.

[\*\*9] See, e.g., Convergys Corp., 582 S.E.2d at 85-86. Synthes contends that Georgia's public policy shifted in November 2010 to support the broad enforcement of restrictive covenants. It argues that the district court erred by not considering Georgia's new public policy.

In November 2010, Georgia did two things that could have changed its public policy on restrictive covenants. First, Georgia's citizens ratified a constitutional amendment granting the General Assembly the power to enact legislation concerning restrictive covenants. Second, HB 173, which purported to authorize the enforcement of previously unenforceable restrictive covenants, went into effect. We conclude neither of these events altered Georgia's public policy on restrictive covenants.<sup>2</sup>

First, the November 2010 constitutional amendment did not change Georgia's public policy on restrictive covenants. The text of that amendment says nothing about Georgia's public policy. Rather the amendment addresses the power of Georgia's General Assembly to legislate. It grants the General Assembly the power "to authorize and provide by general law for judicial enforcement of contracts or agreements restricting or regulating [certain] competitive activities . . ." H.R. Res. 178, 150th Gen. Assemb., Reg. Sess. (Ga. 2009). Because the amendment addressed only the power of the General Assembly, it did not affect Georgia's public policy on restrictive covenants. See Foster v. Brown, 199 Ga. 444, 34 S.E.2d 530, 534-35 (Ga. 1945). [\*\*11] Until the General Assembly acted, Georgia's public policy remained unchanged. See *id.*

Of course, the General Assembly did act to change Georgia's public policy. It anticipated that Georgia's

<sup>2</sup> Synthes urges us to look to the "prevailing social and moral attitudes" of Georgia's citizens to find the state's public policy on restrictive covenants. See Goodwin v. George Fischer Foundry Sys., Inc., 769 F.2d 708, 713 (11th Cir. 1985). We cannot do that. **HN5** In Georgia, "[c]onstitutions and statutes are declarations of public policy . . . [and are] the sources that are first to be considered and that often may be conclusive" in determining [\*\*10] that public policy. See Strickland v. Gulf Life Ins. Co., 240 Ga. 723, 242 S.E.2d 148, 151 (Ga. 1978) (emphasis added) (quotation omitted). Regarding the enforcement of restrictive covenants, Georgia's General Assembly has clearly said that **HN6** "[a]ny restrictive covenant not in compliance with [Georgia law] is unlawful and is void and unenforceable." Ga. Code Ann. § 13-8-53(d) (repealed and reenacted 2011). Under Strickland, this statutory directive is a conclusive statement of Georgia's public policy.

App. 422, 346 S.E.2d 875, 877 (Ga. Ct. App. 1986); see Orkin Exterminating v. Pelfrey, 237 Ga. 284, 227 S.E.2d 251, 252 (Ga. 1976) (“[T]he provisions of an employment contract which allow the employer to assign the employee to any territory it desires with the restrictive covenants following the employee is too indefinite to be enforced.”).

[\*\*16] Becham’s noncompete covenant covers “the territory or territories that [he was] . . . responsible for during the last year of [his] employment with Synthes.” (Dkt. 1-1 at 3.) Becham could not know, until his termination, where he was prohibited from working. Therefore, the covenant is too indefinite to be enforced. See Jarrett, 346 S.E.2d at 877; Durham v. Stand-By Labor of Georgia, Inc., 230 Ga. 558, 198 S.E.2d 145, 149 (Ga. 1973). Because the noncompete covenant fails, the nonsolicitation-of-customers covenant also fails. See Ward v. Process Control Corp., 247 Ga. 583, 277 S.E.2d 671, 673 (Ga. 1981) (citation omitted).

Similarly, the nonsolicitation-of-employees covenant fails because it lacks any territorial limitation. This covenant forbids Becham from soliciting any Synthes employee

anywhere in the world. Thus, it is unreasonable and unenforceable. See MacGinnitie v. Hobbs Group, LLC, 420 F.3d 1234, 1242 (11th Cir. 2005) (citing Hulcher Servs., Inc. v. R.J. Corman R.R. Co., L.L.C., 247 Ga. App. 486, 543 S.E.2d 461, 467 (Ga. Ct. App. 2000)).

Finally, the nondisclosure covenant fails because it did not contain a time limitation. See Howard Schultz & Assoc. v. Broniec, 239 Ga. 181, 236 S.E.2d 265, 270 (Ga. 1977) (citation omitted); U3S Corp. of Am. v. Parker, 202 Ga. App. 374, 414 S.E.2d 513, 517 (Ga. Ct. App. 1991).

Therefore, [\*\*17] the district court did not err when it concluded the Restrictive Covenants are void and unenforceable under “old” Georgia law.

### III. CONCLUSION

Because Synthes has not shown reversible error, we affirm the judgment of the district court.

AFFIRMED.

# **EXHIBIT 7**



US 20020087996A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2002/0087996 A1**

**Bi et al.**

(43) **Pub. Date:**

**Jul. 4, 2002**

(54) **INTERACTIVE REMOTE CONTROL OF AUDIO OR VIDEO PLAYBACK AND SELECTIONS**

**Related U.S. Application Data**

(63) Non-provisional of provisional application No. 60/246,923, filed on Nov. 10, 2000.

(76) **Inventors:** Depeng Bi, Algonquin, IL (US); Stephen Christopher Gladwin, Chicago, IL (US); Troy Steven Denkinger, Chicago, IL (US); Jeffrey Jonathan Spurgat, Madison, WI (US); Hoyet Harrison Andrews III, San Antonio, TX (US)

**Publication Classification**

(51) **Int. Cl.<sup>7</sup>** ..... H04N 7/173  
(52) **U.S. Cl.** ..... 725/89; 725/109; 725/123; 725/134

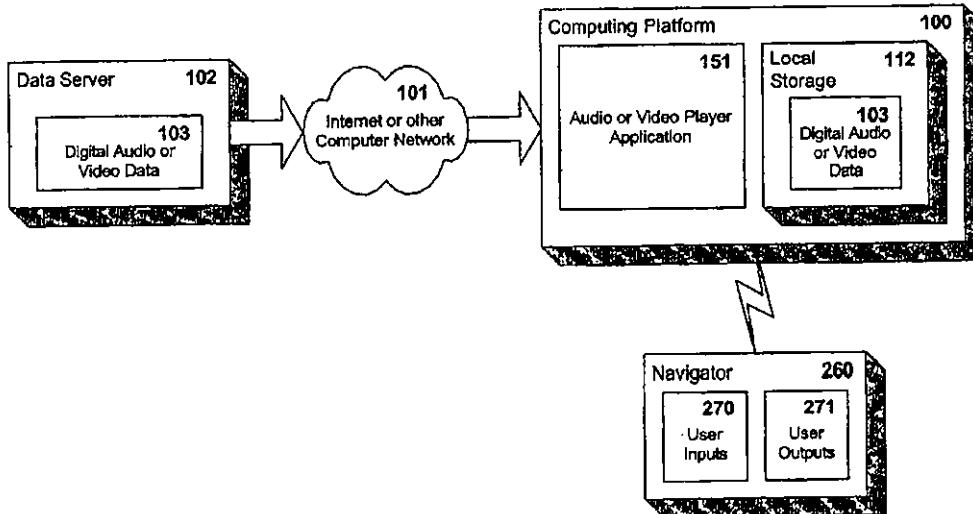
**Correspondence Address:**  
**KATTEN MUCHIN ZAVIS**  
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**Suite 1600**  
**525 West Monroe Street**  
**Chicago, IL 60661-3693 (US)**

**ABSTRACT**

A system for an interactive remote control wired or wireless, of an audio or video playback application running on a personal computer or other computing platform. This interactive control includes playback of current audio or video content or selection of new audio or video content or lists of content for playback. The wireless interactive remote control device, or navigator, may contain an audio or video browser for simplifying interactive control by integrating control of a variety of content, for example, music, video, and Internet radio, independent of whether this content exists locally on the computing platform or is accessed over the Internet or some other computer network.

(21) **Appl. No.:** 09/994,011

(22) **Filed:** Nov. 6, 2001



**EXHIBIT**  
Bove 5-29-14  
7



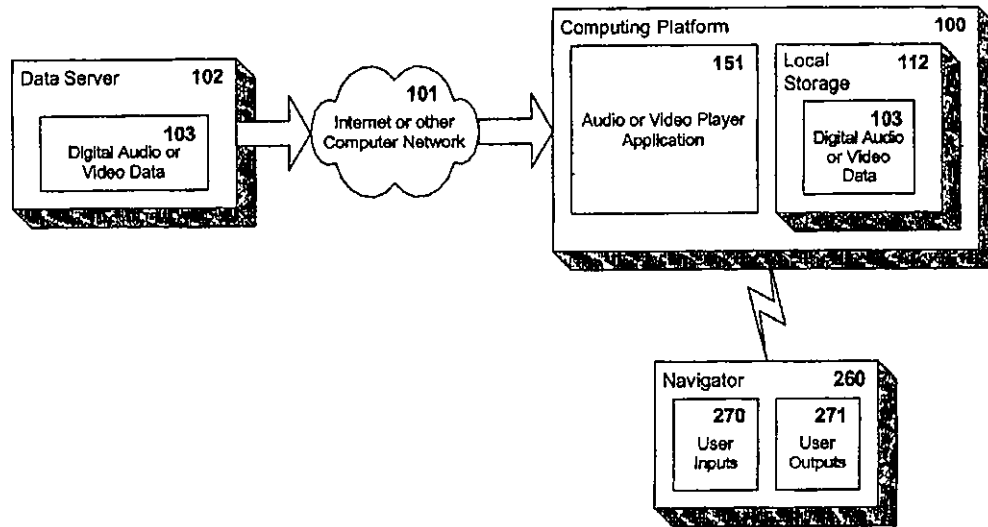


Figure 1

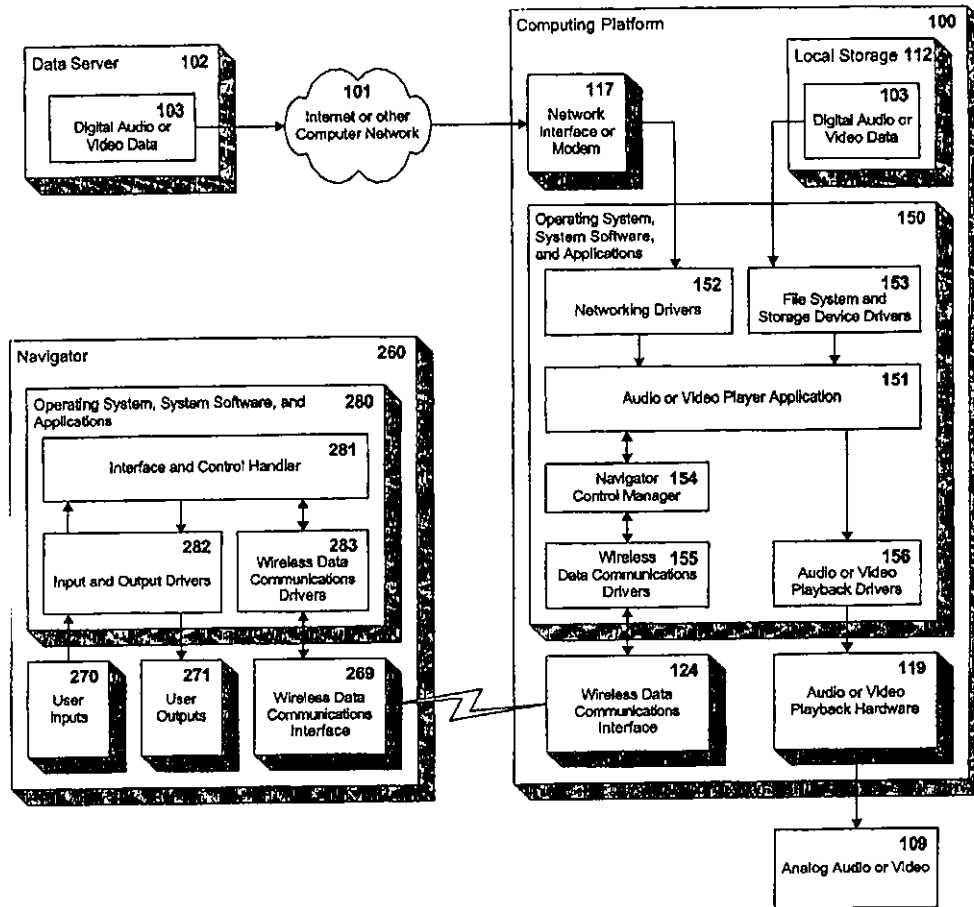


Figure 2

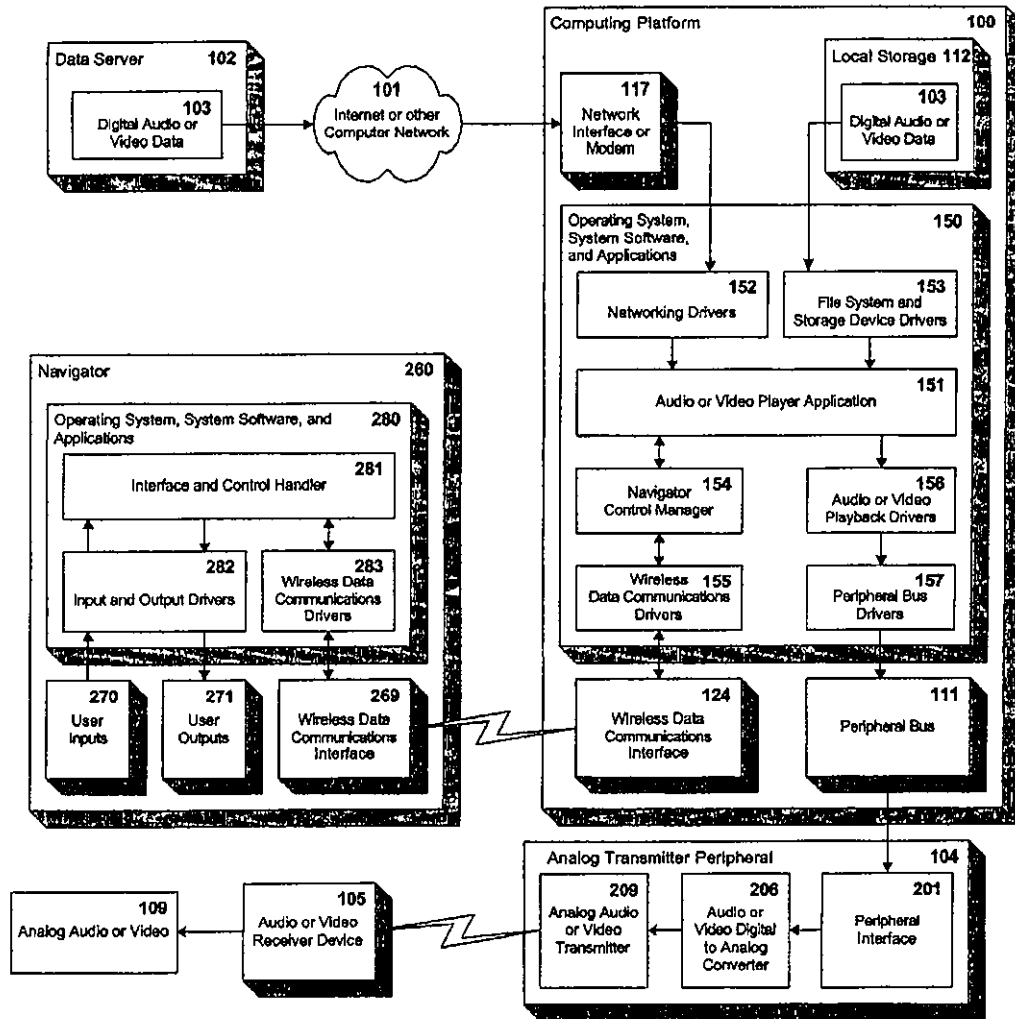


Figure 3

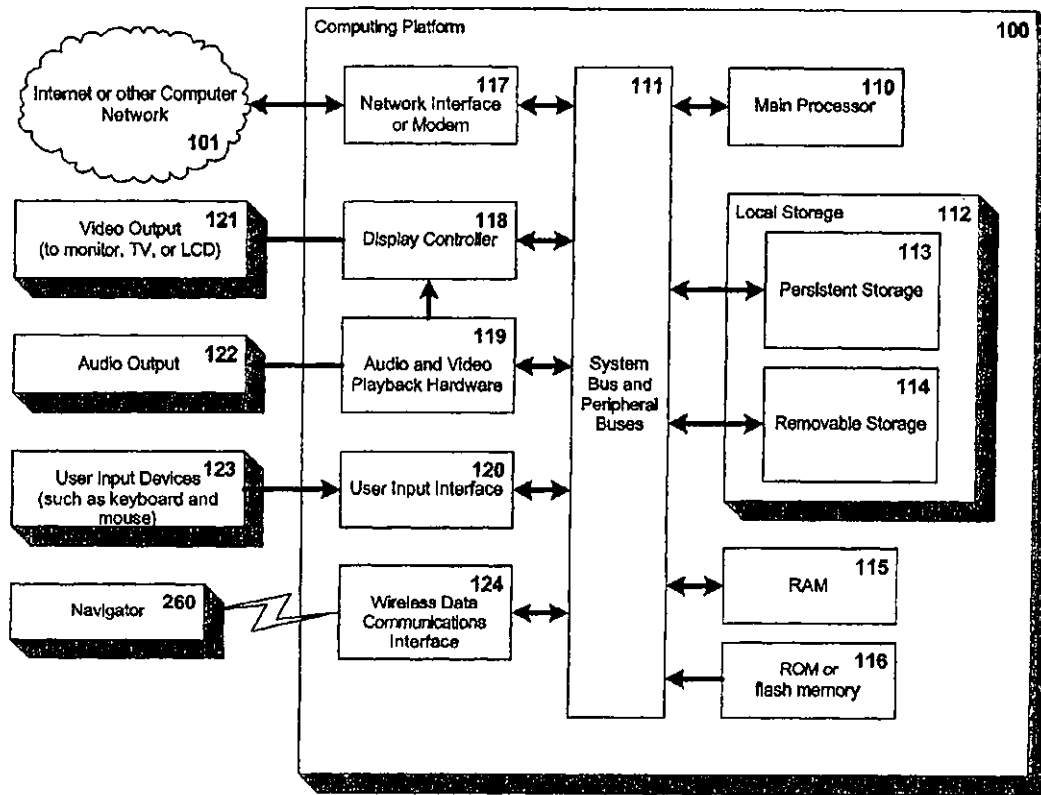
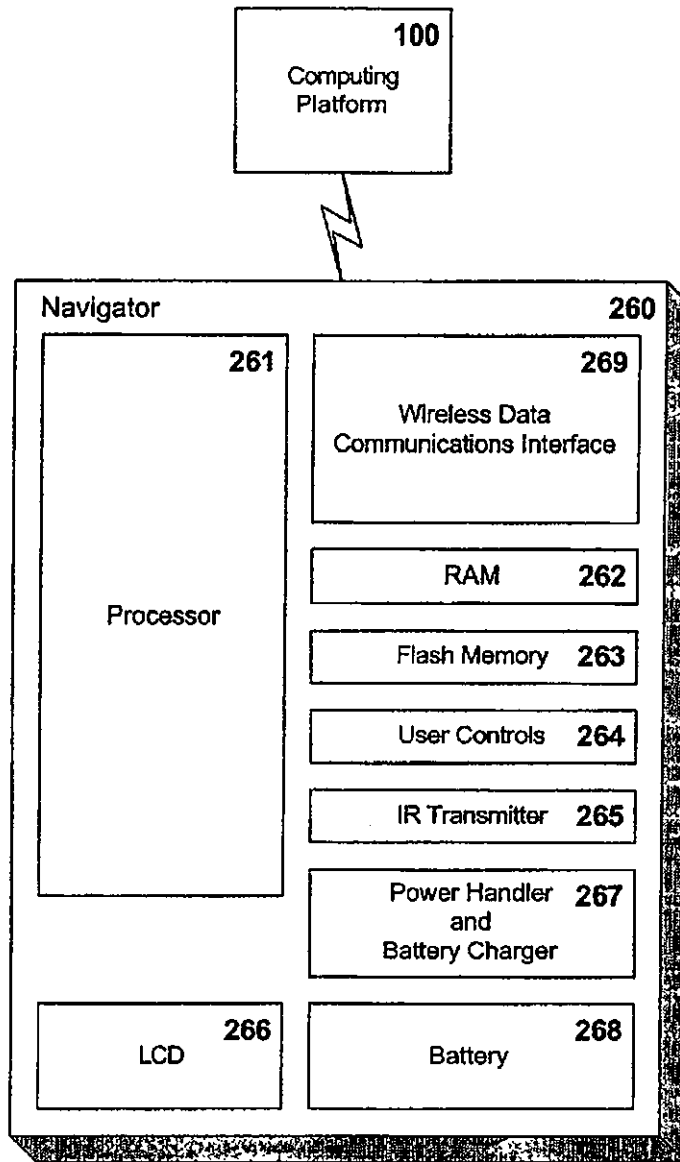


Figure 4



**Figure 5**

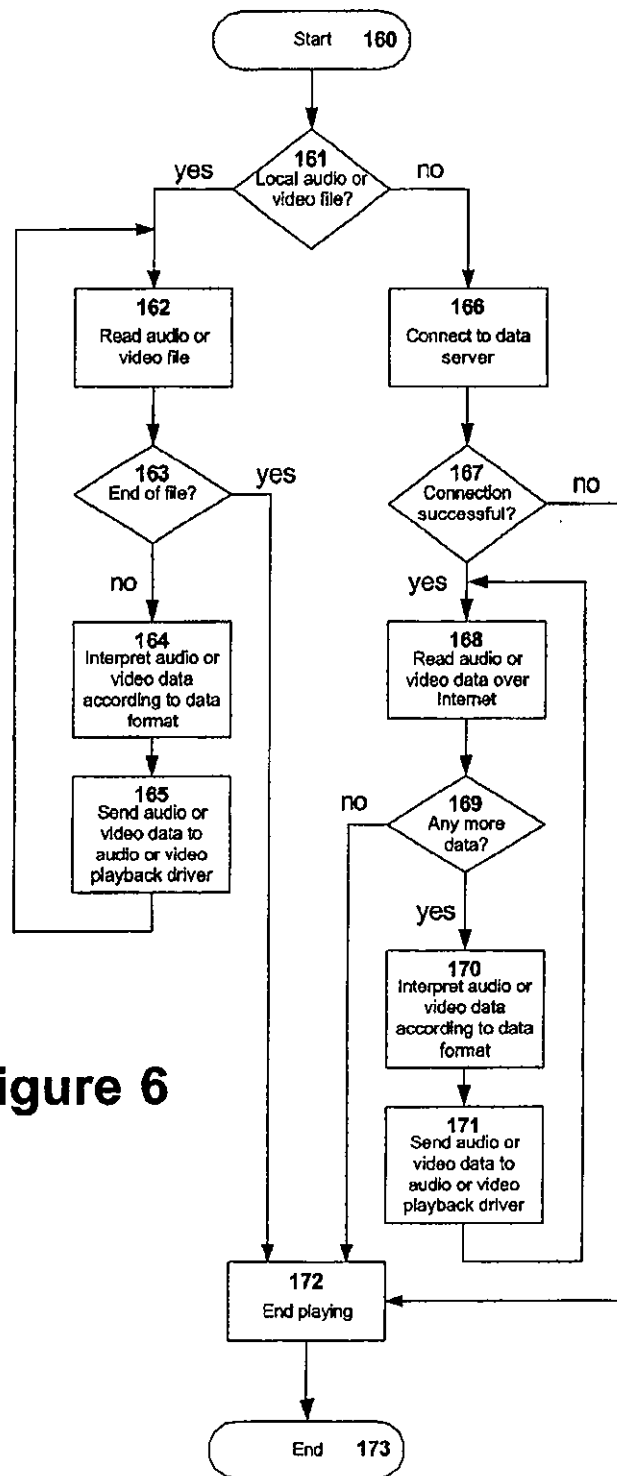


Figure 6

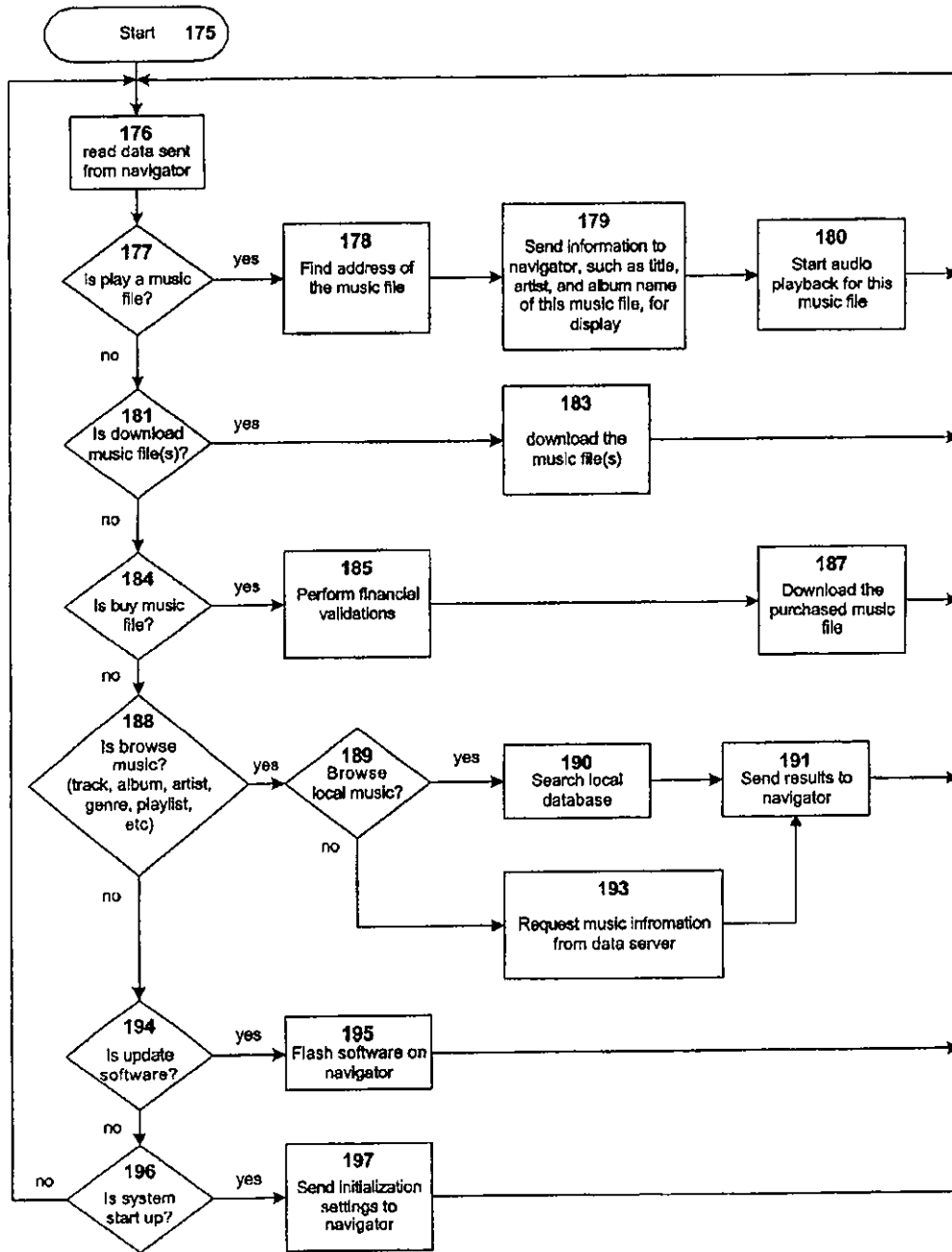
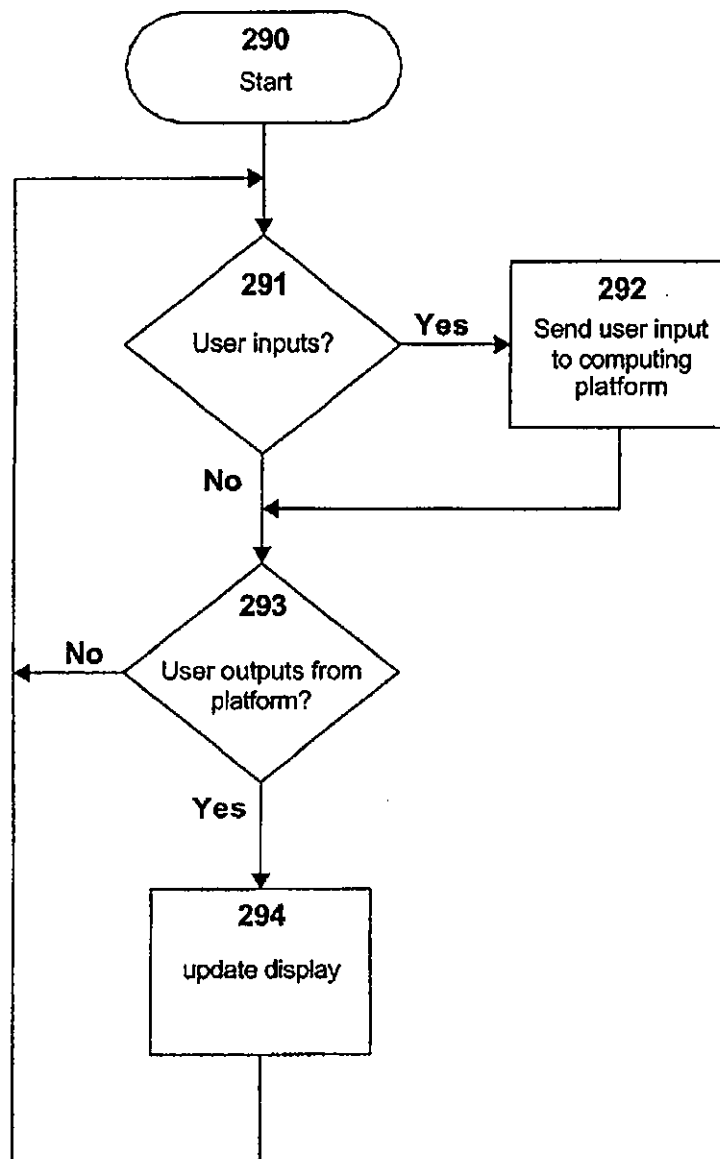


Figure 7



**Figure 8**



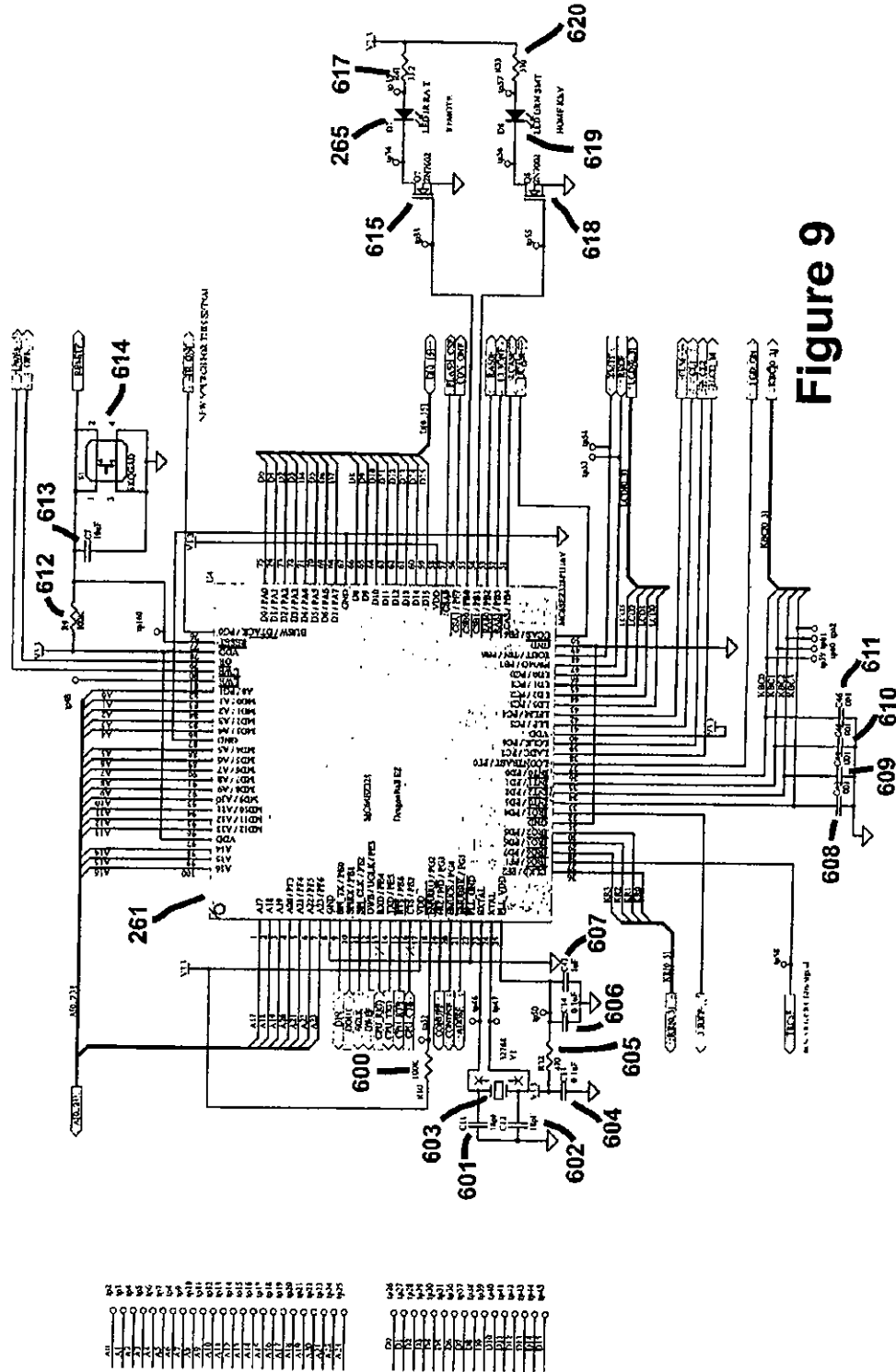


Figure 9

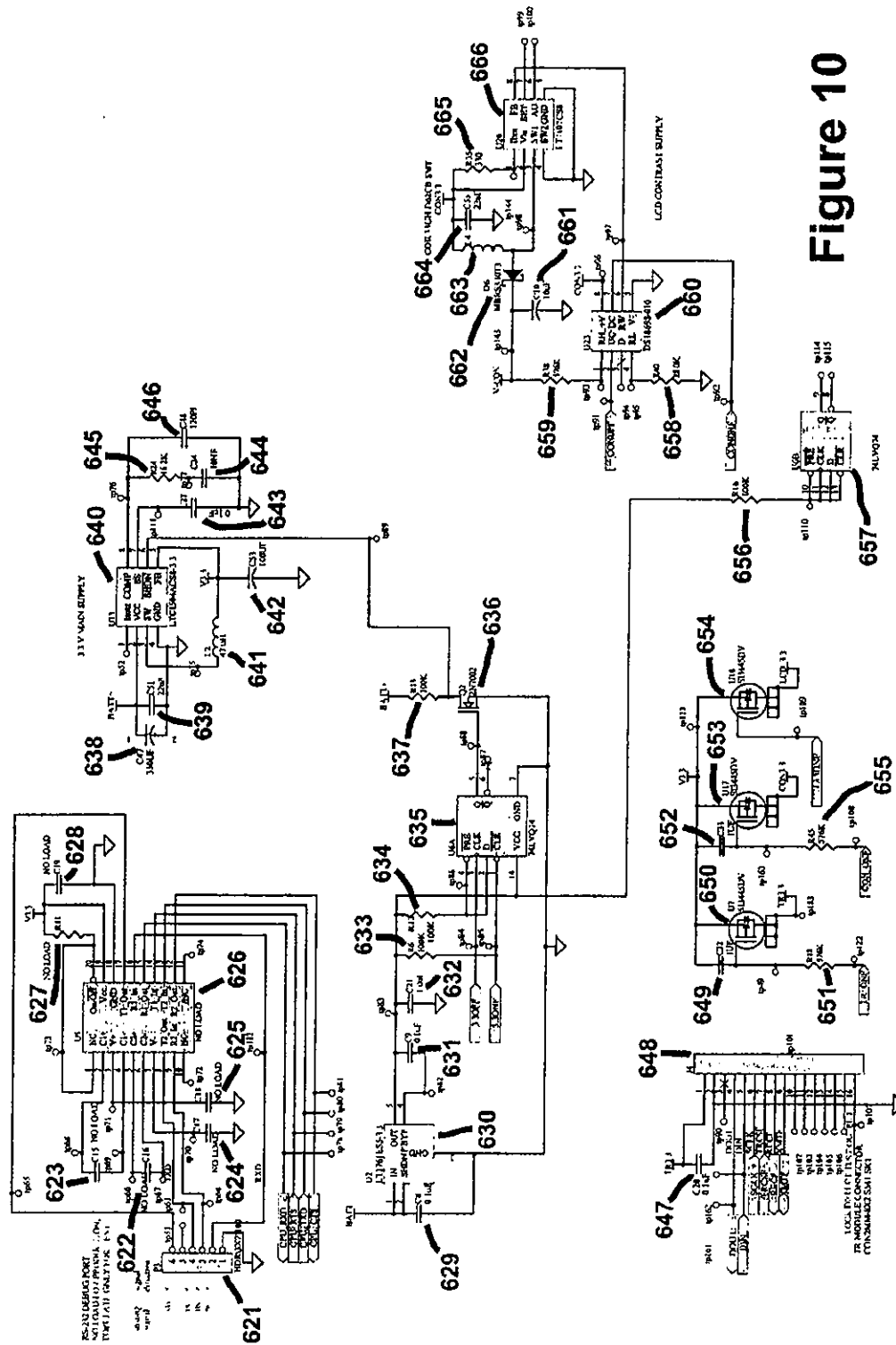


Figure 10

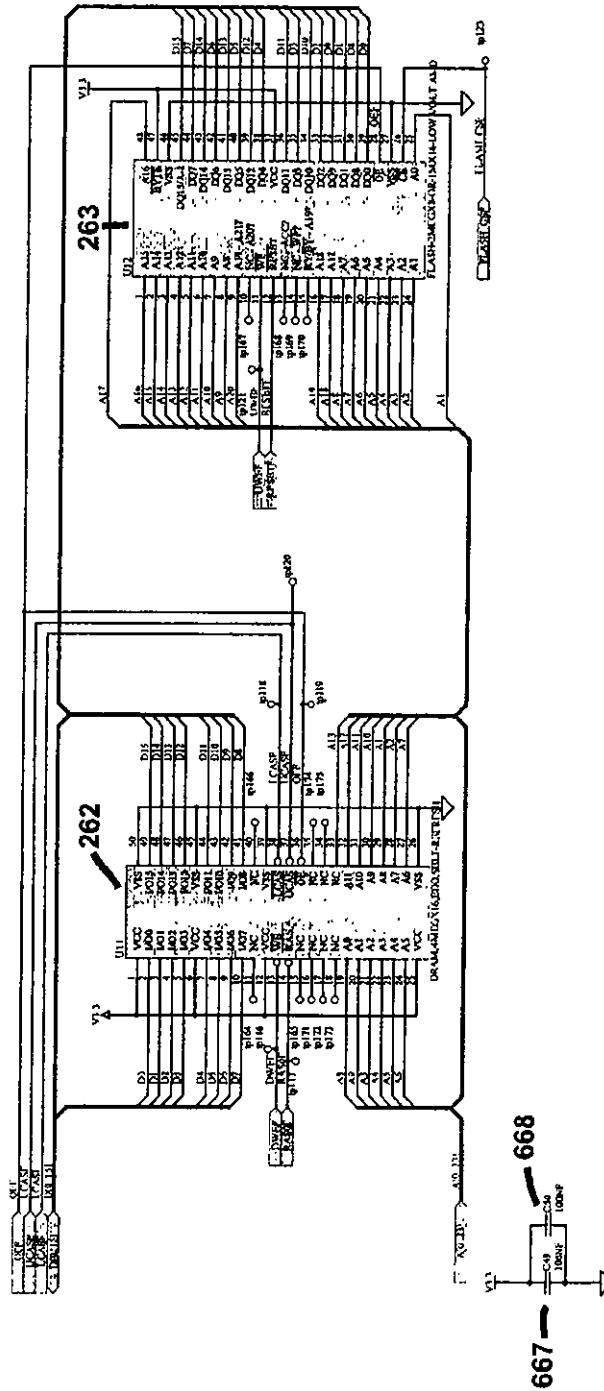


Figure 11

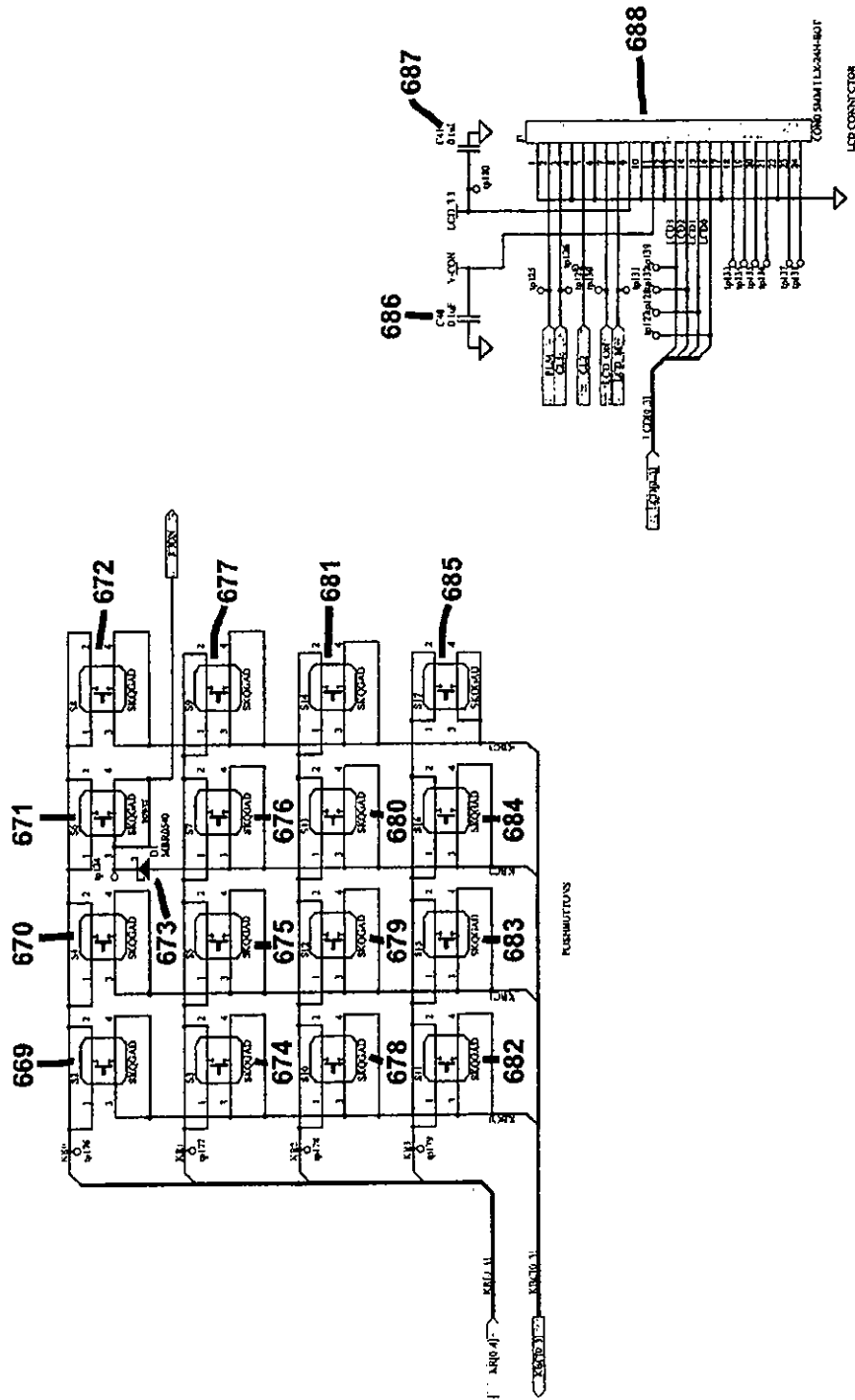


Figure 12

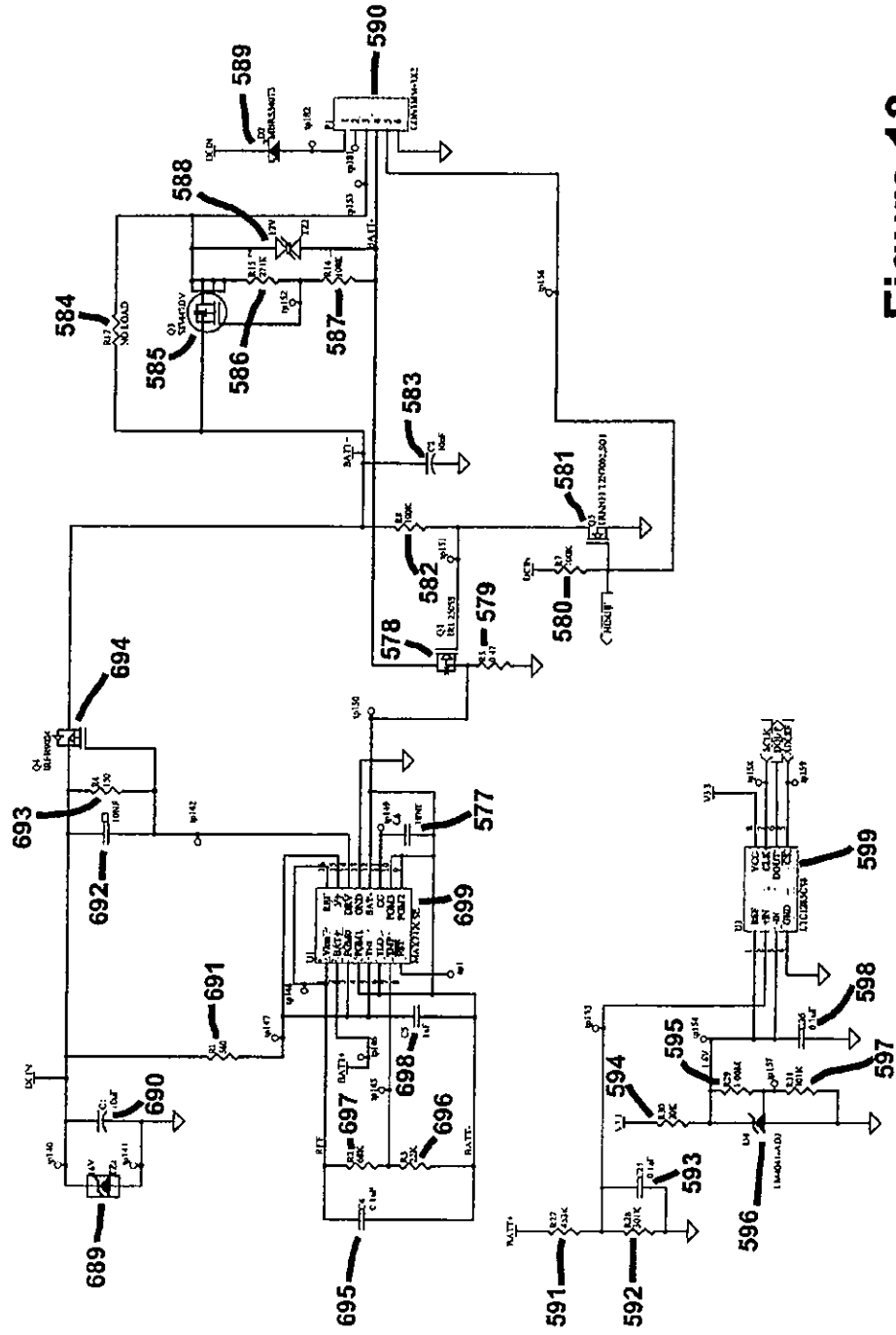


Figure 13

## INTERACTIVE REMOTE CONTROL OF AUDIO OR VIDEO PLAYBACK AND SELECTIONS

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority of U.S. patent application Ser. No. 60/246,923 filed on Nov. 10, 2000. This application is related to co-pending commonly-owned patent applications: Ser. No. 09/649,981, filed on Aug. 29, 2001 and Ser. No. 09/709,772, filed on Nov. 8, 2000, both entitled: "Structure and Method for Selecting, Controlling and Sending Internet-Based or Local Digital Audio to an AM/FM Radio or Analog Amplifier"; "Digital Content Distribution and Subscription File Subscription System," filed on even date; and "Content Protection Through Audio and Video Decrypting and Decoding Device," Ser. No. 09/883,173, filed on Apr. 11, 2001, all hereby incorporated by reference.

### BACKGROUND OF THE INVENTION

#### [0002] 1. Field of the Invention

[0003] The present invention relates to interactive control of audio or video playback and selection of digital content running on a personal computer or other computing platform.

#### [0004] 2. Description of the Prior Art

[0005] There is an ever-increasing amount of digital content available, for example, digital audio files, for example, in MP3 format, like those found at www.mp3.com or as streaming digital audio, such as using the streaming digital audio techniques described in U.S. Pat. No. 5,579,430. These new types of audio content can be played on a personal computer with a sound card, but cannot be played on a radio or stereo that is designed to receive and amplify analog audio signals.

[0006] Several techniques are known for converting a digital audio source to an analog signal for use by an analog radio or amplifier. However, such techniques are known to interfere with the operation of a host PC and thus require use of the PC to select and control the audio, for example, on an analog radio. Thus, there is a need to provide a system which enables digital content, such as Internet-based or digital audio to be played, for example, on an analog radio without tying up a personal computer.

### SUMMARY OF THE INVENTION

[0007] Briefly, the present invention and method involves interactive remote control, either wired or wireless, of an audio or video playback application running on a personal computer or other computing platform. The interactive remote control provides various functions, such as playback of current digital audio or video content; selection of new audio or video content; and providing lists of content for playback. The wireless interactive control device may contain an audio or video browser for simplifying interactive control, by integrating control of a variety content, such as music, video, and Internet radio, independent of whether this content exists locally on the computing platform or is accessed over the Internet or some other computer network. An important aspect of this invention is that the digital

content can be controlled from a location away from the computing platform running the digital content playback application.

### DESCRIPTION OF THE DRAWINGS

[0008] These and other advantages of the present invention will be readily apparent from the following description and attached drawing where:

[0009] FIG. 1 is a block diagram that provides an overview of a system for interactive remote control of audio or video playback and selection in accordance with the present invention.

[0010] FIG. 2 is a block diagram of the system architecture for interactive remote control of audio or video playback and selection using local playback of audio or video in accordance with the present invention.

[0011] FIG. 3 is a block diagram of the system architecture for interactive remote control of audio or video playback and selection using transmitted playback of audio or video in accordance with the present invention.

[0012] FIG. 4 is a block diagram of a computing platform in accordance with the present invention.

[0013] FIG. 5 is a block diagram of the architecture of a remote control device or navigator in accordance with the present invention.

[0014] FIG. 6 is a software flow diagram for audio or video playback on the computing platform as part of a system for interactive remote control of audio or video playback and selection in accordance with the present invention.

[0015] FIG. 7 is a software flow diagram for navigator control management on the computing platform as part of a system for interactive remote control of audio or video playback and selection in accordance with the present invention.

[0016] FIG. 8 is a software flow diagram for interface and control handling on the navigator as part of a system for interactive remote control of audio or video playback and selection in accordance with the present invention.

[0017] FIGS. 9-13 are schematic diagrams of the navigator as part of a system for interactive remote control of audio or video playback and selection in accordance with the present invention.

### DETAILED DESCRIPTION

#### System Overview

[0018] The present invention relates to interactive control of digital content, such as digital audio or video content, running on a computing platform, such as a personal computer, set top box or other device, such as personal digital assistant. The interactive remote control device 260 (FIG. 1), also referred to as the navigator 260, is described in more detail below in connection with FIG. 5. This device 260 communicates with an audio or video player application 151 (FIG. 1) running on a computing platform 100, such as a personal computer, set-top box, or Internet appliance. This communication can be handled in a conventional manner and may be either wired or wireless. The navigator 260 is

used to send user inputs 270 from user controls 264 (FIG. 5) on the navigator 260, such as buttons, dials, a touch screen, and a keyboard, to the audio or video player application 151 (FIG. 1) running on the computing platform 100. The navigator 260 may be configured to display user outputs 271, such as graphics and text for display on an LCD 266 (FIG. 5) or control of LEDs, from the audio or video player application 151 running on the computing platform 100. The audio or video player application 151 (FIG. 1) is configured to receive digital audio or video data 103 from local storage device 112 on the computing platform 100 or from a data server 102 connected to the computing platform 100 by the Internet or other computer network 101.

[0019] The interpretation and translation of the user inputs 270 from the navigator 260 and user outputs 271 to the navigator 260 are handled primarily by a navigator control manager 154, described later in more detail below in connection with FIG. 7, that runs on the computing platform 100. The navigator control manager 154 may be part of the audio or video player application 151 or exist independently.

#### Local Playback System Architecture

[0020] There are various configurations for remote control of audio or video playback and selection. An exemplary embodiment is illustrated in FIG. 2. In this embodiment, the audio or video player application 151, running on the computing platform 100, receives digital audio or video data 103 from the local storage device 112 on the computing platform 100. Access to the local storage device 112 by the audio or video player application 151 is handled through the file system and the storage device drivers 153, conventionally part of the operating system for the computing platform 100. The audio or video player application 151 can also receive digital audio or video data 103 from a data server 102 connected to the computing platform 100 through the Internet or other computer network 101. Access to the network interface or modem 117 by the audio or video player application 151 is handled through networking drivers 152, also part of the operating system for the computing platform 100. The audio or video player application 151 running on the computing platform 100 may interact with the navigator 260 through a wireless data communications interface 124 on the computing platform 100. This wireless data communications interface 124 can be, for example, Bluetooth, HomeRF, IEEE 802.11, or an infrared interface. Access to the wireless data communications interface 124 on the computing platform 100 may be handled through, for example, conventional wireless data communications drivers 155. On the computing platform 100, the navigator control manager 154, discussed in detail in connection with FIG. 7, interprets and translates the user inputs 270 from the navigator 260 into commands for control of the audio or video player application 151 running on the computing platform 100. The navigator control manager 154, running on the computing platform 100, takes information from the audio or video player application 151 and generates user outputs 271 for the navigator 260. On the navigator 260, communication with the navigator control manager 154 running on the computing platform 100 is handled through a wireless data communications interface 269 on the navigator 260. This wireless data communications interface 269 must be compatible with the wireless data communications interface 124 on the computing platform 100. Access to the wireless data communications interface 269 on the navigator

260 is handled through wireless data communications drivers 283. The wireless communication interfaces 124 and 269 may be standard interfaces, such as Home RF, IEEE 802.11 or Bluetooth. The communication drivers 283 may be the standard drivers for the communication interfaces discussed above. Alternative embodiments of the wireless data communication interfaces 124 and 269 as well as the wireless communications driver 283 are disclosed in commonly-owned co-pending patent application Ser. No. 09/649,981, hereby incorporated by reference. The interface and control handler 281, discussed in detail in connection with FIG. 8, running on the navigator 260 takes user inputs 270 from user controls 264, such as buttons, dials, and touch screens, and passes these user inputs 270 through the wireless data communications interface 269 to the navigator control manager 154 running on the computing platform 100. As well, the interface and control handler 281 running on the navigator 260 receives user outputs 271 from the navigator control manager 154 running on the computing platform 100 through the wireless data communications interface 269. The interface and control handler 281 then passes these user outputs 271 to the appropriate user output devices, such as a graphics display on an LCD 266 or the LEDs. Access to user inputs 270 and user outputs 271 is handled through input and output drivers 282 on the navigator 260.

[0021] The audio or video player application 151 running on the computing platform 100 passes the digital audio or video data 103 to the audio or video playback hardware 119 on the computing platform 100, using the audio or video playback drivers 156 to communication with the audio or video playback hardware 119. The audio or video playback hardware 119 converts the digital audio or video data 103 to analog audio or video 109, which can then be connected to a stereo or headphones for listening or to a TV for viewing.

[0022] Software components running on the computing platform 100 are contained within the operating system, system software, and applications 150. Similarly, software and firmware components running on the navigator 260 are contained within the operating system, system software, and applications 280.

#### Transmitted Playback System Architecture

[0023] Various alternate embodiments of remote control of audio or video playback and selection are contemplated. One such embodiment is illustrated in FIG. 2 of commonly-owned co-pending patent application Ser. No. \_\_\_\_\_, filed on even date, entitled "Digital Audio and Video Distribution Transmission and Playback System," (Attorney Docket No. 11748/13 PCT), hereby incorporated by reference. Another embodiment is illustrated in FIG. 3. As in the previous configuration shown in FIG. 2, the audio or video player application 151 running on the computing platform 100 can receive digital audio or video data 103 from the local storage device 112 on the computing platform 100. Access to local storage 112 device by the audio or video player application 151 is handled through file system and storage device drivers 153. The audio or video player application 151 can also receive digital audio or video data 103 from a data server 102 connected to the computing platform 100 through the Internet or other computer network 101. Access to the network interface or modem 117 by the audio or video player application 151 is handled through networking drivers 152. The audio or video player application 151 running on

the computing platform 100 interacts with the navigator 260 through a wireless data communications interface 124 on the computing platform 100. This wireless data communications interface can be, for example, Bluetooth, HomeRF, IEEE 802.11, or an infrared interface. Access to the wireless data communications interface 124 on the computing platform 100 is handled through the wireless data communications drivers 155. On the computing platform 100, the navigator control manager 154 interprets and translates the user inputs 270 from the navigator 260 into commands for and control of the audio or video player application 151 running on the computing platform 100. The navigator control manager 154 running on the computing platform 100 also takes information from the audio or video player application 151 and generates user outputs 271 for the navigator 260. On the navigator 260, communication with the navigator control manager 154 running on the computing platform 100 is handled through a wireless data communications interface 269 on the navigator 260. This wireless data communications interface 269 must be compatible with the wireless data communications interface 124 on the computing platform 100. Access to the wireless data communications interface 269 on the navigator 260 is handled through wireless data communications drivers 283. The interface and control handler 281 running on the navigator 260 takes user inputs 270 from user controls 264, such as buttons, dials, and touch screens, and passes these user inputs 270 through the wireless data communications interface 269 to the navigator control manager 154 running on the computing platform 100. As well, the interface and control handler 281 running on the navigator 260 receives user outputs 271 from the navigator control manager 154 running on the computing platform 100 through the wireless data communications interface 269. The interface and control handler 281 then passes these user outputs 271 to the appropriate user output device, such as a graphics display on an LCD 266 or LEDs. Access to user inputs 270 and user outputs 271 is handled through input and output drivers 282 on the navigator 260.

[0024] However, unlike the previous configuration described in FIG. 2, where the computing platform 100 generates an analog audio or video data 109 for input to an analog device, in the configuration shown in FIG. 3, the digital audio or video data 103 is passed by the audio or video player application 151 running on the computing platform 100 to an analog transmitter peripheral 104. The audio or video player application 151 uses audio or video playback drivers 156 and peripheral bus drivers 157 to communicate with the analog transmitter peripheral 104 through the peripheral bus 111 on the computing platform 100. The analog transmitter peripheral 104 receives the digital audio or video data 103 through a peripheral interface 201 on the analog transmitter peripheral 104. The digital audio or video data 103 is then converted to analog audio or video 109 by the audio or video digital to analog converter 206 on the analog transmitter peripheral 104. The analog audio or video 109 is transmitted by an analog audio or video transmitter 209 on the analog transmitter peripheral 104 to an audio or video receiver device 105 that makes the analog audio or video 109 available for listening, such as on a stereo or headphones, or viewing such as on a TV.

[0025] Software components including the various drivers discussed above, running on the computing platform 100 are contained within the operating system, system software, and applications 150. Similarly, software and firmware compo-

nents running on the navigator 260 are contained within the operating system, system software, and applications 280.

[0026] It should be noted that the embodiments described (FIGS. 2 and 3) represent only two of a plethora of possible embodiments for configurations of a system for interactive remote control of audio or video playback and selection.

#### Computing Platform

[0027] FIG. 4 illustrates an exemplary system architecture for the computing platform 100, which can encompass anything from general-purpose devices, such as a personal computer, to open fixed function devices, such as a set-top box that connects to a television set. However, the computing platform 100 is not restricted to these examples. In general, the computing platform 100 includes a main processor 110, for example, an Intel Pentium III or better, for executing various software components. The various software components are typically stored in read only memory, or ROM, or flash memory 116, or the local storage device 112. The local storage device 112 can consist of persistent storage 113, such as hard drives or flash memory, or removable storage 114, such as floppy drives, CD-ROM drives, or DVD drives. The software components are executed by the main processor 110 directly from their storage location or may be loaded into random access memory or RAM 115, to be executed from RAM 115 by the main processor 110. The computing platform 100 uses a network interface or modem 117 to access data server computers 102 on the Internet or other computer network 101, in order to download digital audio or video data 103. The network interface or modem 117 is connected internally or externally to the computing platform 100 using a system bus or peripheral bus 111. The system bus and peripheral buses 111 are provided for connecting internal and external devices to the computing platform 100 in a standard manner. Typical system and peripheral buses 111 include Universal Serial Bus, commonly referred to as USB, IEEE 1394, commonly referred to as FireWire, and Peripheral Connect Interface, commonly referred to as PCI. The computing platform 100 may also support connection through a user input interface 120 to external or integrated user input devices 123, such as a keyboard and mouse. For output to the user, the computing platform 100 may contain a display controller 118, for example, an NVIDIA model GeForce2, which stores graphical data, such as windows, bitmaps and text. The display controller 118 outputs the graphical data as video output 121 that is typically displayed to the user on a video monitor, television, or LCD panel. In addition to video output 121, the computing platform 100 may provide audio output 122, which is handled by the audio and video playback hardware 119, which also provides support for video playback to the display controller 118. It should be noted that a client computing platform 100 is not limited to the capabilities and features listed in this description, but may contain a subset of the described features or may contain additional capabilities or features not listed.

#### Navigator Architecture

[0028] The navigator 260 (FIG. 5) acts as a remote control and allows the user to receive feedback from and provide input to an audio or video player application 151 running on a computing platform 100. In the embodiment shown, the computing platform 100 wirelessly transmits and receives



data communications with the navigator 260, giving the navigator 260 functionality within the range of the wireless communications. The navigator 260 receives and transmits the data communications using the wireless data communications interface 269. This wireless data communications interface 269 may be, for example, a Bluetooth, HomeRF, or IEEE 802.11 interface. This wireless data communications interface 269 must match the technology chosen for use on the computing platform 100. The processor 261 handles the data communications with the wireless data communications interface 269. The processor 261 also takes user inputs 270 from the user controls 264, which are typically buttons and dials, and sends this information to the wireless data communications interface 269 for wireless transmission to the computing platform 100 and eventually back to the audio or video player application 151 running on the computing platform 100. The processor 261 receives update information from the audio or video player application 151 through the wireless data communications interface 269, which the processor 261 then makes available to the user by updating the graphic information on the liquid crystal display panel, or LCD 266. The processor 261 reads the code it runs from the flash memory 263, which is also used to store information that must survive power cycling of the navigator 260. The processor 261 uses random access memory, or RAM 262, for executing code and storing volatile information, this is information that is subject to change or does not need to survive power cycling of the navigator 260.

[0029] Additional functionality may be provided through the power handler and battery charger 267, controlled by the processor 261 and responsible for handling power management, conserving battery life, and charging of the battery 268. There is also an infrared or IR transmitter 265 that allows the navigator 260 to control audio playback equipment, such as a stereo.

#### Audio or Video Playback Handler

[0030] FIG. 6 is a software flow diagram for audio or video playback on the computing platform 100, which in the example described henceforth, is called the audio or video playback handler. The audio or video playback handler is called as part of the audio or video player application 151 to playback the digital audio or video data 103. "Start" in step 160 represents the beginning of the audio or video playback handler. The audio or video playback handler receives the audio or video playback selection when it is called. The audio or video playback handler checks if the audio or video playback selection is available locally on the computing platform 100 in step 161. If the file is available locally, the audio or video playback handler reads the digital audio or video data 103 from the audio or video file in step 162. Next, the audio or video playback handler checks if it is at the end of the audio or video file to playback in step 163. If it is at the end of the audio or video file, then the audio or video playback handler ends playing of the audio or video file in step 172 and the audio or video playback handler ends in step 173. If not, at the end of the audio or video file in step 163, then the audio or video playback handler takes this digital audio or video data 103 and interprets the data according to the data format in step 164. The audio or video playback handler then sends the interpreted digital audio or video data in step 165 to the audio or video playback drivers 156, which handle conversion of the digital audio or video data 103 to analog audio or data video 109 using the audio

or video playback hardware 119. The audio or video playback handler reads digital audio or video data 103 from the audio or video file in step 162 again. If the audio or video file is not available locally in step 161, then the audio or video playback handler connects to the data server 102 on the Internet or other computer network 101 in step 166. If the connection is not successful in step 167, then the audio or video playback handler ends playing of the audio or video file in step 172 and the audio or video playback handler ends in step 173. If the connection is successful in step 167, then the audio or video playback handler reads the digital audio or video data 103 from the data server 102 over the Internet or other computer network 101 in step 168. Next, the audio or video playback handler checks if there is more digital audio or video data to read for playback in step 169. If there is no more digital audio or video data 103 to read, then the audio or video playback handler ends playing of the audio or video data 103 in step 172 and the audio or video playback handler ends in step 173. If there is more digital audio or video data 103 to read for playback in step 169, then the audio or video playback handler takes this digital audio or video data 103 and interprets the data according to the data format in step 170. The audio or video playback handler then sends the interpreted digital audio or video data in step 171 to the audio or video playback drivers 156, which handles conversion of the digital audio or video data 103 to analog audio or video 109 using the audio or video playback hardware 119. Then the audio or video playback handler reads digital audio or video data 103 from the data server 102 over the Internet or other computer network 101 in step 168 again.

#### Navigator Control Manager

[0031] The navigator control manager 154, which runs on the computing platform 100, takes the user inputs 270, such as button presses, from the navigator 260 and interprets and translates them into commands and actions for the audio or video player application 151. The navigator control manager 154 then takes the results from the commands and actions of the audio or video player application 151 to provide user outputs 271 on the navigator 260, such as updated graphics on an LCD 266 on the navigator 260. FIG. 7 provides the software flow of the navigator control manager 154. In this example, the navigator control manager 154 is a continuously running process on the computing platform 100 and operates with an audio player application 151 and a navigator 260 with graphical output capabilities and operates as part of interactive remote control specifically for digital music playback and selection.

[0032] "Start" in step 175 represents the beginning of the navigator control manager 154. Next, the navigator control manager 154 reads any data sent from the interface and control handler 281 on the navigator 260 in step 176. If there is a play music file command from the navigator 260 in step 177, then the navigator control manager 154 finds the address of the music file in step 178. Next, the navigator control manager 154 sends user output information to the navigator 260 in step 179, such as the music title, the artist, and the album name, for display to the user. The navigator control manager 154 then starts the audio playback handler, described previously (FIG. 6), to playback the music file in step 180 and the navigator control manager 154 reads any data sent from the interface and control handler 281 on the navigator 260 in step 176 again. If there is not a play music

file command in step 177, and if there is a download music file or files command from the navigator 260 in step 181, then the navigator control manager 154 downloads the music file or files in step 183. Then the navigator control manager 154 reads any data sent from the interface and control handler 281 on the navigator 260 in step 176 again. If there is not a download music file or files command in step 181 and if there is a buy music file command from the navigator 260 in step 184, then the navigator control manager 154 performs any financial validations required to complete the purchase of the music file in step 185. Next, the navigator control manager 154 downloads the purchased music file in step 187 and the navigator control manager 154 reads any data sent from the interface and control handler 281 on the navigator 260 in step 176 again. If there is not a buy music file command in step 184 and if there is a browse music command from the navigator 260 in step 188, then the navigator control manager 154 checks if the music to browse is local to the computing platform 100 in step 189. If the music to browse is local to the computing platform 100, then the navigator control manager 154 searches the local database in step 190 and sends the results of the local music browse to the navigator 260 in step 191. Then the navigator control manager 154 reads any data sent from the interface and control handler 281 on the navigator 260 in step 176 again. If the music to browse is not local to the computing platform 100, then the navigator control manager 154 requests music information from the data server 102 in step 193 and sends the results of the local music browse to the navigator 260 in step 191. Then the navigator control manager 154 reads any data sent from the interface and control handler 281 on the navigator 260 in step 176 again. Typically, a browse of music is based on such criteria as music track, album, artist, music genre, and playlists. If there is not a browse music command in step 188 and if there is an update software command from the navigator 260 in step 194, then the navigator control manager 154 updates the system software stored in flash memory 263 on the navigator 260 and the navigator control manager 154 reads any data sent from the interface and control handler 281 on the navigator 260 in step 176 again. This software update includes the interface and control handler 281 on the navigator 260. If there is not an update software command in step 194 and if there is a system start up command from the navigator 260 in step 196, then the navigator control manager 154 sends initialization settings to the navigator 260 in step 197 and the navigator control manager 154 reads any data sent from the interface and control handler 281 on the navigator 260 in step 176 again.

#### Interface and Control Handler

[0033] The interface and control handler 281, which runs on the navigator 260, takes the user inputs 270, such as button presses, and sends them to the navigator control manager 154 running on the computing platform 100. The interface and control handler 281 also receives user outputs 271 from the navigator control manager 154 such as updated graphics on an LCD 266 on the navigator 260. FIG. 8 provides the software flow of the interface and control handler 281. In this example, the interface and control handler 281 is a continuously running process on the navigator 260 and provides user outputs 271 in a graphical display on an LCD 266 on the navigator 260.

[0034] "Start" in step 290 represents the beginning of the interface and control handler 281. If there are user inputs 270 from the user controls 264 on the navigator 260 in step 291, then the interface and control handler 281 sends the user inputs 270 to the navigator control manager 154 running on the computing platform 100 in step 292. If there are no user inputs 270 in step 291 or the user inputs 270 have been sent in step 292, then the interface and control handler 281 checks if there are user outputs 271 from the navigator control manager 154 running on the computing platform 100 in step 293. If there are user outputs 271 from the navigator control manager 154, then the interface and control handler 281 takes the user outputs 271 and updates the graphics displayed on the LCD 266 in step 294. After the display has been updated in step 294 or if there are no user outputs 271 in step 293 then the interface and control handler 281 checks for user inputs in step 291 again.

#### Navigator Schematics

[0035] FIGS. 9-13 represent the schematic design for an exemplary embodiment of the navigator 260. The wireless data communication interface 269 module connects both electrically and mechanically to the navigator 260 using the connector 648 on the navigator 260. Capacitor 647 on the navigator 260 provides additional filtering on the power supplied to the wireless data communication interface 269 module.

[0036] Control of the navigator 260 rests in the processor 261, which is, for example, a Motorola MC68EZ328. The processor 261 interprets the input from the user controls 264 and sends this information back to the computing platform 100 through the wireless data communication interface 269. The processor 261 also receives and interprets display update information from the audio or video player application 151 running on the computing platform 100 from the wireless data communication interface 269. The display information is sent to the liquid crystal display panel, or LCD, 266, which connects to the navigator 260 circuit board using the connector 688 on the navigator 260. A pair of capacitors 686 and 687 are used to filter power going to the LCD 266 on the connector 688. The processor 261 controls an infrared LED, or IR transmitter, 265 that is used to control audio or video playback devices, such as a stereo or television, that supports infrared control. The transistor 615 acts as a switch based on a signal from the processor 261 to enable and disable the IR transmitter 265. The resistor 617 provides additional load to limit the amount of current to the IR transmitter 265. Another LED 619 indicates to the user that the navigator 260 is successfully powered. A transistor 618 acts as a switch based on a signal from the processor 261 to enable and disable the LED 619 and the resistor 620 provides additional load to limit the amount of current to the LED 619. Oscillator 603 provides timing to the processor 261, while a pair of capacitors 601 and 602 provide loading required by the oscillator 603. The reset signal of the processor 261, which is responsible for resetting the processor 261, is enabled when power is first applied to the processor 261 through a delay circuit composed of a resistor 612 and a capacitor 613. The button 614 also resets the processor 261 and is included for debug purposes. A plurality of capacitors 604, 606, and 607 along with a resistor 605 provide filtering for the power to a phase locked loop, or PLL, circuit within the processor 261 that is used to

generate additional timing within the processor 261. A resistor 600 acts as a pull-up to power for a signal on the processor 261.

[0037] External random access memory, or RAM, 262, may be provided, configured for example in a 4 megabyte by 16-bit configuration, for storing code other data that doesn't need to survive a power down of the navigator 260. External flash memory 263 may also be provided, for example, in a 1 megabyte by 16-bit configuration, for storing the code to be executed as well as storing data that must survive a power down of the navigator 260. A pair of capacitors 667 and 668 provide filtering for the power to the RAM 262 and flash memory 263.

[0038] The user controls 264 may be configured as a set of 16 buttons 669, 670, 671, 672, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, and 685, arranged in a 4x4 array and scanned by the processor 261. This reduces the number of signals required on the processor 261 to support the user controls 264. A plurality of capacitors 608, 609, 610, and 611 act to reduce voltage spikes on the return signals from the user controls 264 to the processor 261 when the user controls 264 are activated and deactivated.

[0039] The button 671 is used to turn power on to the entire navigator 260. The button 671 is always powered, even when power is turned off to the rest of the navigator 260. Diode 673 prevents current leakage from button 671 when the rest of the navigator 260 is turned off. The 3.3-volt regulator 630 provides power to the button 671 as well as a flip-flop 635 that is also always on to receive the power on signal from the button 671. A plurality of capacitors 629, 631, and 632 provide filtering for power to the always on button 671 and flip-flop 635. A pair of resistors 633 and 634 act as pull-ups to power for signals to the flip-flop 635. A resistor 637 and a transistor 636 work together with the flip-flop 635 to control the shut down of the 3.3-volt switcher 640 that provides power to the rest of the navigator 260. A plurality of capacitors 638, 639, 642, and 643 provide filtering for power to and from the switcher 640. An inductor 641 completes a feedback circuit required by the switcher 640. A resistor 645 and a pair of capacitors 644 and 646 provide external compensation circuitry also required by the switcher 640.

[0040] A battery 268 provides power to the navigator 260 and connects to the navigator 260 through the connector 590 on the navigator 260. A circuit which includes a plurality of diodes 588, and 589, transistor 585, and a resistors 586 and 587, provides over-voltage protection from the battery 268 and also protect against the battery 268 being plugged incorrectly into the connector 590. This protection can be bypassed by including resistor 584. The navigator 260 supports recharging of the battery 268 through a battery charger 267. The battery charger 267 is composed of a battery charge controller 699, for example, a Maxim Integrated Products MAX712CSE, along with the required support circuitry. The support circuitry required by the battery charge controller 699 diode 689, a transistor 694, a plurality of resistors 691, 693, 696, and 697, and a plurality of capacitors 577, 583, 690, 692, 695, and 698. A plurality of resistors 579, 580 and 582 and a pair of transistors 578 and 581 detect if the battery 268 is rechargeable and provide this signal to the battery charge controller 699 to prevent the battery charger 267 from trying to charge a non-rechargeable battery 268.

[0041] An analog to digital converter 599 along with a diode 596, a pair of capacitors 593 and 598, and a plurality of resistors 591, 592, 594, 595, and 597 are used by the processor 261 to monitor the battery voltage level for calculating battery life and controlling battery charging. Using a plurality transistors 650, 653, and 654, a plurality capacitors 649 and 652, and a pair of resistors 651 and 655, the processor 261 can individually control power to the wireless data communication interface 269 and the LCD 266 as part of power management to increase battery life on the navigator 260. In addition, the processor 261 is configured to control the voltage level for the contrast power supplied to the LCD 266, which allows user control of display contrast. To do this, the processor 261 adjusts a digital potentiometer 660, which outputs a variable voltage level based on a voltage divider circuit made up of resistors 658 and 659. This variable voltage level feeds a DC to DC converter 666, which takes this voltage level as an input to determine the contrast supply voltage level that is output to the LCD 266. A resistor 665, an inductor 663, and a diode 662 fulfill the requirements of the DC to DC converter 666. A pair of capacitors 661 and 664 may be used to provide filtering for the contrast power supply to the LCD 266.

[0042] A connector 621 may be provided for debug access to the processor 261. The debug port is implemented as an industry standard RS-232 serial port. An RS-232 interface controller 626 handles the required RS232 interface level conversions. A plurality of capacitors 622, 623, 624, 625, and 628 provide filtering for power for the various voltage levels used by the RS-232 interface controller 626. A resistor 627 acts as a pull-up to power for the ON signal to the RS-232 interface controller 626. None of the processor 261 debug port components 621, 622, 623, 624, 625, 626, 627, and 628 are included for production. The flip-flop 657 is unused. A resistor 656 is used to pull-up to power the inputs of the unused flip-flop 657.

[0043] Obviously, many modifications and variations of the present invention are possible in light of the above teachings. Thus, it is to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described above.

[0044] What is claimed and desired to be covered by a Letters Patent is as follows:

We claim:

1. A system for controlling playback of digital content, the system comprising:

a computing platform including playback hardware for converting said digital content to audio signals for playback by an analog playback device;

a digital content player application, resident on said computing platform, for playback of said digital content; and

a remote control device for communicating with said computing platform over a predetermined communication link and controlling said digital content playback application.

2. The system as recited in claim 1, further including a transmitter for transmitting audio signals from said computing platform to a remote analog playback device.

3. The system as recited in claim 1, wherein said digital content is digital audio data.

4. The system as recited in claim 1, wherein said digital data content is digital video data.

5. The system as recited in claim 1, wherein said computing platform includes a local storage device for locally storing digital content.

6. The system as recited in claim 1, wherein said computing platform is configured to receive said digital content over a network.

7. The system as recited in claim 6, wherein said network is the Internet.

8. The system as recited in claim 1, wherein said remote control device includes user inputs as well as user outputs.

9. The system as recited in claim 5, wherein said local storage device includes a persistent storage device.

10. The system as recited in claim 5, wherein said local storage device includes a removable storage device.

11. The system as recited in claim 1, wherein said predetermined communication link is a wireless link.

12. The system as recited in claim 11, wherein said wireless link is an RF link.

13. The system as recited in claim 11, wherein said wireless link is an infrared link.

\* \* \* \* \*

# **EXHIBIT 8**



US006622018B1

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**Erekson**

(10) **Patent No.:** **US 6,622,018 B1**  
(45) **Date of Patent:** **Sep. 16, 2003**

(54) **PORTABLE DEVICE CONTROL CONSOLE WITH WIRELESS CONNECTION**

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(75) **Inventor:** Rich Erekson, Ogden, UT (US)

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(73) **Assignee:** 3Com Corporation, Santa Clara, CA (US)

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(\*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(74) *Attorney, Agent, or Firm*—Wagner, Murabito & Hao LLP

(57) **ABSTRACT**

(21) **Appl. No.:** 09/558,413

A system and method for controlling a remote device over a wireless connection. In one embodiment, a hand-held computer system having a Bluetooth-enabled transceiver is used to control other Bluetooth-enabled devices. A wireless connection between a transceiver and a remote device is established. A position where a stylus makes contact with a surface of an input device of the hand-held computer system is registered. The particular position where the stylus element makes contact with the input device is translated into a particular command for controlling the remote device. The command is then transmitted to the remote device over the wireless connection.

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(51) **Int. Cl.<sup>7</sup>** ..... H04M 3/00

(52) **U.S. Cl.** ..... 455/420; 455/419

(58) **Field of Search** ..... 455/420, 456, 455/457, 445, 404, 75, 566, 575, 96, 99, 145; 342/457.1; 340/825.36, 825.37, 825.49

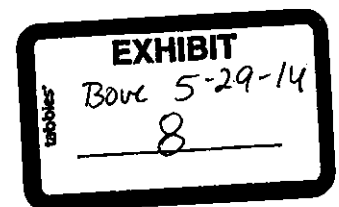
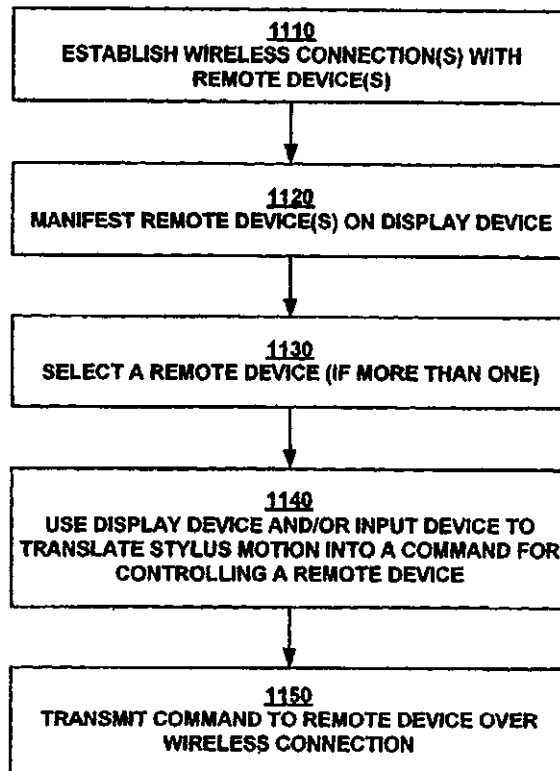
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**27 Claims, 12 Drawing Sheets**

**1100**



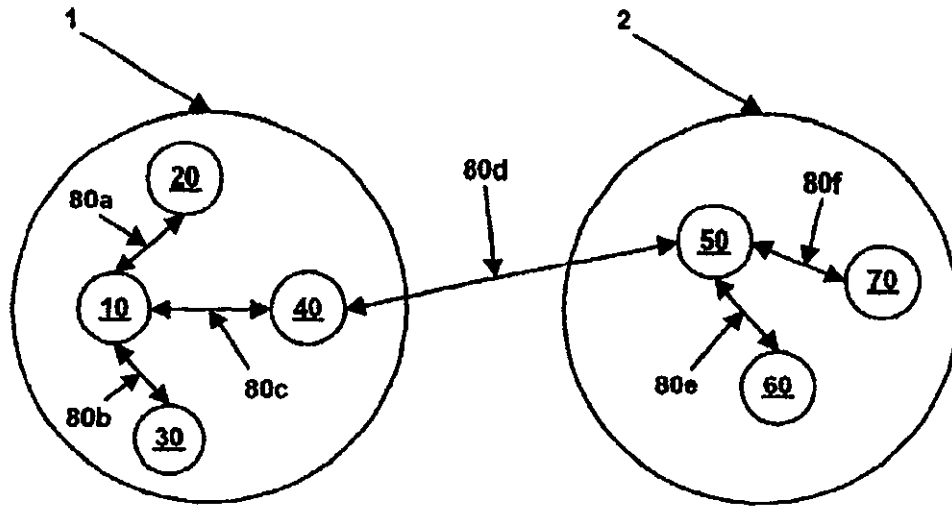


FIG. 1

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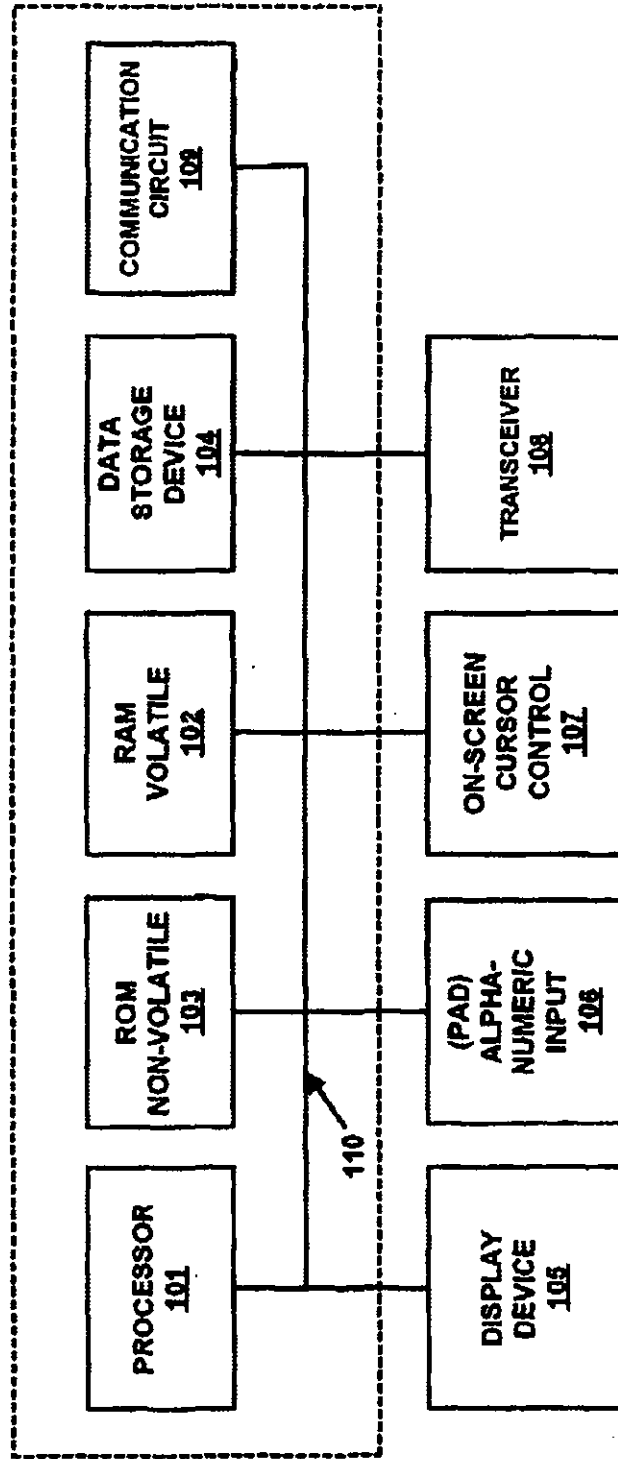
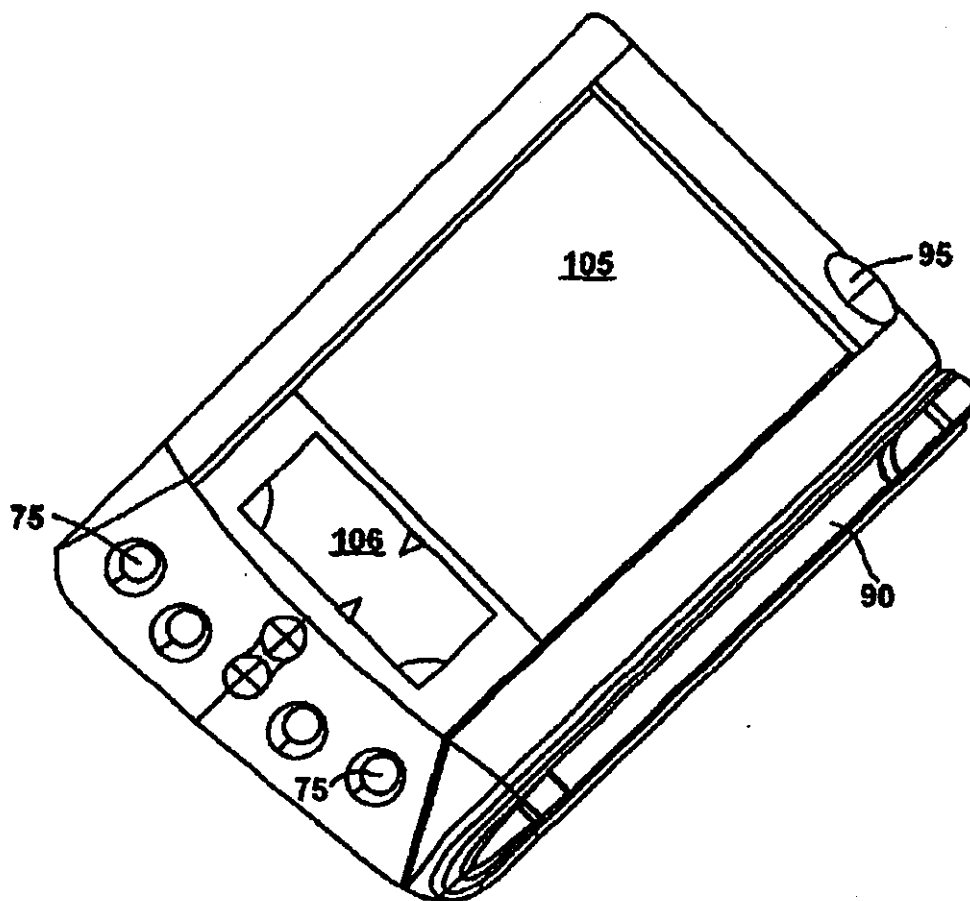


FIG. 2



**100a**



**FIG. 3**

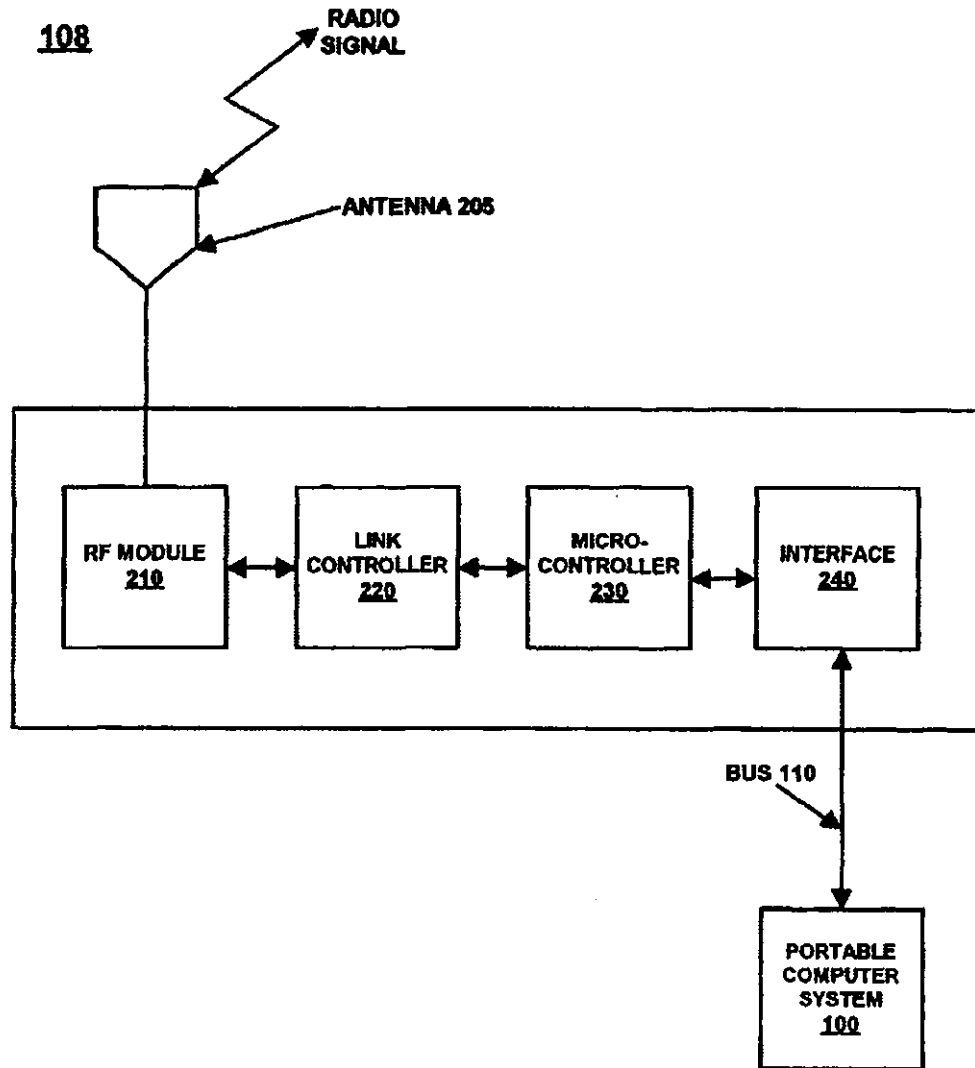


FIG. 4A

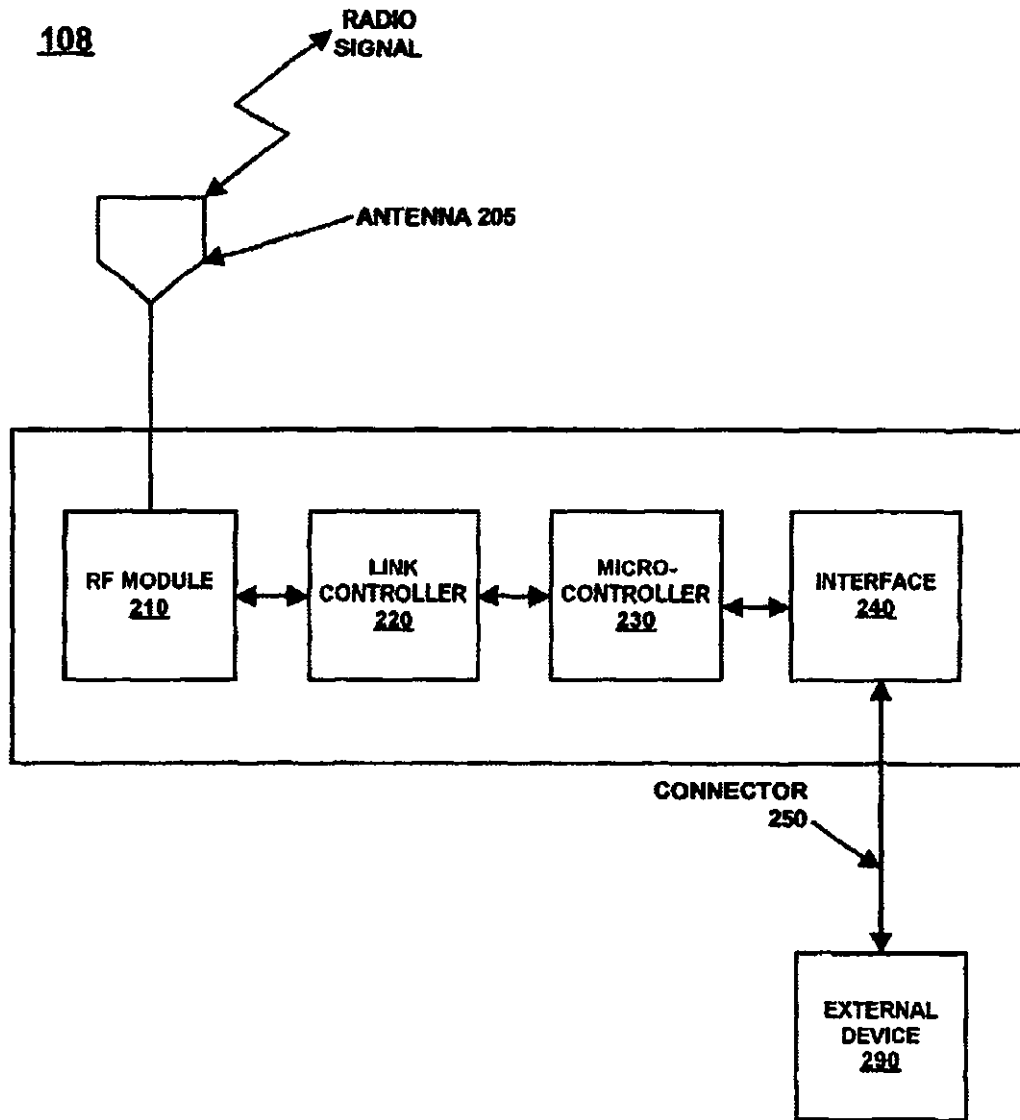


FIG. 4B

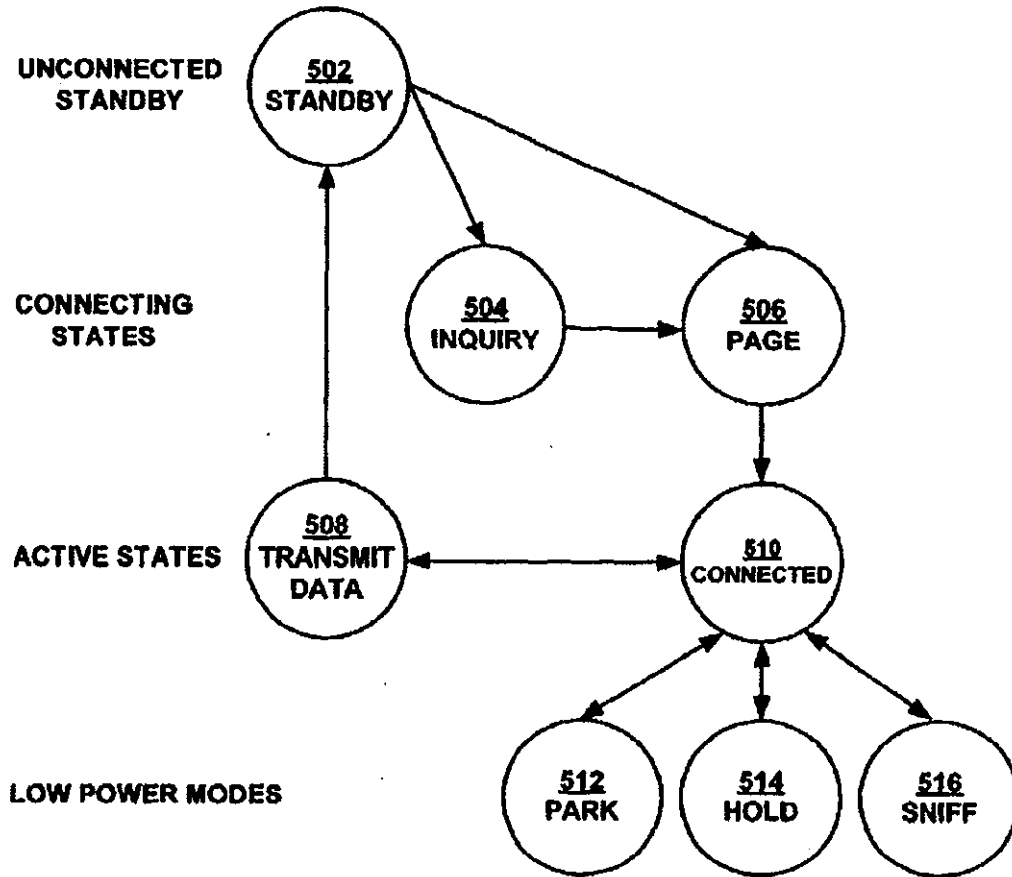


FIG. 5

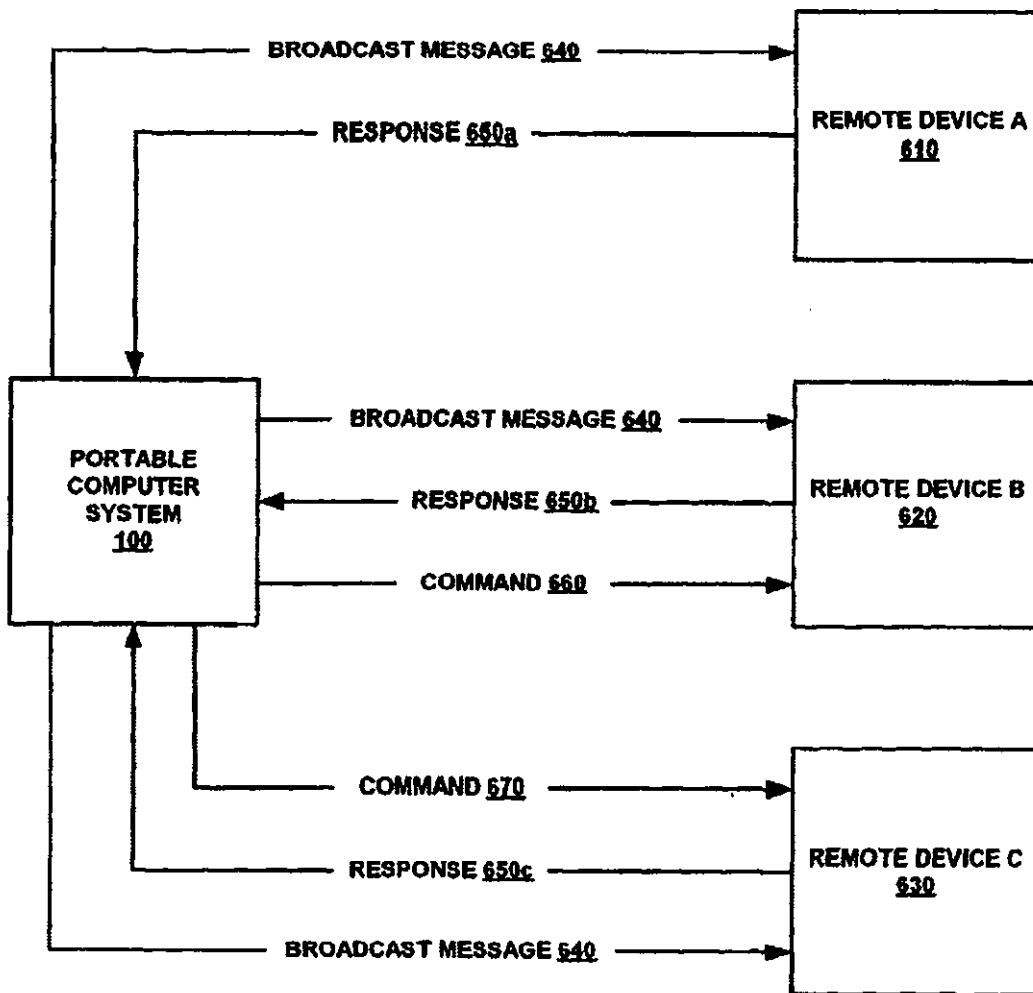
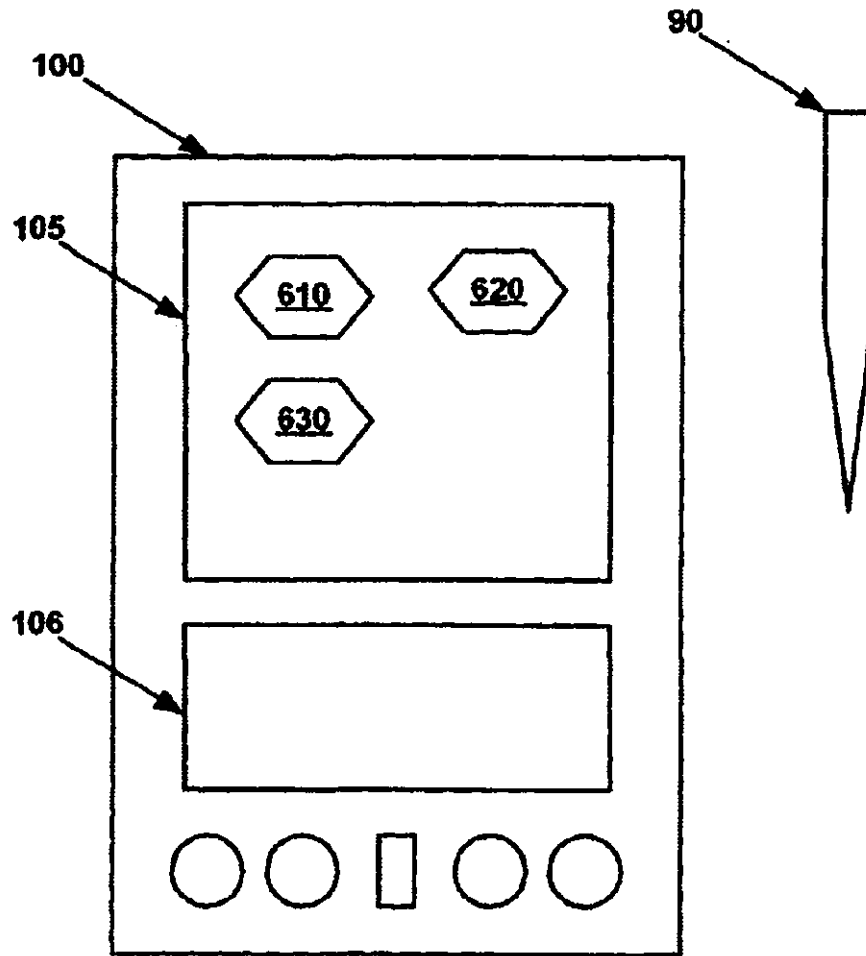
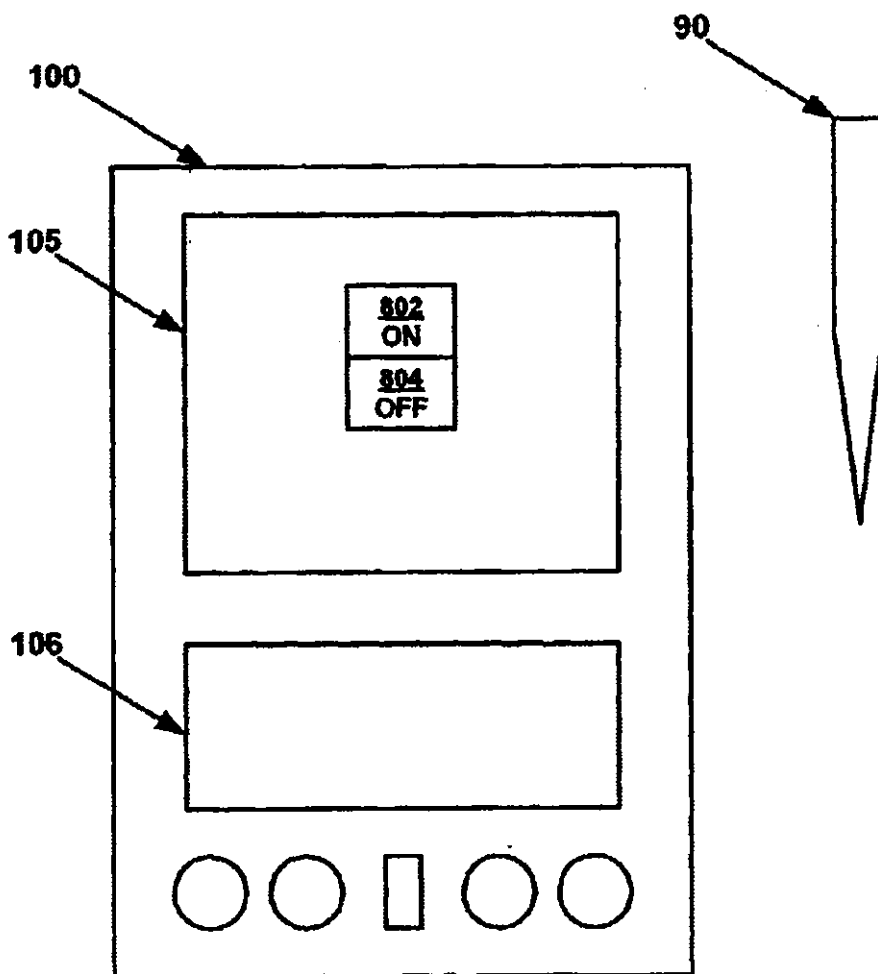


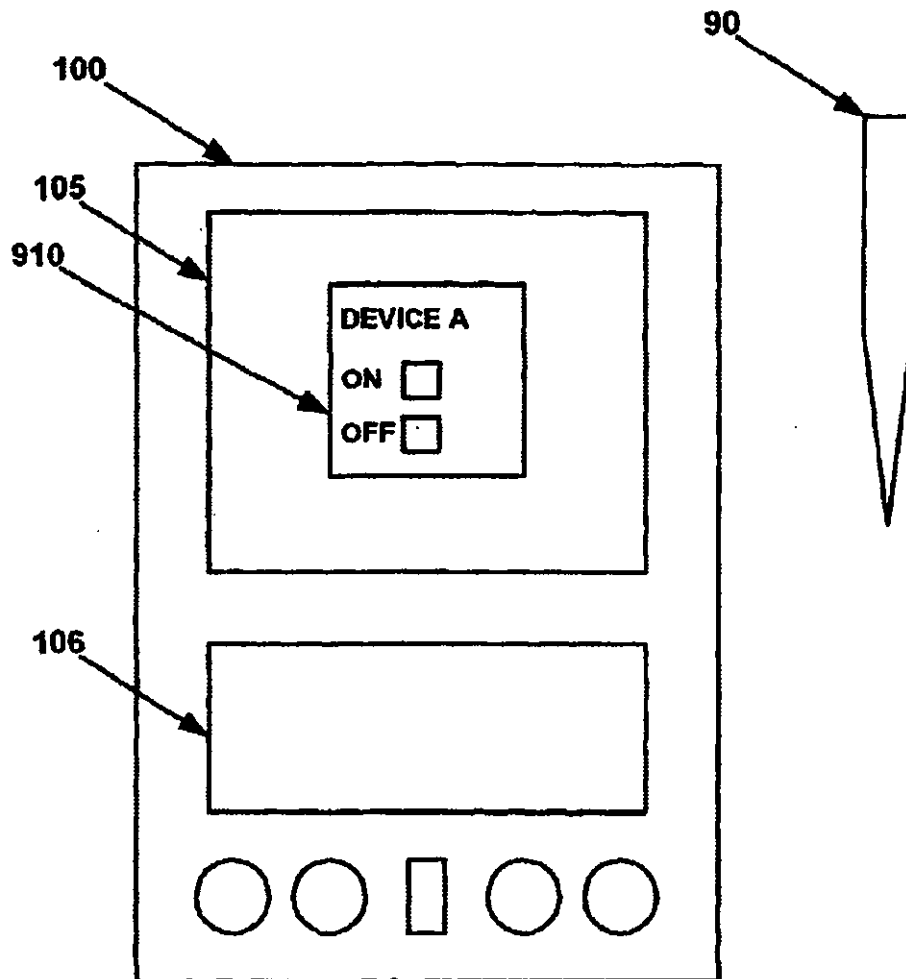
FIG. 6



**FIG. 7**

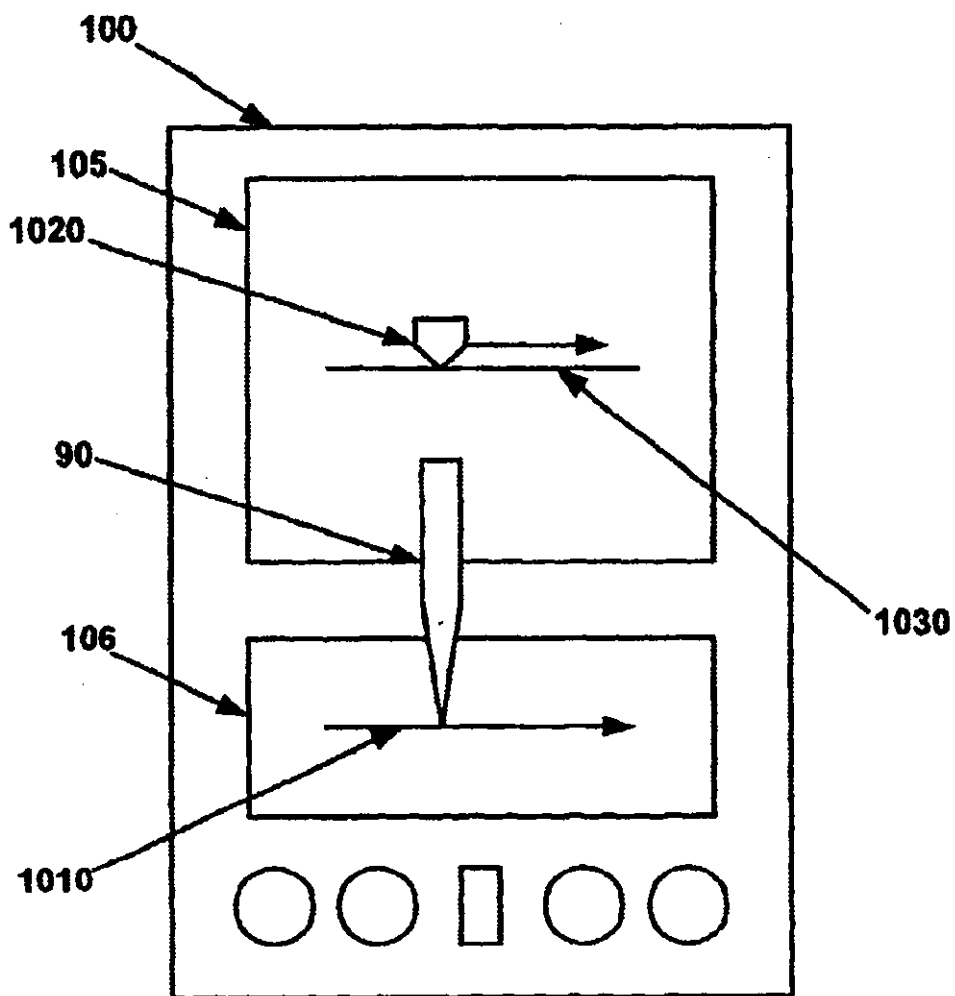


**FIG. 8**



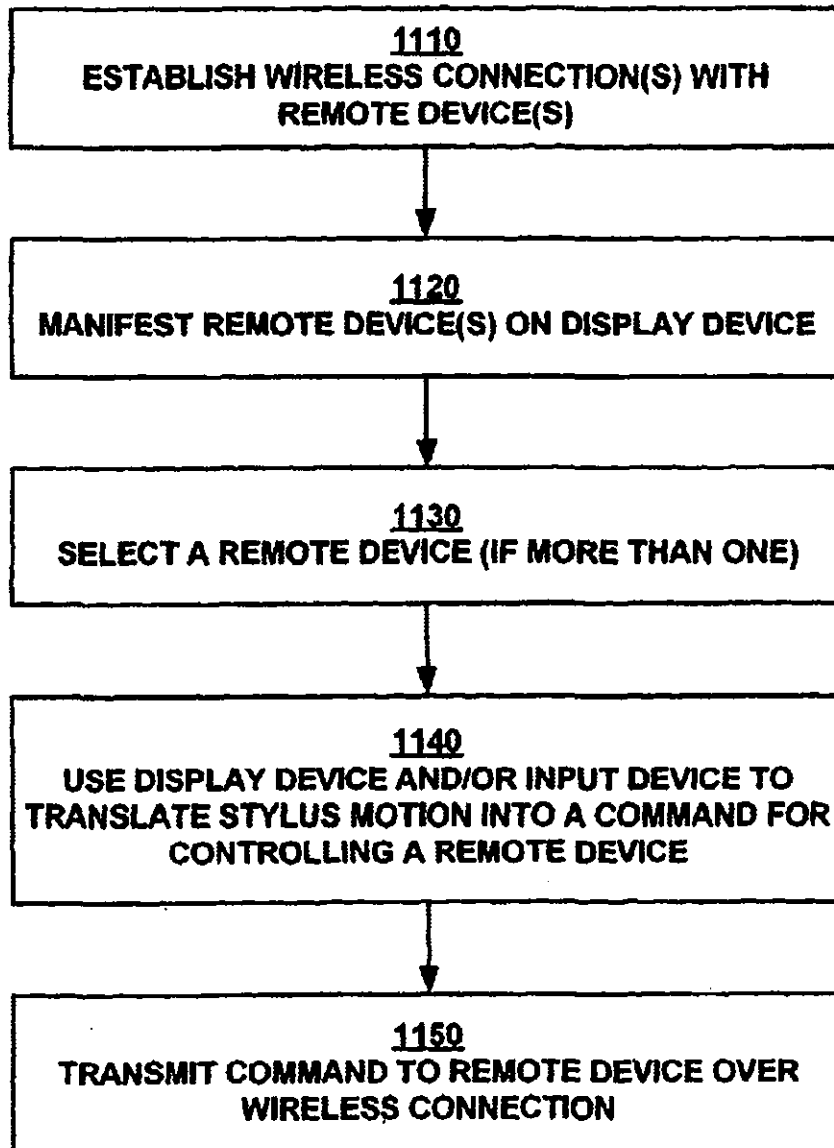
**FIG. 9**





**FIG. 10**

**1100**



**FIG. 11**

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## PORTABLE DEVICE CONTROL CONSOLE WITH WIRELESS CONNECTION

### TECHNICAL FIELD

The present invention relates to systems and devices connected using wireless links, such as systems and devices that use the Bluetooth technology. In particular, the present invention pertains to a method and system for controlling remote devices over a wireless connection.

### BACKGROUND ART

Consider, for example, the number of devices and appliances in the typical living room or family room of a residential dwelling: lamps, light switches, a thermostat, and consumer electronic devices such as televisions, video cassette recorders, and stereos, some of these devices themselves comprising multiple devices such as compact disk players, tape players, etc. Each of these devices requires manual interaction by a user in order to turn them off or on, to raise or lower levels, and so on. Other rooms of the house, as well as factories and places of business, also have countless devices and appliances that require manual interaction in order to use and control them.

Of course, many of these devices are or can be remotely controlled. In the home, for example, remote control devices for televisions, stereos and the like are very common. Devices for controlling lights, etc., are also available although generally not as commonly used.

Remote control devices in each of their present forms have a number of associated shortcomings. For example, a separate remote control device may be required for each device to be controlled. In some instances the separate remotes can be replaced with a universal remote control; however, universal remotes still have their shortcomings. Generally, current universal remotes often do not have the resources (e.g., memory and computational logic) to allow them to be used with all devices, or they may not be capable of controlling a new device. In addition, in order to accommodate the variety of devices to be controlled, universal remotes usually have a multiplicity of buttons and thus can be difficult to use.

Another shortcoming associated with current remote control devices is their limited range. Commonly, remote control devices use infrared beams to communicate commands to the device that is to be controlled, and so the remotes can only be used for line-of-sight applications. Devices behind an object, around a corner, or in another room cannot be controlled if they are not in the line of sight of an infrared remote.

A more modern solution is to wire devices together into a network of some sort, so that they can be controlled from a central location such as a personal computer. However, this approach also has a number of shortcomings. For example, the connections and cabling needed may be quite cumbersome and complex. In addition, this approach is difficult and expensive to backfit into existing homes and businesses. Furthermore, such an approach is not necessarily convenient. For instance, the central computer system is not a practical or convenient replacement for a television remote, nor is it portable enough to allow it to be easily moved from one room to another whenever it is necessary to do so.

Accordingly, a need exists for a device and/or method that can be used to remotely control a variety of different devices and appliances, including new devices. A need also exists for

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a device and/or method that can satisfy the above need, that is relatively simple to introduce into existing homes and businesses, and that is user-friendly. In addition, a need exists for a device and/or method that satisfies the above needs, is portable, and is not limited to line-of-sight applications.

### DISCLOSURE OF THE INVENTION

The present invention provides a system and method that can be used to remotely control a variety of different devices, including new devices. The present invention also provides a system and method that is relatively easy to introduce into existing homes and businesses and that is user-friendly. In addition, the present invention provides a system and method that is portable and that is not limited to line-of-sight applications.

In the present embodiment, the present invention pertains to a system and method for controlling remote devices over a wireless connection (e.g., using a radio signal). In one embodiment, a portable computer system (e.g., a palmtop or hand-held computer) having a transceiver is used to control compliant devices. In a preferred embodiment, the transceiver and the remote devices are Bluetooth-enabled devices.

In the present embodiment of the present invention, a wireless connection between the portable computer system and one or more remote devices is established. Each of the remote devices is manifested on a display device of the portable computer system, and one of the devices is selected using, for example, a stylus element.

In one embodiment, the stylus element can also be used to specify commands for controlling the remote device. A position where the stylus element makes contact with a surface of the display device of the portable computer system is registered. The particular position where the stylus element makes contact with the display device is translated into a particular command for controlling the remote device. The command is then transmitted to the remote device over the wireless connection.

In one embodiment, a rendering of the remote device or of a mechanism that can be used to control the remote device is displayed on the display device. The contact of the stylus element with a position in the rendering is translated into a particular command for controlling the remote device. In another embodiment, a menu of commands for controlling the remote device is displayed on the display device. The contact of the stylus element with a position in the menu is translated into a particular command for controlling the remote device.

In yet another embodiment, the movement of the stylus element over the surface of an input device is recognized and translated into a particular command for controlling the remote device. In another embodiment, by moving the stylus element over the surface of the input device, motion is imparted to the rendering on the display device of the remote device or the mechanism for controlling the remote device.

The present invention thus provides a system (e.g., a Bluetooth-enabled device, specifically a portable computer system) that can be used to remotely control compliant devices (e.g., other Bluetooth-enabled devices) over a wireless (radio) connection. With a radio connection, the system of the present invention is not limited to line-of-sight applications. Remote devices can be adapted to receive commands over the wireless connection, obviating the need for hardwire connections and making the system relatively easy to implement in homes and businesses. The processing

power and other features of the portable computer system enable user-friendly interfaces, and also allow a variety of remote devices to be controlled, including new devices introduced into the home or business.

These and other objects and advantages of the present invention will become obvious to those of ordinary skill in the art after having read the following detailed description of the preferred embodiments which are illustrated in the various drawing figures.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention:

FIG. 1 illustrates one embodiment of a network of devices coupled using wireless connections in accordance with the present invention.

FIG. 2 is a block diagram of one embodiment of a portable computer system in accordance with the present invention.

FIG. 3 is a top-side perspective view of a portable computer system in accordance with one embodiment of the present invention.

FIGS. 4A and 4B are block diagrams showing one embodiment of a wireless transceiver coupled to, respectively, a portable computer system and an external device in accordance with the present invention.

FIG. 5 illustrates the different operating modes of a wireless transceiver in accordance with one embodiment of the present invention.

FIG. 6 illustrates the flow of messages between a controlling device and remote devices in accordance with one embodiment of the present invention.

FIG. 7 illustrates one embodiment of a display used on a controlling device in accordance with the present invention.

FIG. 8 illustrates another embodiment of a display used on a controlling device in accordance with the present invention.

FIG. 9 illustrates another embodiment of a display used on a controlling device in accordance with the present invention.

FIG. 10 illustrates a display on a controlling device responding to movement on an input device in accordance with one embodiment of the present invention.

FIG. 11 is a flowchart of the steps in a process for controlling a remote device over a wireless connection in accordance with one embodiment of the present invention.

#### BEST MODE FOR CARRYING OUT THE INVENTION

Reference, will now be made in detail to the preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. While the invention will be described in conjunction with the preferred embodiments, it will be understood that they are not intended to limit the invention to these embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be included within the spirit and scope of the invention as defined by the appended claims. Furthermore, in the following detailed description of the present invention, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be obvious to one of ordinary skill in the art that the present

invention may be practiced without these specific details. In other instances, well-known methods, procedures, components, and circuits have not been described in detail so as not to unnecessarily obscure aspects of the present invention.

Some portions of the detailed descriptions which follow are presented in terms of procedures, logic blocks, processing, and other symbolic representations of operations on data bits within a computer memory. These descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. A procedure, logic block, process, etc., is here, and generally, conceived to be a self-consistent sequence of steps or instructions leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a computer system. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, bytes, values, elements, symbols, characters, terms, numbers, or the like.

It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the following discussions, it is appreciated that throughout the present invention, discussions utilizing terms such as "establishing," "registering," "recognizing," "broadcasting," "receiving," "manifesting," "transmitting," "displaying," or the like, refer to the action and processes (e.g., process 1100 FIG. 11) of a computer system or similar intelligent electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

The present invention is discussed primarily in a context in which devices and systems are coupled using wireless links, and specifically with regard to devices and systems compliant with the Bluetooth technology. Bluetooth is the code name for a technology specification for small form factor, low-cost, short-range radio links between personal computers (PCs), mobile phones and other devices and appliances. However, it is appreciated that the present invention may be utilized with devices and systems compliant with standards different from Bluetooth, such as the IEEE (Institute of Electronic and Electrical Engineering) 802.11 standard.

The Bluetooth technology allows cables that connect one device to another to be replaced with short-range radio links. Bluetooth is targeted at mobile and business users who need to establish a link, or small network, between their computer, cellular phone and other peripherals. The required and nominal range of Bluetooth is thus set to approximately ten (10) meters. To support other uses, for example the home environment, Bluetooth can be augmented to extend the range to up to 100 meters.

The Bluetooth technology is based on a high-performance, yet low-cost, integrated radio transceiver. For instance, Bluetooth transceivers built into both a cellular telephone and a laptop computer system would replace the cables used today to connect a laptop to a cellular telephone.

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Bluetooth radio technology can also provide: a universal bridge to existing data networks, a peripheral interface, and a mechanism to form small private ad hoc groupings of connected devices away from fixed network infrastructures.

FIG. 1 illustrates the topology of a network of devices coupled using wireless connections in accordance with one embodiment of the present invention. In the parlance of Bluetooth, a collection of devices connected in a Bluetooth system are referred to as a "piconet" or a "subnet." In the present embodiment, a piconet starts with two connected devices, and may grow to eight connected devices. All Bluetooth devices are peer units; however, when establishing a piconet, one unit will act as a master and the other(s) as slave(s) for the duration of the piconet connection.

A Bluetooth system supports both point-to-point and point-to-multi-point connections. Several piconets can be established and linked together in a "scatternet," where each piconet is identified by a different frequency hopping sequence. All devices participating on the same piconet are synchronized to their respective hopping sequence.

Accordingly, devices 10, 20, 30 and 40 are coupled in piconet 1 using wireless connections 80a-c. Similarly, devices 50, 60 and 70 are coupled in piconet 2 using wireless connections 80a-f. Piconet 1 and piconet 2 are coupled using wireless connection 80d. Devices 10-70 can be printers, personal digital assistants (PDAs), desktop computer systems, laptop computer systems, cell phones, fax machines, keyboards, and joysticks equipped with a Bluetooth radio transceiver or adapted to communicate with Bluetooth devices ("Bluetooth-enabled"). In accordance with the present invention, devices 10-70 can also be virtually any type of device, including mechanical devices and appliances, equipped with a Bluetooth radio transceiver or Bluetooth-enabled. The Bluetooth radio transceiver may be integrated into the device, or it may be coupled to the device.

FIG. 2 is a block diagram of a portable computer system 100 (e.g., a PDA, a hand-held computer system, or palmtop computer system) upon which embodiments of the present invention can be implemented. Computer system 100 includes an address/data bus 110 for communicating information, a central processor 101 coupled with the bus for processing information and instructions, a volatile memory 102 (e.g., random access memory, RAM) coupled with the bus 110 for storing information and instructions for the central processor 101 and a non-volatile memory 103 (e.g., read only memory, ROM) coupled with the bus 110 for storing static information and instructions for the processor 101. Computer system 100 also includes an optional data storage device 104 (e.g., memory stick) coupled with the bus 110 for storing information and instructions. Data storage device 104 can be removable.

Computer system 100 also contains a display device 105 coupled to the bus 110 for displaying information to the computer user. The display device 105 utilized with computer system 100 may be a liquid crystal display device, a cathode ray tube (CRT), a field emission display device (also called a flat panel CRT) or other display device suitable for generating graphic images and alphanumeric characters recognizable to the user. In the preferred embodiment, display device 105 is a flat panel display.

Computer system 100 also includes a cursor control or directing device (on-screen cursor control 107) coupled to bus 110 for communicating user input information and command selections to processor 101. In one implementation, on-screen cursor control device 107 is a

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touch-screen device incorporated with display device 105. On-screen cursor control device 107 is capable of registering a position on display device 105 where a stylus makes contact.

In accordance with the present invention, a stylus can be used to select a command for controlling a remote device by touching the stylus to display device 105. In one embodiment, a command can be selected from a menu of commands displayed on display device 105. In another embodiment, a rendering of the remote device or of a mechanism for controlling the remote device may be manifested on display device 105, and a command can be selected by touching the stylus to a prescribed location in the rendering. The position where the stylus contacts display device 105 is registered and fed to processor 101, which translates this information into a command for controlling the remote device. The command is then transmitted to the remote device over a wireless connection using signal transmitter/receiver device ("transceiver") 108.

Also included in computer system 100 of FIG. 2 is an input device 106 that in one implementation is a stroke or character recognition pad (e.g., a "digitizer"). Input device 106 can communicate information and command selections to processor 101. Input device 106 is capable of registering a position where a stylus (or an element having the functionality of a stylus) makes contact. Input device 106 also has the capability of registering movements of a stylus (or an element having the functionality of a stylus) across or above the surface of input device 106.

In accordance with the present invention, in one embodiment, a stylus can be used for making a stroke or inscribing a character on the surface of input device 106. The stroke or character information is then fed to a processor 101 for automatic character recognition. Once the stroke or character information is recognized, it can be displayed on display device 105 for verification and/or modification.

In accordance with the present invention, stroke information entered onto input device 106 can correspond to a command that can be used to control a remote device. That is, particular strokes or characters can correspond to a respective command. A stroke or character is recognized by processor 101 and translated by processor 101 into a command for controlling a remote device. The command is then transmitted to the remote device over a wireless connection using transceiver 108.

With reference still to FIG. 2, transceiver 108 is coupled to bus 110 and enables computer system 100 to communicate wirelessly with other electronic devices coupled in a piconet or scatternet (refer to FIG. 1). It should be appreciated that within the present embodiment, transceiver 108 is coupled to an antenna and provides the functionality to transmit and receive information over a wireless communication interface. In one embodiment, transceiver 108 is a Bluetooth device. Additional information with regard to the Bluetooth embodiment is provided in conjunction with FIGS. 4A and 4B.

FIG. 3 is a perspective illustration of the top-side face 100a of one embodiment of the portable computer system 100 (FIG. 2) in accordance with the present invention. The top-side face 100a contains one or more dedicated and/or programmable buttons 75 for selecting information and causing the computer system to implement functions. The on/off button 95 is also shown.

In the present embodiment, the top-side face 100a contains a display device 105 typically surrounded by a bezel or cover. A removable stylus element 90 is also shown. The

display device 105 is a touch screen capable of registering contact between the screen and the tip of the stylus element 90. The top-side face 100a also contains an input device 106 that in one implementation is a stroke or character recognition pad. Input device 106 is a touch screen type of device capable of registering contact with a tip of stylus element 90, and also can register movements of the stylus element. The stylus element 90 can be of any shape and material to make contact with the display device 105 and input device 106.

FIGS. 4A and 4B are block diagrams of one embodiment of a transceiver 108 in accordance with the present invention. In a preferred embodiment (the "Bluetooth embodiment", transceiver 108 is a Bluetooth device comprising a digital component (e.g., a Bluetooth controller) and an analog component (e.g., a Bluetooth radio). In accordance with the present invention, a transceiver 108 is coupled via a system bus 110 to a system or device that will be used to control remote devices (e.g., portable computer system 100 of FIG. 2). Similarly, a transceiver 108 is coupled via a connector 250 to each remote device that is to be controlled (e.g., external device 290).

With reference to both FIGS. 4A and 4B, in the present embodiment, transceiver 108 comprises an antenna 205 for receiving or transmitting radio signals, a radio frequency (RF) module 210, a link controller 220, a microcontroller (or central processing unit) 230, and an external interface 240.

In the Bluetooth embodiment, RF module 210 is a Bluetooth radio. Bluetooth radios operate in the ISM (Industrial, Scientific, Medical) band at 2.4 GHz. A frequency hop transceiver is applied to combat interference and fading. Bluetooth uses a packet-switching protocol based on a frequency hop scheme with 1600 hops/second. Slots can be reserved for synchronous packets. A packet nominally covers a single slot, but can be extended to cover up to five slots. Each packet is transmitted in a different hop frequency. The entire available frequency spectrum is used with 79 hops of one (1) MHz bandwidth, defined analogous to the IEEE 802.11 standard. The frequency hopping scheme is combined with fast ARQ (Automatic Repeat Request), cyclic redundancy check (CRC) and Forward Error Correction (FEC) for data.

In the present embodiment, link controller 220 is a hardware digital signal processor for performing baseband processing as well as other functions such as Quality-of-Service, asynchronous transfers, synchronous transfers, audio coding, and encryption.

In one embodiment, microcontroller 230 is an application specific integrated circuit (ASIC). In the Bluetooth embodiment, microcontroller 230 is a separate central processing unit (CPU) core for managing transceiver 108 and for handling some inquiries and requests without having to involve the host device. In the Bluetooth embodiment, microcontroller 230 runs software that discovers and communicates with other Bluetooth devices via the Link Manager Protocol (LMP). The LMP provides a number of services including sending and receiving of data, inquiring of and reporting a name or device identifier, making and responding to link address inquiries, connection setup, authentication, and link mode negotiation and setup. The LMP also can be used to place transceiver 108 in "sniff" mode, "hold" mode, "park" mode or "standby" mode (refer to FIG. 5 below).

With reference still to FIGS. 4A and 4B, in the present embodiment, interface 240 is for coupling transceiver 108 to portable computer system 100 or to external device 290 in a suitable format (e.g., USB, PCMCIA, PCI, CardBus, PC

Card, etc.). In the present embodiment, interface 240 runs software that allows transceiver 108 to interface with portable computer system 100 or external device 290.

FIG. 5 illustrates the different operating modes of a wireless transceiver 108 (FIGS. 4A and 4B) in accordance with one embodiment of the present invention. In the Bluetooth embodiment, before any connections between Bluetooth devices are created, all devices are in standby mode (502). In this mode, an unconnected unit "listens" for messages at a regular rate (e.g., every 1.28 seconds) on a set of hop frequencies defined for that unit. The hold mode (514) is a power saving mode that can be used for connected units if no data need to be transmitted. The sniff mode (516) and park mode (512) are also low power modes. In the sniff mode, a device listens to the piconet at a reduced rate (relative to the regular rate), thus reducing its duty cycle. The sniff interval is programmable and depends on the application. In the park mode, a device is still synchronized to the piconet but does not participate in the traffic.

A connection between devices is made by a "page" message (506) if the address is already known, or by an "inquiry" message (504) followed by a subsequent page message if the address is unknown. When connected (510), data can be transmitted (508) between devices.

FIG. 6 illustrates the flow of messages between a controlling device (e.g., portable computer system 100) and remote devices to be controlled (610, 620 and 630) in accordance with the present embodiment of the present invention. In one embodiment, portable computer system 100 and remote devices 610-630 are Bluetooth devices or Bluetooth-enabled devices.

In the present embodiment, when it is necessary to locate and identify compliant devices, portable computer system 100 transmits a broadcast message 640 (e.g., an inquiry 504) that is received by compliant remote devices 610-630. For example, a user with portable computer system 100 enters a room containing remote devices 610-630. Portable computer system 100, either automatically or in response to a user input, transmits broadcast message 640 for the purpose of discovering compliant devices in the room.

As compliant devices, remote devices 610-630 respond to broadcast message 640 via responses 650a, 650b and 650c, respectively. In the present embodiment, responses 650a-c include the Medium Access Control (MAC) address for remote devices 610-630. Typically, each remote device is assigned a temporary MAC address for the duration of the connection. All communications between portable computer system 100 and a remote device carry the MAC address of the remote device. Responses 650a-c can also include information characterizing, for example, the type and capabilities of each remote device. This information may include an identifier that can be used by portable computer system 100 to characterize the remote device based on information stored in a database or lookup table.

Portable computer system 100 can then transmit a command 660 to a selected remote device (e.g., remote device B 620). Command 660 is a command for controlling the remote device in some prescribed manner (e.g., turning the device off or on, raising or lowering a level, etc.) based on the type of device and its capabilities. In accordance with the present invention, a second device can be selected (e.g., remote device C 630), and a command 670 can be transmitted to that device.

In the present embodiment, when a connection between portable computer system 100 and a remote device has already been established, or when the MAC address of the

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remote device is known, broadcast message 640 is a page 506 (FIG. 5) instead of an inquiry 504.

FIG. 7 illustrates one embodiment of a display used on a controlling device (e.g., portable computer system 100) in accordance with the present invention. As described above, portable computer system 100 includes a display device 105, an input device 106, and a stylus element 90.

In this embodiment, with reference also to FIG. 6, each of the remote devices 610-630 have sent a response 650a-c, respectively, to portable computer system 100 in response to broadcast message 640. Accordingly, each of remote devices 610-630 are indicated on display device 105. For example, an icon can be used to represent each remote device, each remote device can be identified by its name in a menu, etc. It is appreciated that other mechanisms may be used to indicate a remote device on display device 105 in accordance with present invention.

In the present embodiment, a user can then select one of the remote devices by touching stylus element 90 to display device 105. It is appreciated that an element other than stylus element 90 can be used to make a selection, or that another mechanism may be used to make a selection. For example, the user may simply touch the screen, or an on-screen cursor of some type may be used.

FIG. 8 illustrates another embodiment of a display used on a controlling device (e.g., portable computer system 100) in accordance with the present invention. In this embodiment, a connection has been established between the controlling device and the device to be controlled, and the characteristics of the device to be controlled have been identified. In this embodiment, display device 105 displays a rendering of a mechanism that can be used to control the remote device, such as an on/off switch. In the present embodiment, a user can turn the remote device on by touching stylus element 90 to position 802 in the rendering, and can turn the remote device off by touching stylus element 90 to position 804. However, it is appreciated that an element other than stylus element 90 can be used to make a selection, or that another mechanism may be used to make a selection.

In one embodiment, a user can also control the remote device using input device 106. As described above, input device 106 is adapted to recognize movements of stylus 90 on or above the surface of input device 106, and to translate particular movements into particular commands. Thus, for example, a user might turn on the remote device by writing the word "on" using input device 106. Alternatively, a user might instead write a character that represents the command "on" in some type of shortened version, or might make a stroke that represents this command. It is appreciated that other mechanisms, styles, and methods can be used to input a command using input device 106 in accordance with the present invention.

FIG. 9 illustrates another embodiment of a display used on a controlling device (e.g., portable computer system 100) in accordance with the present invention. In this embodiment, a connection has been established between the controlling device and the device to be controlled, and the characteristics of the device to be controlled have been identified. In this embodiment, display device 105 displays a menu 910 of commands for the remote device, such as an "on" command and an "off" command. In the present embodiment, a user can turn the remote device on by touching stylus element 90 to a particular position in the menu 910. It is appreciated that an element other than stylus element 90 can be used to make a selection, or that another mechanism may be used to make a selection.

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FIG. 10 illustrates a display on a controlling device (e.g., portable computer system 100) responding to movement on an input device 106 in accordance with one embodiment of the present invention. In this embodiment, a connection has been established between the controlling device and the device to be controlled, and the characteristics of the device to be controlled have been identified. In this embodiment, for example, a variable level of the remote device is to be controlled (e.g., a level of brightness if the remote device is a light).

In the present embodiment, the level to be controlled is indicated by an indicator 1020 displayed on display device 105. A user touches stylus element 90 to input device 106, and moves the stylus as indicated by stroke 1010. In response to the motion of the stylus across input device 106, indicator 1020 moves in a corresponding manner along the path 1030. That is, motion is imparted to indicator 1020 by moving stylus element 90 on input device 106. It is appreciated that an element other than stylus element 90, or another type of mechanism, can be used with input device 106.

It is appreciated that, in accordance with the present invention, different mechanisms for controlling the remote device can be rendered on display device 105, different types of movement can be used with input device 106, and different types of motion can be imparted to the rendering on display device 105 in response to the movements on input device 106. In accordance with the present embodiment of the present invention, either the motion of the stylus itself or the corresponding motion of the rendering can be translated into a command for controlling the remote device.

FIG. 11 is a flowchart of the steps in a process 1100 for controlling a remote device over a wireless connection in accordance with one embodiment of the present invention. In step 1110, a wireless connection is established between the controlling device (e.g., portable computer system 100 of FIG. 6) and a remote device or remote devices to be controlled (e.g., remote devices 610, 620 and 630 of FIG. 6). As described above, if the MAC addresses of remote devices 610-630 are known, then a page 506 (FIG. 5) is used by portable computer system 100; otherwise, an inquiry 504 (FIG. 5) is used. In response to the broadcast message, each of remote devices 610-630 sends a response to portable computer system 100. In the Bluetooth embodiment, the broadcast message and the responses are transmitted using radio signals.

In one embodiment, the characteristics and capabilities of remote devices 610-630 are identified in the response. In another embodiment, the characteristics and capabilities of various types of devices are stored in a database or lookup table in a memory unit of portable computer system 100. In this latter embodiment, the responses from the remote devices include an identifier that can be used by portable computer system 100 to retrieve the characteristics and capabilities of remote devices 610-630 from memory.

In step 1120 of FIG. 11, each of the remote devices (e.g., remote devices 610-630) responding to the broadcast message is manifested on portable computer system 100. In one embodiment, each remote device is indicated on display device 105 of portable computer system 100 (refer to FIG. 7). The characteristics and capabilities of each remote device 610-630 are linked to the indications (e.g., icons) on display device 105.

In step 1130, one of the remote devices 610-630 is selected by a user. In one embodiment, the user makes a selection by touching a stylus (e.g., stylus element 90 of

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FIG. 7) to the screen of display device 105. It is appreciated that, if only one remote device is present or if a response is received from only one remote device, then step 1130 may be bypassed.

In step 1140 of FIG. 11, as described above in conjunction with FIGS. 8, 9 and 10, a user can input a command for controlling any of remote devices 610-630 using display device 105 and/or input device 106. In various embodiments, display device 105 displays a rendering of the remote device, a rendering of a mechanism for controlling the remote device, or a menu of commands for controlling the remote device. In one embodiment, a user can use stylus element 90 to make contact with the surface of display device 105. The position where stylus element 90 contacts the surface of input device 105 is registered and translated into a particular command.

In another embodiment, a user can input a command using input device 106 and stylus element 90, by inscribing a command or by using a character or stroke that represents a command. In these cases, input device 106 registers the movement of the stylus and translates the movement into a particular command. In another embodiment, a user can impart motion to the rendering of the remote device displayed on display device 105 by moving stylus element 90 on input device 106. The motion of the stylus or the corresponding motion of the rendering can be translated into a command for controlling the remote device.

In step 1150 of FIG. 11, the command (e.g., command 660 of FIG. 6) is transmitted to the remote device. In accordance with the present invention, additional commands can also be sent to the remote device. In the Bluetooth embodiment, commands are transmitted via a radio signal.

In the case in which more than one remote device is to be controlled, another remote device can be selected as in step 1130, and commands can be input and transmitted to that device as described above. Furthermore, portable computer system 100 can be transported to a new location (e.g., another room), and process 1100 can be repeated to locate and identify compliant remote devices in the new location, establish connections with those devices, and specify and transmit commands for controlling those devices. The processing power and intelligence of portable computer system 100 in combination with the processing power and intelligence of each transceiver 108 (in both portable computer system 100 and in the remote device; refer to FIGS. 4A and 4B) permit portable computer system 100 to be updated as needed, so that it can operate as a universal remote control device for a multiplicity of different devices, including new devices.

Thus, the present invention provides a system and method that can be used to remotely control a variety of different devices. In one embodiment, the present invention provides a system (e.g., a Bluetooth-enabled device, specifically a portable computer system) that can be used to remotely control compliant devices (e.g., other Bluetooth-enabled devices) over a wireless (radio) connection. With a radio connection, the system of the present invention is not limited to line-of-sight applications. Remote devices can be adapted to receive commands over the wireless connection, obviating the need for hardwire connections and making the system relatively easy to implement in homes and businesses. The processing power and other features of the portable computer system enable user-friendly interfaces, and also allow a variety of remote devices to be controlled, including new devices introduced into the home or business.

The preferred embodiment of the present invention, portable device control console with wireless connection, is

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thus described. While the present invention has been described in particular embodiments, it should be appreciated that the present invention should not be construed as limited by such embodiments, but rather construed according to the following claims.

What is claimed is:

1. A method for controlling a remote devices over a wireless connection, said method comprising:

a) establishing said wireless connection between a transceiver and said remote device by:

broadcasting a message, said message for locating remote devices within range of said transceiver; and receiving a response from said remote device;

b) manifesting said remote device on a display device;

c) registering a position where contact is made with a surface of an input device, wherein a particular position on said input device is translated into a particular command for controlling said remote device; and

d) transmitting a command to said remote device over said wireless connection.

2. The method as recited in claim 1 wherein said step c) comprises the step of:

registering a position where a stylus element makes contact with said surface of said input device.

3. The method as recited in claim 2 wherein said step c) further comprises the step of:

recognizing a movement of said stylus element over said surface of said input device, wherein a particular movement of said stylus element is translated into a particular command for controlling said remote device.

4. The method as recited in claim 2 further comprising the step of:

registering a position where said stylus element makes contact with a screen of said display device, wherein a particular position on said screen is translated into a particular command for controlling said remote device.

5. The method as recited in claim 1 further comprising the steps of:

receiving responses from a plurality of remote devices; manifesting each of said plurality of remote devices on said display device; and

selecting one of said plurality of remote devices.

6. The method as recited in claim 1 further comprising the step of:

displaying on said display device a rendering of a mechanism for controlling said remote device.

7. The method as recited in claim 6 further comprising the step of:

contacting a particular position in said rendering, wherein said contacting is translated into a particular command corresponding to said particular position.

8. The method as recited in claim 6 further comprising the step of:

imparting motion to said rendering in response to movement of a stylus element over said surface of said input device.

9. The method as recited in claim 1 further comprising the steps of:

displaying on said display device a menu of commands for controlling said remote device; and

contacting a particular position in said menu, wherein said contacting is translated into a particular command corresponding to said particular position.

10. The method as recited in claim 1 wherein said transceiver and said remote device are Bluetooth-enabled devices.



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11. A computer system comprising:  
 a bus;  
 a processor coupled to said bus;  
 a transceiver coupled to said bus;  
 a display device coupled to said bus; and  
 an input device coupled to said bus;  
 said processor for performing a method for controlling a remote device over a wireless connection, said method comprising the computer-implemented steps of:  
 a) establishing said wireless connection between said transceiver and said remote device by:  
   broadcasting a message, said message for locating remote devices within range of said transceiver;  
   and  
   receiving a response from said remote device;  
 b) manifesting said remote device on a display device;  
 c) registering a position where contact is made with a surface of an input device, wherein a particular position on said input device is translated into a particular command for controlling said remote device; and  
 d) transmitting a command to said remote device over said wireless connection.

12. The computer system of claim 11 wherein said step c) of said method comprises the step of:  
 registering a position where a stylus element makes contact with said surface of said input device.

13. The computer system of claim 12 wherein said step c) of said method further comprises the step of:  
 recognizing a movement of said stylus element over said surface of said input device, wherein a particular movement of said stylus element is translated into a particular command for controlling said remote device.

14. The computer system of claim 12 wherein said method further comprises the steps of:  
 registering a position where said stylus element makes contact with a screen of said display device, wherein a particular position on said screen is translated into a particular command for controlling said remote device.

15. The computer system of claim 11 wherein said method further comprises the steps of:  
 receiving responses from a plurality of remote devices;  
 manifesting each of said plurality of remote devices on said display device; and  
 selecting one of said plurality of remote devices.

16. The computer system of claim 11 further comprising the step of:  
 displaying on said display device a rendering of a mechanism for controlling said remote device.

17. The computer system of claim 16 wherein said method further comprises the step of:  
 contacting a particular position in said rendering, wherein said contacting is translated into a particular command corresponding to said particular position.

18. The computer system of claim 16 wherein said method further comprises the step of:  
 imparting motion to said rendering in response to movement of a stylus element over said surface of said input device.

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19. The computer system of claim 11 wherein said method further comprises the steps of:  
 displaying on said display device a menu of commands for controlling said remote device; and  
 contacting a particular position in said menu, wherein said contacting is translated into a particular command corresponding to said particular position.

20. The computer system of claim 11 wherein said transceiver and said remote device are Bluetooth-enabled devices.

21. A hand-held computer system for controlling a remote device over a radio connection, said system comprising:  
 a bus;  
 a processor coupled to said bus;  
 a transceiver coupled to said bus, said transceiver for transmitting commands for controlling said remote device over said radio connection, wherein said transceiver is adapted to broadcast a message for locating remote devices within range of said transceiver, wherein each remote device responding to said message is indicated on said display device;  
 a display device coupled to said bus, said display device adapted to register a position where a stylus element makes contact with a screen of said display device, wherein a particular position on said screen is translated into a particular command for controlling said remote device; and  
 an input device coupled to said bus, said input device adapted to register a position where a stylus element makes contact with a surface of said input device, wherein a particular position on said input device is translated into a particular command for controlling said remote device.

22. The computer system of claim 21 wherein said input device is adapted to recognize a movement of said stylus element over said surface of said input device, wherein a particular movement of said stylus element is translated into a particular command for controlling said remote device.

23. The computer system of claim 21 wherein said transceiver and said remote device are Bluetooth-enabled devices.

24. The computer system of claim 21 wherein said display device is adapted to display a rendering of a mechanism for controlling said remote device.

25. The computer system of claim 24 wherein said display device is adapted to register a position where said stylus element makes contact within said rendering, wherein a particular position within said rendering is translated into a particular command for controlling said remote device.

26. The computer system of claim 24 wherein said display device is adapted to impart motion to said rendering in response to movement of said stylus element over said surface of said input device.

27. The computer system of claim 21 wherein said display device is adapted to display a menu of commands for controlling said remote device.

\* \* \* \* \*

# **EXHIBIT 9**



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**Berman et al.**

(10) **Patent No.:** **US 6,502,194 B1**

(45) **Date of Patent:** **Dec. 31, 2002**

(54) **SYSTEM FOR PLAYBACK OF NETWORK AUDIO MATERIAL ON DEMAND**

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(52) **U.S. Cl.:** **713/201; 713/200; 709/231; 370/231; 370/352; 370/310; 370/468; 705/51; 705/26**

(58) **Field of Search:** **705/51, 57, 26, 705/27; 713/200, 201; 370/69.1, 231, 352, 354, 310, 468; 709/231, 233, 235**

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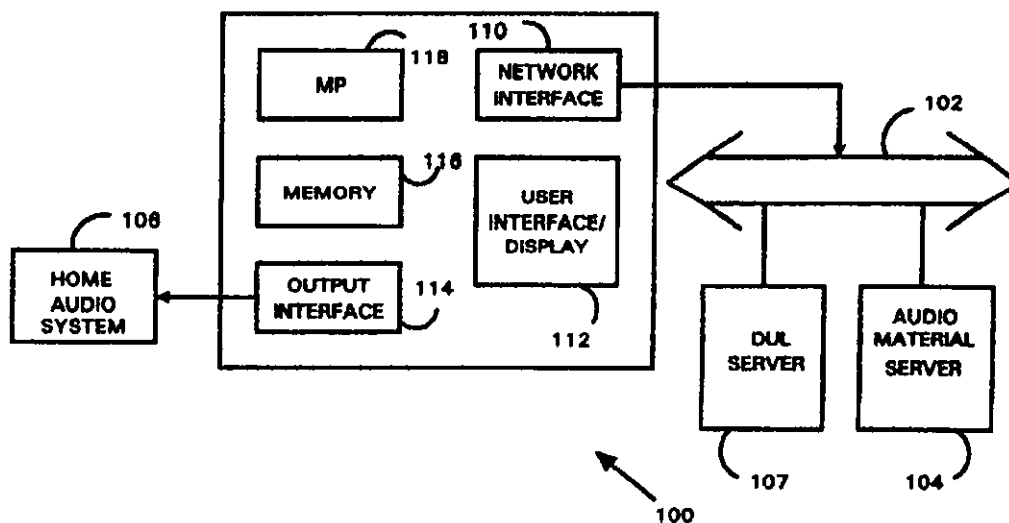
*Primary Examiner*—Ly V. Hua

(74) *Attorney, Agent, or Firm*—David A. Hall

(57) **ABSTRACT**

A playback unit resembling a home audio component, retrieves audio data from a remote server and plays them back in real time, using a home audio system, in response to user selection. The playback unit provides an interface between a network source for audio material, such as the Internet, and a conventional home audio system for playback. The playback unit has a relatively simple operating system that does not require a lengthy boot-up sequence, cannot be accessed by the user, and does not require the launch of special software to initiate playback. Access to audio material and distribution rights can be controlled by network servers. In this way, the playback unit can retrieve audio material from the network on demand, thereby vastly expanding the range of music available for playback, and can reproduce that music using the home audio system for high quality playback in a comfortable setting, with controlled access to audio material and controlled distribution and duplication of the material.

**24 Claims, 10 Drawing Sheets**



**EXHIBIT**  
Borc 5-29-14  
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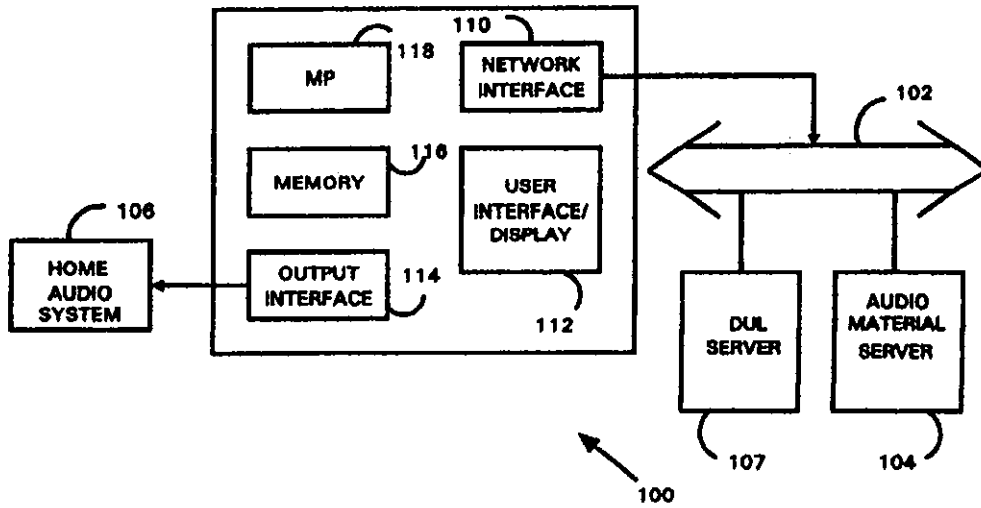


FIG. 1

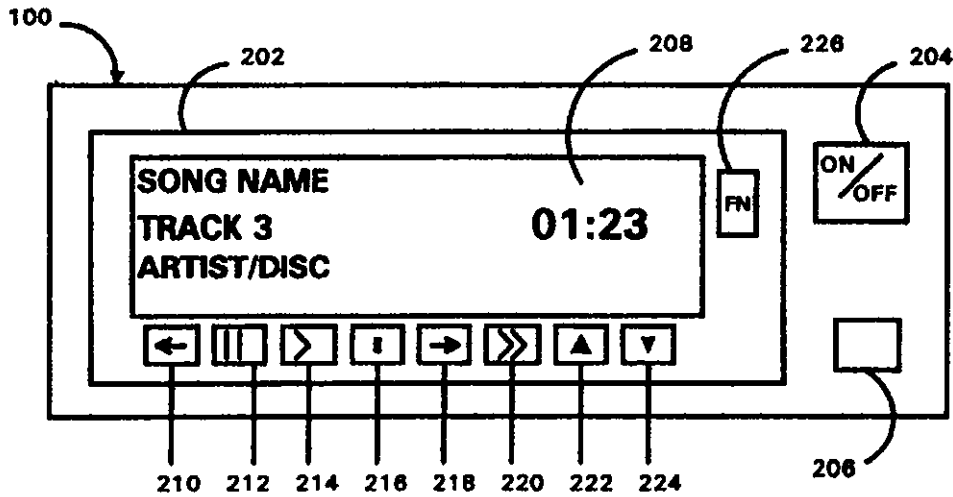


FIG. 2

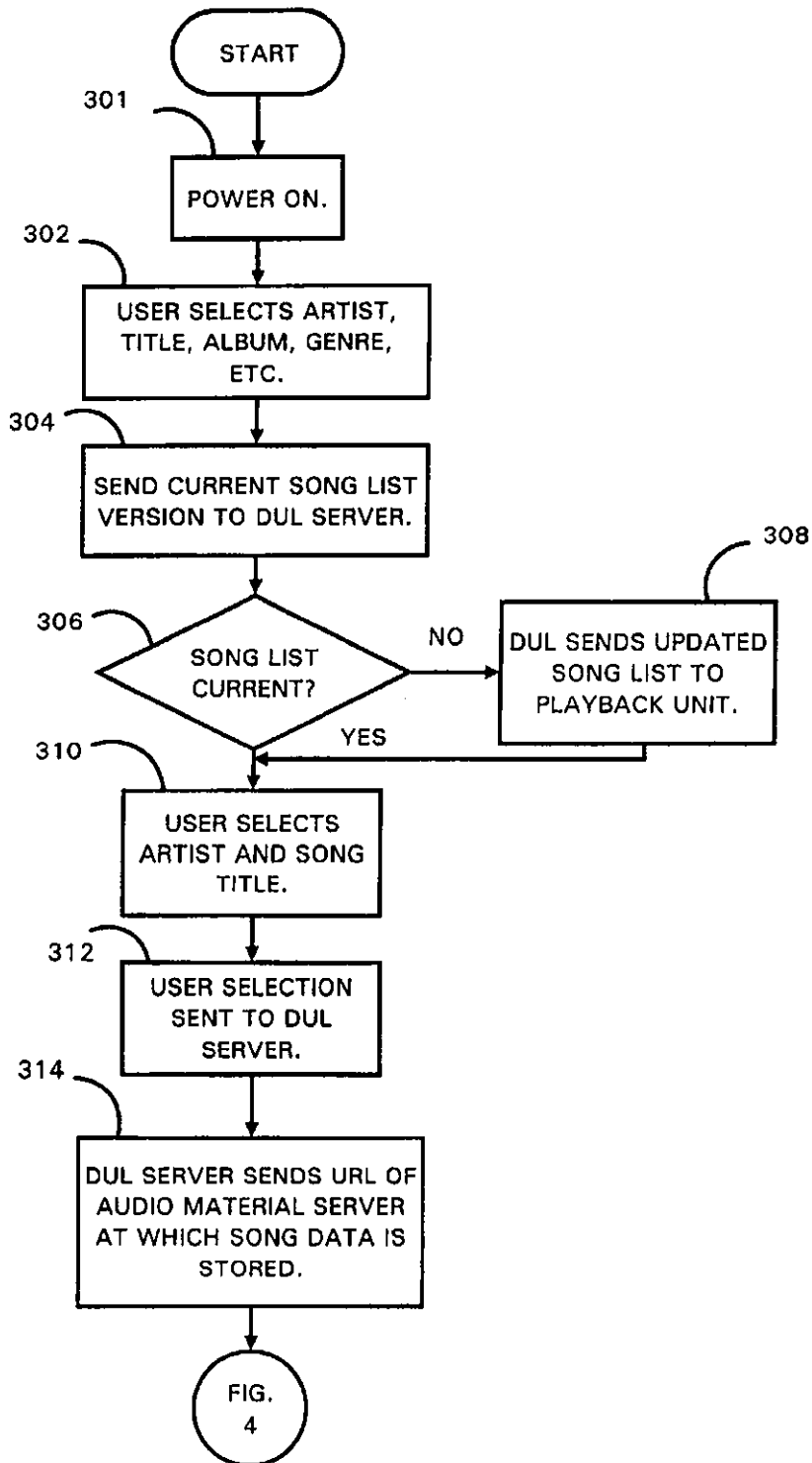


FIG. 3

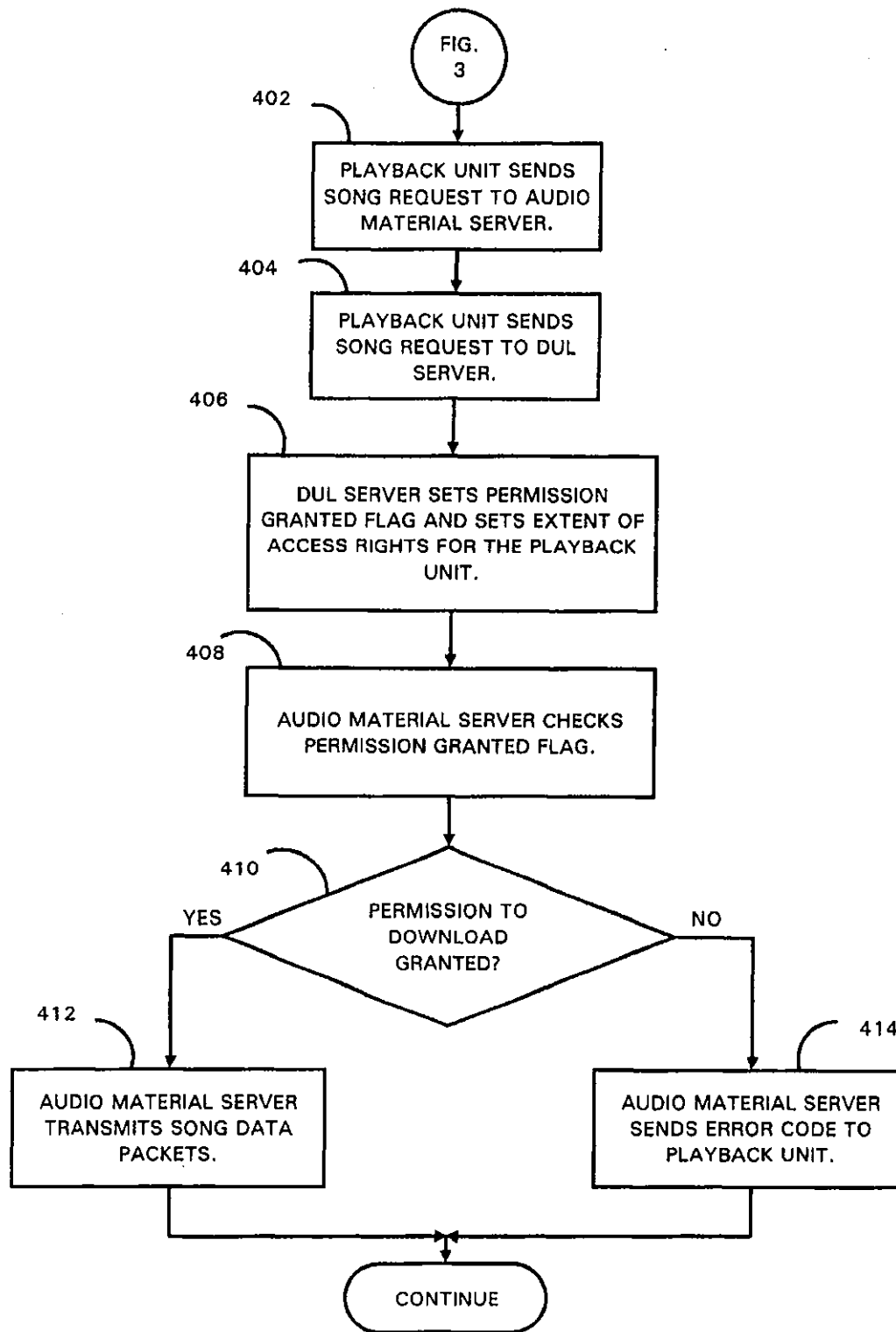


FIG. 4

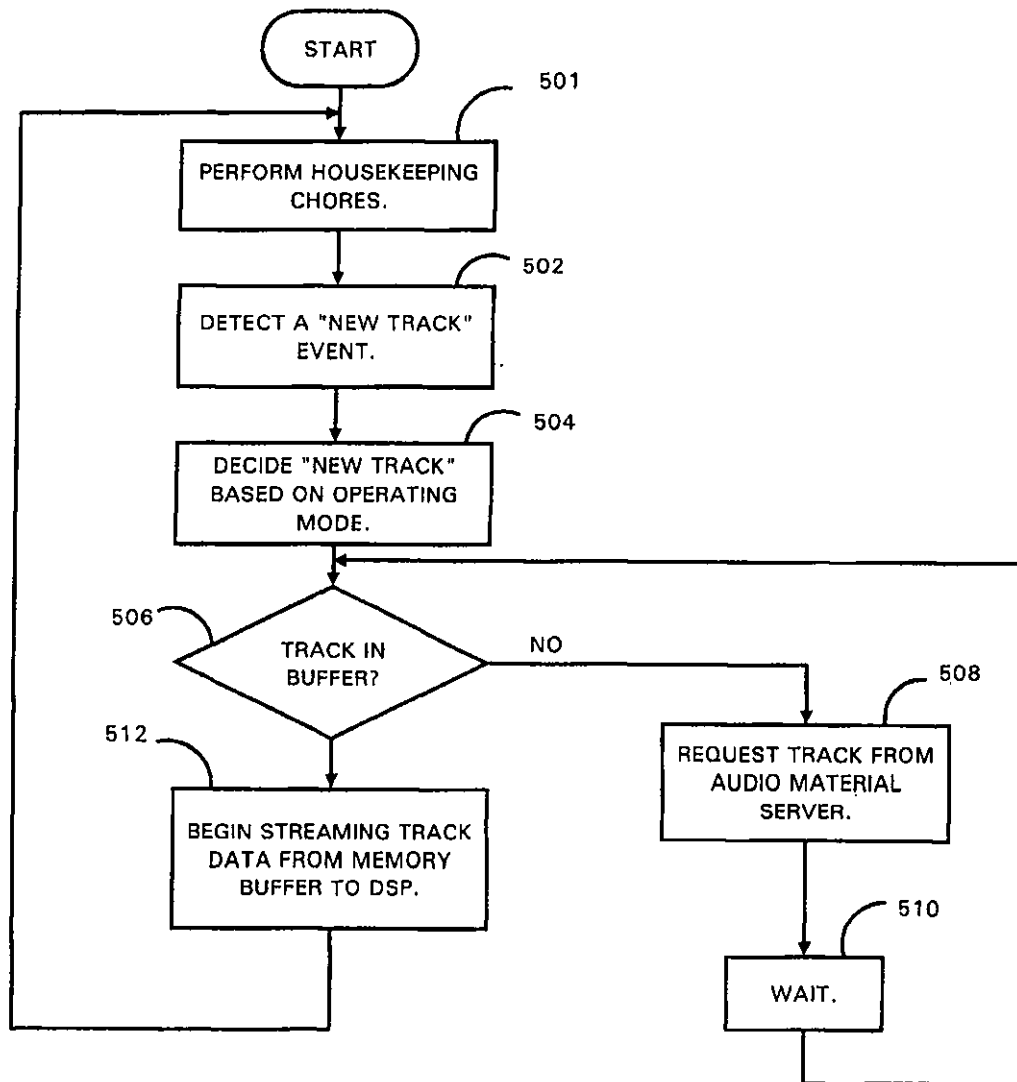


FIG. 5

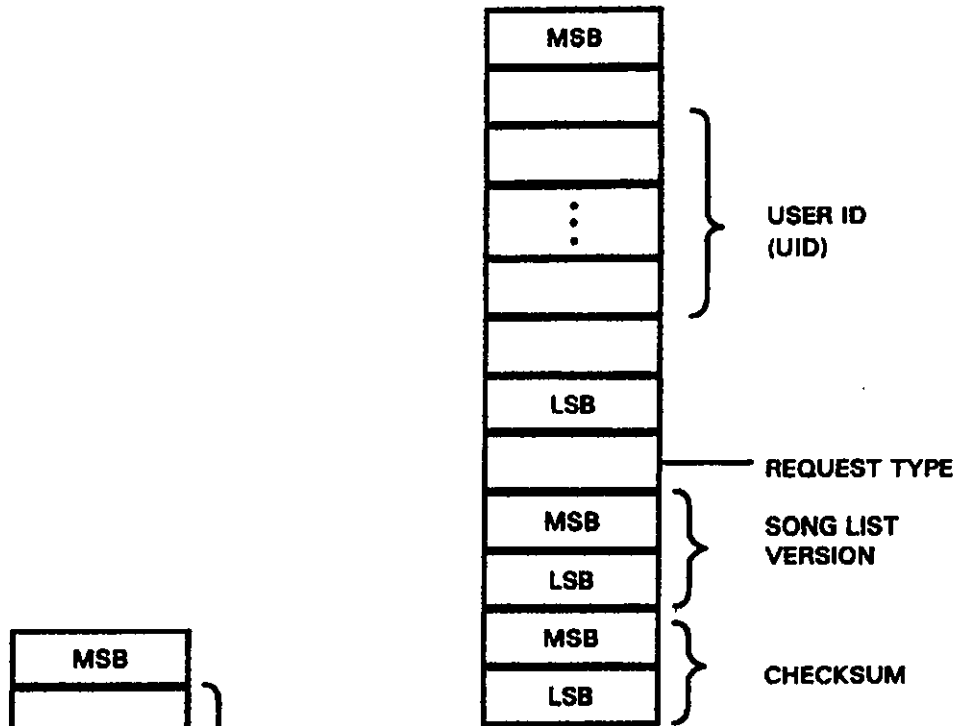


FIG. 6

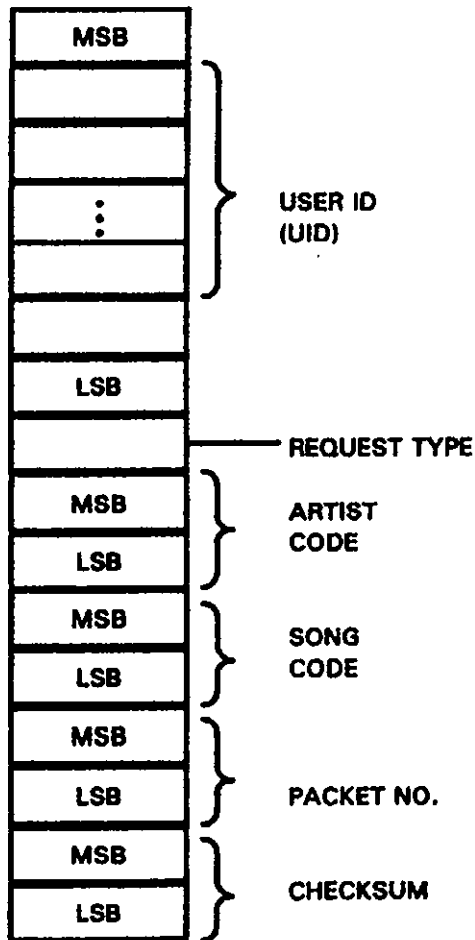


FIG. 7



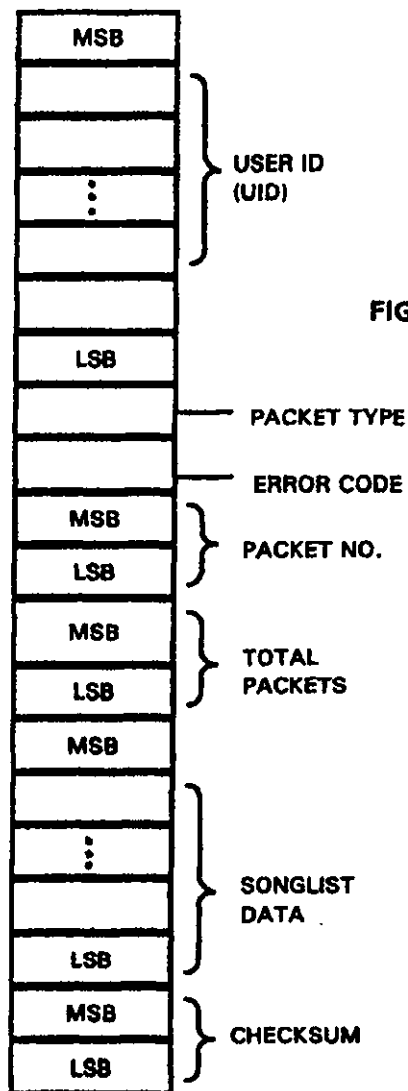


FIG. 8

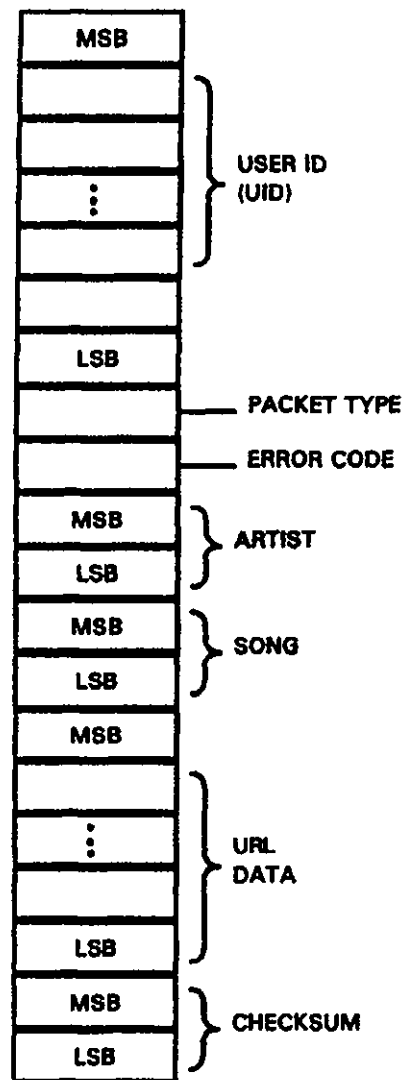


FIG. 9

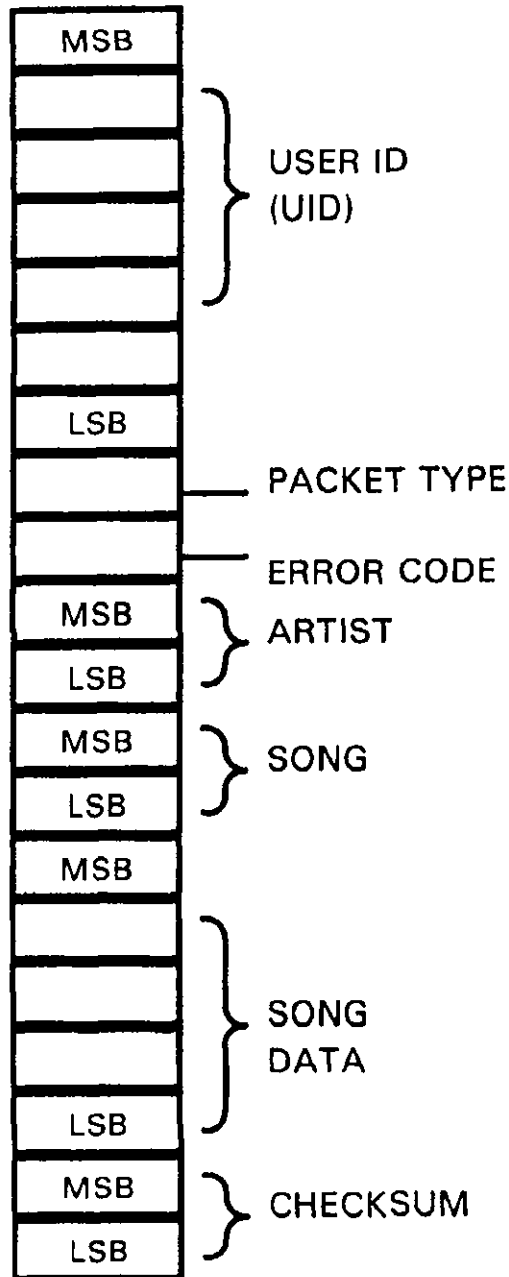


FIG. 10

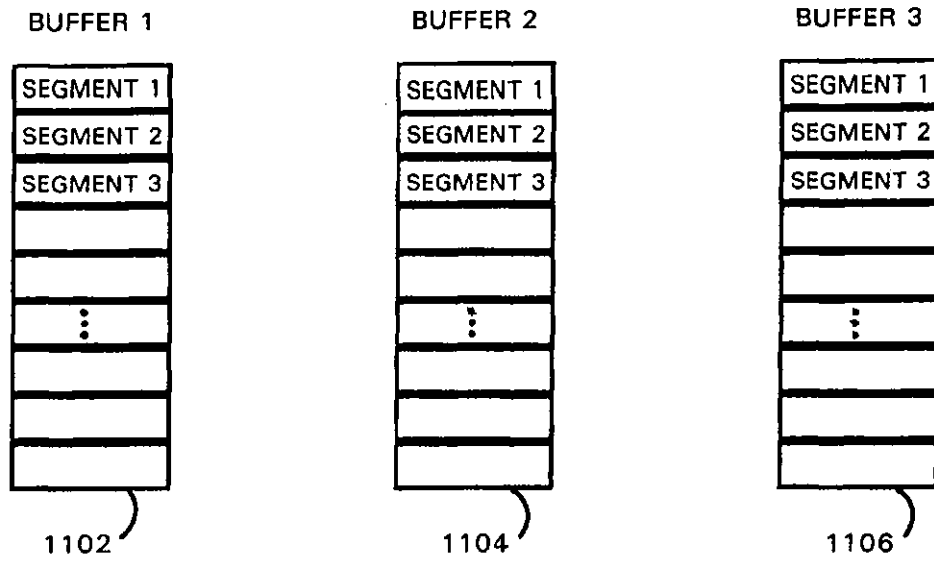


FIG. 11

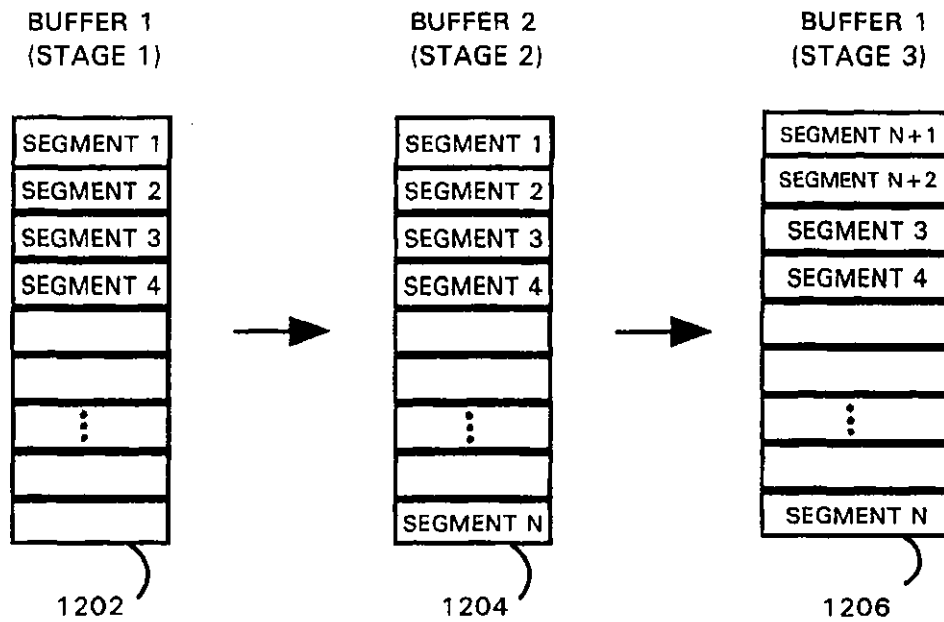


FIG. 12

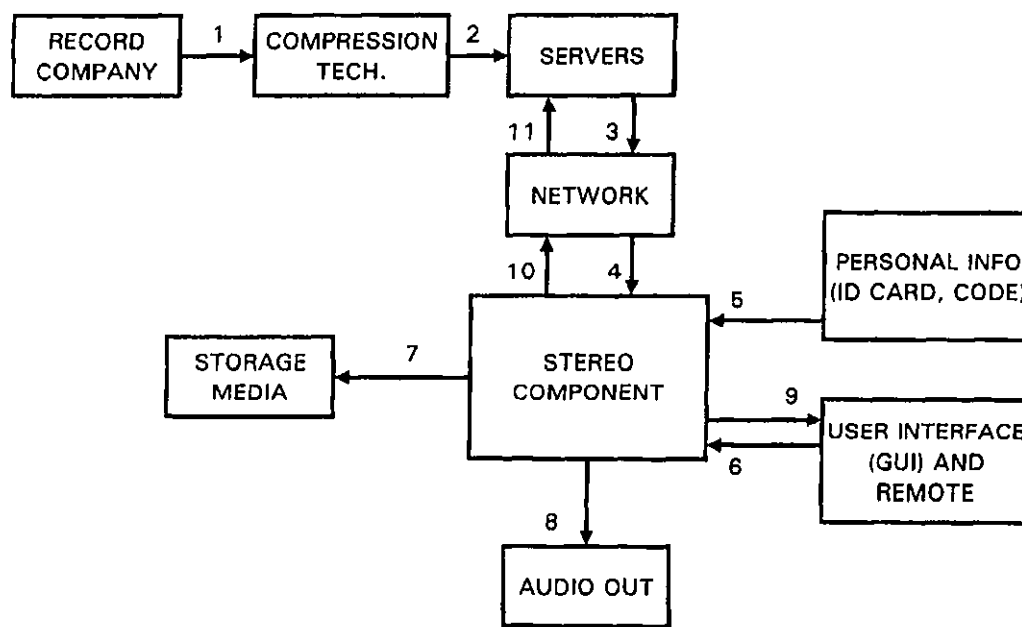


FIG. 13

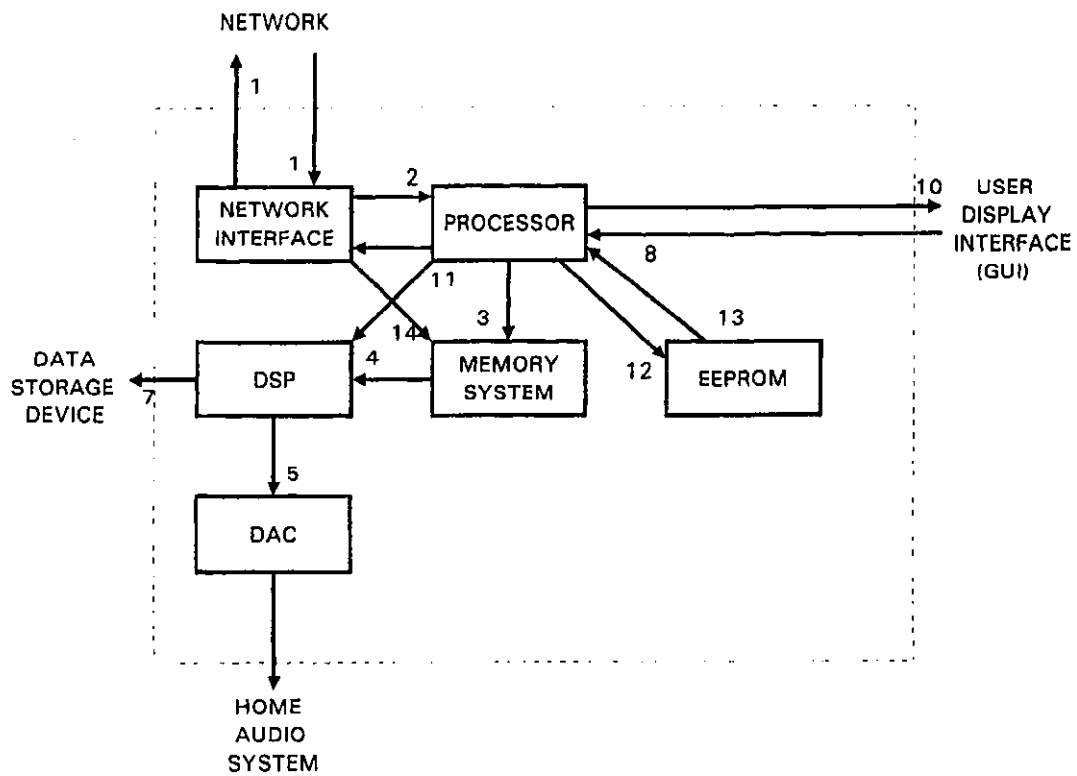


FIG. 14

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## SYSTEM FOR PLAYBACK OF NETWORK AUDIO MATERIAL ON DEMAND

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention relates generally to music playback systems and, more particularly, to playback of network audio material in response to user command.

#### 2. Description of the Related Art

Two popular means of listening to digitally encoded audio material are conventional home audio music playback systems that include conventional media players that reproduce recorded music information and computer-based systems that typically include a standard personal computer (PC) or similar machine capable of utilizing a variety of digital music formats, including pre-recorded media and computer audio files. Both types of systems permit users to initiate playback of a selected piece of audio material, such as recorded songs or other music.

Conventional home audio music systems typically include a player that accepts media encoded with digital audio material. Such media include the compact disc (CD), MiniDisc (MD), and digital audio tape (DAT) formats. The CD format comprises a plastic-coated aluminum substrate from which digital audio material can be optically retrieved. The MiniDisc is a magneto-optical storage format. The DAT format comprises a tape substrate with a magnetic recording layer in which digital audio material is magnetically recorded. The CD format is the most popular current means of delivering recorded music and offers the largest library of recorded works for selection. Other popular media for playback of digital music information include the "Laserdisc" (LD) format and the "Digital Video Disc" (DVD) format, both of which can combine video information with music or other digital audio information. All of these formats offer a relatively stable recording media, high quality audio reproduction, convenient storage and playback, and simple operation of players.

Home audio players, such as CD players and DAT players, can provide exceptional quality sound reproduction, made all the better because such players are typically connected to a relatively good quality, home high-fidelity music system. The CD format discs are convenient because they are especially easy to store and take up comparatively little storage space. Playback of CDs also is convenient, because the CD player is ready to read the digital audio material upon power-up of (application of electrical power to) the player. For playback the discs are simply inserted into a CD player's tray or slot and started with simple one-button operation. In addition, such home music systems are typically arranged in a comfortable setting within the home. Such home music systems typically include, in addition to the CD player that reads the digital audio material and produces a playback signal, one or more amplification and control devices, signal processors, and power amplifiers to process and amplify the analog playback signal, and also a set of loudspeakers, to receive the amplified playback signal and convert it to sound.

Home music systems permit a user to initiate playback on demand by the selection of an appropriate disc or tape media. The selection, however, must be made from the user's personal collection of media on hand, which limits the available music to that which the user has purchased, borrowed, or otherwise received. This limits the repertoire from which the user may select and discourages many users

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from review of and experimentation with audio material and musical products. This is undesirable from the perspective of the music industry, because it is believed that such experimentation and review can lead to further sales of recorded audio material. Borrowing media from another user or from a commercial enterprise, thereby expanding the library of material available to include that which is maintained by acquaintances or rental shops but this is not convenient.

In contrast to the home audio system with CD or DAT player, the conventional computer-based system with appropriate software and hardware can provide music either from pre-recorded digital media or from computer audio files. For purposes of this discussion, the computer-based playback system will be referred to as a PC-based system, regardless of the computer on which it is based.

If the PC-based system includes a CD-ROM drive and sound card, for example, a CD with digital audio material can be inserted into the drive and the sound recorded on the CD can be listened to through PC speakers that receive output from the sound card. This mode of listening has the same limitations of repertoire as the home audio CD player. Moreover, the typical PC-based system does not have audio components as good as that of the typical home audio system, and is usually not located in as comfortable a setting as the typical home audio system.

A PC-based system with access to a network such as the Internet can, with the appropriate software, download audio material for playback. This audio material can comprise, for example, digitized sound clips stored as ".wav" files, MPEG (Motion Picture Experts Group) Audio Layer 3 (MP3) compressed-audio files, streaming audio formats for continuous play of audio material, and other digital formats for the storage of audio material, all of which can be stored on a fixed media and received by the PC. More recently, another sound file format called the Secure Digital Music Initiative (SDMI) has been proposed. Alternatively, the audio material can be received from a network file server, and then stored on the hard drive of the PC itself. Additional software can be used for convenient organization of downloaded music files. Other audio material may comprise streaming audio files, which require additional streaming audio playback software.

Such network downloading of music can vastly expand the repertoire from which the user may select, and encourages review of and experimentation with audio material. Again, however, the PC-based system provides limited enjoyment because the typical PC-based system does not have audio components as good as that of the typical home audio system, and is usually not located in as comfortable a setting as the typical home audio system. Furthermore, the PC-based system is not as convenient to use as the home audio system, because the PC is typically located in a work environment away from the home audio system, and the operating system of the PC requires an initial lengthy boot-up process that loads an operating system from peripheral storage, the launching of appropriate player software, and the navigation of a potentially complicated software interface with multiple windows and drop-down menus to select before initiating playback each time the user wants to listen to audio material.

In addition, operating a PC-based system, gaining Internet access, and downloading audio files can require computer skills not possessed by the average listener, in addition to requiring the initial purchase of the computer equipment. Peripheral playback devices also may need to be installed on the PC-based system, requiring knowledge of the operating system and peripheral interface, and some of these formats

only provide low-fidelity playback that is adequate for audio while working at the computer, but is not useful as an adjunct or replacement for the home audio system and CD player.

Some forms of PC-based systems also are meeting with resistance from commercial music industry interests and from artists because of the potential for widespread copyright violation and the difficulty of policing the download and duplication of audio information files by users. The availability of network databases and the download and duplication of audio files make it almost impossible to monitor and control the distribution of recorded musical performances. Some PC-based systems also may be problematic in view of governmental regulation, such as the Audio Home Recording Act passed by the U.S.A. legislature, which under certain conditions mandates a serial copy management system (SCMS) to control digital copying. It would be advantageous to provide a system that is capable of interfacing with home audio systems for high quality playback, that has access to the large repertoire possible through network databases, and would have the acceptance of commercial music interests and artists.

From the discussion above, it should be apparent that there is a need for a system that can provide playback of a wide range of audio material on demand, using the home audio system for high quality playback, without requiring sophisticated computer skills, and with controlled access to audio material and controlled distribution and duplication of the material. The present invention fulfills this need.

#### SUMMARY OF THE INVENTION

The present invention provides a system for playback of network audio material on demand by using a playback apparatus that provides an interface to network audio files that are retrieved in real time in response to user selection. In accordance with the invention, the playback unit provides an interface between a conventional home audio system and a network source for audio material, such as the Internet. The playback unit has a relatively simple built-in operating system that is not accessed from peripheral storage, does not require a lengthy boot-up sequence, and cannot be manipulated without the authorization of the manufacturer or network source. As a result, the playback unit can be operated without special computer skills or navigation of complicated PC-like windows. Receipt of audio material and enforcement of distribution rights can be controlled by network servers that provide the audio material to the playback unit. In this way, the playback unit can retrieve a wide range of digital audio material from the network on demand, thereby vastly expanding the range of music available for playback, can reproduce that music using the home audio system for high quality playback in a comfortable setting, and can provide controlled access to audio material and controlled distribution and duplication of the material.

The playback unit includes a user interface and display component, which presents an easy-to-use interface that simulates playback controls that might be found on a conventional player such as a CD player or DAF player. The user interface and display component substantially duplicates the appearance of a conventional home audio player control panel, such as CD player buttons and track displays. The playback unit also includes memory for holding program instructions and temporarily storing audio material for playback so it is not accessible to the user, and includes a microprocessor that controls operation of the playback unit. In one aspect of the invention, the playback unit includes a

network interface to communicate with the network, send user commands, and receive audio material. The network interface can communicate using a number of different protocols having a variety of physical connection schemes, such as telephone line modem connections, high-speed Ethernet connections, and cable modem connections. The playback unit also includes an output interface that receives the audio material and provides it to the home audio system in a format that can be reproduced by that system.

Other features and advantages of the present invention should be apparent from the following description of the preferred embodiment, which illustrates, by way of example, the principles of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a playback unit constructed in accordance with the present invention showing the connections to a home audio system and a network.

FIG. 2 is a representation of the screen display shown on the user interface of the playback unit illustrated in FIG. 1.

FIG. 3 and FIG. 4 are processing flow diagrams that illustrate the processing steps executed by the components illustrated in FIG. 1 to request, receive, and play audio material from the network.

FIG. 5 is a processing flow diagram that illustrates the processing steps executed by the playback unit processor illustrated in FIG. 1.

FIGS. 6, 7, 8, 9, and 10 are representations of packet information processed by the playback unit illustrated in FIG. 1.

FIG. 11 is a representation of the buffers contained in the memory illustrated in FIG. 1.

FIG. 12 is a representation of the loop buffering operations executed under control of the microprocessor illustrated in FIG. 1.

FIG. 13 is a data flow diagram of the FIG. 1 system operation, showing the information that is transmitted among the system components.

FIG. 14 is a data flow diagram of the playback unit operation, showing the information that is transmitted among the playback unit components.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates a playback unit 100 constructed in accordance with the present invention. The playback unit communicates over a network, such as the Internet 102, to request digital audio material from one or more audio material servers 104. The playback unit receives audio material from an audio material server and provides it to a conventional home audio system 106 for playback. The playback unit 100 has a simple operating system that accesses instructions from high-speed semiconductor memory, does not require a lengthy boot-up sequence, and cannot be manipulated by the user. Thus, the playback unit does not require the user to launch special software such as the "Windows 98" operating system by Microsoft Corporation to initiate playback, and therefore the playback unit is very stable in operation and can be operated without special computer skills or navigation of complicated PC-like windows. Access to the audio material and authority for distribution rights are preferably controlled by a directory and user list (DUL) server 107 described further below. In this way, the playback unit 100 can retrieve a wide range of digital audio material from the network upon user demand,

thereby vastly expanding the range of music available for playback, and can reproduce that music using the home audio system for high quality playback in a comfortable setting.

The playback unit 100 is most likely to be installed adjacent to the home audio equipment 106, which typically includes a variety of amplifier, processor, receiver, control, and record/playback units. The playback unit 100 comprises a stand-alone device that is preferably the same size as the individual home audio system devices, so as to be physically and aesthetically compatible with them. The playback unit includes a network interface 110 that provides a communication channel with the Internet 102 and to the audio material server 104. The network interface can communicate using a number of different protocols having a variety of physical connection schemes, such as telephone line modem connections, high-speed ISDN and Ethernet connections, and cable modem connections.

#### Playback Unit Components

The playback unit 100 includes a user interface and display component 112, which presents an easy-to-use interface that substantially duplicates the appearance of typical user-operable controls that might be found on a conventional home audio player that plays physical media, such as a CD player or a DAT player. These controls may include, for example, PLAY, STOP, FORWARD, BACKWARD, PAUSE, TRACK, and SELECT buttons. In the preferred embodiment, the user interface and display component 112 includes a touch panel or screen that responds to user activation of virtual buttons shown on the display screen. The function represented by the activated display button is then executed by the playback unit. The touch panel permits easy updates to the player functionality by changing the buttons and their operation with new program instructions stored in memory, as described below. Alternatively, the buttons may comprise actual physical buttons that have an electromechanical interface so they respond to physical pressure by producing a signal that activates the corresponding function.

FIG. 2 shows an exemplary display interface comprising a touch panel screen 202 of the playback unit 100. The playback unit preferably includes at least one physical button, a power button 204 that initiates the application of electrical power to the circuits of the playback unit. The playback unit may also include a sensor, such as an infrared sensor 206, for receiving command signals from a remote control unit (not illustrated). The display interface has a display area 208 on which playback status information is shown. For example, FIG. 2 shows the display area 208 with a list of song or selection name, track number, artist name or disc (compilation), and song playing time. The display interface may include virtual operation buttons, or actual physical buttons, that cause operations such as reverse 210, pause 212, play 214, stop 216, forward 218, fast forward/skip 220, cursor navigation up 222 and down 224, and a function select 226 button. As noted above, the buttons 210-226 may be virtual buttons of a touch panel screen 202 also having a status information display area 208, or may be physical buttons adjacent a display area 208 in which alphanumeric information is shown.

Returning to the illustration of FIG. 1, the playback unit 100 also includes an output interface 114, memory 116, and microprocessor 118. The output interface processes the audio material and provides it to the home audio system in a format that can be used by that system. The connection to

the home audio system 106, for example, can comprise a direct wire connection to home audio loudspeakers that receive an analog signal, or can be a connection to a signal processor, receiver, or other control and/or amplification device for playback using the loudspeakers of the home audio system. The memory 116 holds data including program instructions and temporarily stores audio material for processing and playback. The memory may comprise a combination that includes, for example, semiconductor memory such as electrically erasable programmable read only memory (EEPROM) or flash memory for holding program instructions and buffer memory for holding song data (audio material).

The program instructions are automatically executed by the microprocessor 118 when power is applied to the playback unit. Thus, there is no need to access an operating system stored on a disk drive or other peripheral storage device to operate the playback unit. As a result, the playback unit does not require an electromechanical storage device (such as a disk drive), is very stable in operation, and does not require a boot-up sequence. The buffer memory for audio material storage is preferably dynamic random access memory (RAM), which is a low-cost, efficient means of temporarily storing digital audio material to be processed for playback. In addition, the volatility of the buffer memory ensures that the user has no permanent copy of the audio material, thereby ensuring protection of copyrighted material. As described further below, storage of the audio material in the memory is determined by data downloaded through the network interface 110, and therefore is externally controlled.

The playback unit 100 operates under control of the microprocessor 118, which controls operation of the other playback unit components 110, 112, 114, 116. The microprocessor also performs the various calculations and computations required for processing the audio material and preparing it for playback. If desired, the microprocessor component 118 may work along with a specialized digital signal processing (DSP) circuit for performing sound data computations and, if necessary, audio material data decomposition. As noted above, the program steps executed by the microprocessor are stored in a program instruction flash memory portion of the memory 116. Therefore, although the user cannot change the operating system instructions, the playback unit operation is fully determined by the stored program instructions, which can be changed by loading new instructions into the memory 116. This permits changing, for example, the display buttons to provide new functions.

#### Playback Unit Operating Steps

FIG. 3 is a flow diagram of the processing steps executed by the microprocessor 118 of FIG. 1, and illustrates the processing carried out by the playback unit 100 in response to user commands. An initial step, as represented by the flow diagram box numbered 301, occurs when electrical power is applied to the playback unit. As noted above, the operation of the playback unit is sufficiently simple so that no operating system loaded from peripheral storage is required, therefore, there is no boot sequence, and the user cannot alter system operation of the playback unit. As a result, upon the application of electrical power, the playback unit 100 is immediately operational.

In the first operational step, represented by the flow diagram box numbered 302, the user selects a music category or type of song desired for playback from a list. This list may include categories such as the artist, the song title,



the album, and musical genres. In addition, the user may limit search results by confining the query to specific, user-defined categories. The generated list appears on the display area of the user interface. In the next step, the playback unit sends the version of the current song list to the directory and user list (DUL) server 107, shown in FIG. 1. During this step, the DUL server also can perform user list checks and authorization confirmation, if desired. In this way, the DUL server acts as a "gatekeeper" to ensure that only appropriate users are being granted access to the audio material, thereby ensuring commercial music interests and artists have desired control over distribution. The flow diagram box numbered 304 represents this operational step.

At the decision box numbered 306, the DUL server checks to determine if the received song list is current. If the song list is not current, a negative outcome at the decision box 306, then a new song list is available and the server sends back an updated song list, as represented by the flow diagram box numbered 308. If the playback unit song list is already current, an affirmative outcome at the decision box 306, then no song list data transmission from the DUL server is needed. With a confirmed current song list, the user is now permitted to select a track from among those available in a selection menu. The selection menus are displayed, for example, on the display area of the interface illustrated in FIG. 2. The user may need to scroll up and down the displayed selection menu list. Tracks can be selected by artist, genre, disc name, or a number of other factors. The operation of a user making an artist and song selection is represented by the flow diagram box numbered 310. At the next step, represented by the flow diagram box numbered 312, the playback unit sends the user-requested song title information to the DUL server. The DUL server returns the network address for the requested song. This step is represented by the flow diagram box numbered 314. The playback unit is now ready to retrieve audio material from the network. The flow diagram for these operations continues in FIG. 4.

In the case of an Internet network connection, the returned network address is referred to as the uniform resource locator (URL) for the song. Once the song URL is received, the playback unit initiates communication with the appropriate audio material server to request the song from the appropriate directory. This step is represented by the FIG. 4 flow diagram box numbered 402. In the preferred embodiment, the DUL server maintains control over communication from the playback unit to the network, and therefore the DUL server can determine if the audio material server at the indicated URL is inactive or not responding. If either is the case, then the DUL server will detect this condition and may send the URL of a backup or alternate audio material server at which the requested song is stored. In this way, the user may still gain access to the requested song and listen to it.

When the playback unit sends the song request to the server whose URL it received from the DUL server, it also sends a user identification code (user ID) and encrypted password information to the DUL server. This step is represented by the flow diagram box numbered 404. That is, because the DUL server maintains communication control, the DUL server can perform a gatekeeping function to permit or prevent the playback unit from receiving the requested audio material. If the user ID and password information is validated, then the DUL server sets a permission granted flag that is checked by the appropriate audio material server. The permission granted flag may be stored at the DUL server and remotely checked by the audio

material server, or otherwise communicated to the audio material server. This operation step is represented by the flow diagram box numbered 406.

The permission granted flag dictates whether or not a user will be permitted to download a song for listening and also for recording. Other authorizations, in accordance with the Secure Digital Music Initiative (SDMI) for example, may be accommodated. That is, the permission granted flag may grant or deny a range of distribution, reproduction, copy, and recording rights. Thus, the permission granted flag may include a copy authorization flag to control digital copying. These rights may be granted in accordance with predetermined arrangements between commercial music interests and artists on the one hand, and entities controlling the DUL server and audio material servers on the other hand. If permission to record is granted, for example, a feature of the output interface will be set to permit an output format that is suitable for recording. If the user is not granted recording privileges, then no output will be available at the needed output connections of the output interface, or any attempt to exceed the granted song rights will result in display of an error message on the display interface and a halt to operations of the playback unit.

Thus, after the permission granted flag is set by the DUL server at step 406, the audio material server checks the flag at step 408. The flag may be sent to the audio material server by the DUL server or forwarded by the playback unit. If the permission granted flag indicates that the user has been granted permission to download the requested song, an affirmative outcome at the decision box 410, then at the flow diagram box numbered 412 the audio material server transmits the audio material (comprising a sound file or streaming audio information) to the playback unit, where it is received by the network interface as described above. Other operation of the playback unit then continues. If the permission granted flag indicates that the user has not been granted permission to download the song, a negative outcome at the decision box 410, then at the flow diagram box numbered 414 the audio material server sends an error code to the playback unit to halt operation. Similar processing will be performed if other user actions are attempted that require authorization, such as digital copying.

#### Playback Unit Processor Operating Steps

FIG. 5 is a processing flow diagram of the processing steps executed by the playback unit microprocessor 118 shown in FIG. 1, and illustrates the processing repeatedly executed by the microprocessor during operation for responding to user commands. During operation, the microprocessor executes "housekeeping" chores as part of typical background processing as indicated by the flow diagram box numbered 501. The housekeeping chores include, for example, updating the user display, scanning the user keypad buttons for actuation, scanning any infrared receiver for user input, and downloading tasks. The downloading tasks may include, for example, downloading the first few seconds of each track on a current selected disc to reduce the latency time when one of the tracks is later selected by the user. Such samples from the tracks may be stored in the memory of the playback unit for later listening. FIG. 5 illustrates processing when a "New Track" event is detected.

The detection of a user action at the user interface and display is represented by the first FIG. 5 flow diagram box numbered 502, which indicates that the processor detects a "New Track" event. A "New Track" event is defined to be a user action such as selection of the Play button, Skip Track

button, or other button such as "Jump Track" or "Change Disk" or the like. Upon receipt of a "New Track" event, the microprocessor determines the system operating mode, which may comprise either a normal mode, random mode, or custom mode. This step is represented by the flow diagram box numbered 504.

The system operating modes specify an algorithm for determining the next track. The normal mode specifies that the "next" track is the next sequential track in the selected compilation. The random mode specifies that the "next" track is a randomly selected track in the selected compilation. The custom mode specifies that the "next" track is a user programmed track, such as when a user records a program of track selections for playback in the programmed order.

Once the "next" track is determined in accordance with the operating mode, the microprocessor determines if the next track is in the memory buffer of the playback unit. If the next track is not in the buffer, a negative outcome at the decision box 506, then the microprocessor requests the missing track from the appropriate audio material server. The request is represented by the flow diagram box numbered 508. The microprocessor waits for receipt of the missing track, as indicated by the flow diagram box numbered 510, and then loops to the decision box 506 again. Once a sufficient portion of the track is received or otherwise located in the buffer, an affirmative outcome at the decision box 506, the microprocessor begins streaming the audio material data from the memory buffer to the DSP for processing. The DSP may be one of a number of commercially available DSP engines for the decompression and decoding processing of digital audio data. Those skilled in the art will understand the processing involved without further explanation.

#### Data Packets

As noted above, the network interface can communicate using a number of different protocols having a variety of physical connection schemes. FIGS. 6, 7, 8, 9, and 10 show the data bytes of exemplary data packets that can be used to communicate the different types of information needed for operation of the system constructed in accordance with the present invention. FIG. 6 illustrates the data packet when the playback unit requests a song list version check. FIG. 7 illustrates the data packet used when the playback unit requests a song from the audio material server. FIG. 8 illustrates the data packet used when the DUL server sends an updated song list to the playback unit. FIG. 9 illustrates the data packet when the DUL server sends the URI of a song to the playback unit. FIG. 10 illustrates the data packet when an audio material server sends a song to the playback unit. It should be understood that the data packets of FIGS. 6 through 10 are intended only to illustrate the type of information that may be exchanged between the playback unit, DUL server, and audio material server, and should not be taken in a limiting sense as a requirement for operation of a system constructed in accordance with the present invention.

FIG. 6 shows the user request data packet. With this packet, the playback unit requests a check to ensure the song list being used is current. The first eight bytes comprise an optional user ID field that would be sent so the DUL server can identify who is requesting the song list. The next byte is a request field that permits the DUL server (or any other network server) to identify what data is being requested by the client playback unit. The next two bytes comprise a song

list version field that provides the version number of the song list currently stored in the memory of the playback unit. Finally, the last two bytes of the data packet contain checksum data for identifying any errors that might occur during transmission over the network connection.

FIG. 7 shows the song request data packet. The first eight bytes contain the optional user ID data and the next byte contains the request data, as described above for FIG. 6. The next two bytes contain an artist code comprising a unique identification number for an artist of a song. The artist code (AC) can be used as an index to the directory on the audio material server that contains the artist's work. The next two bytes contain the song code (SC) comprising a unique identification code for the requested song. The song code can be used as an index to the song data file on the audio material server. The next two bytes contain a packet identification code (packet ID) that tells the audio material server which packet to send next. That is, because each song to be downloaded is sent in several pieces, the playback unit must be able to communicate to the audio material server which portion of the song is needed next. The last two bytes comprise the checksum field for identifying errors.

FIG. 8 shows the updated song list packet, which is sent from the DUL server to the playback unit. The first eight bytes contain the user ID, which in this case is returned to the playback unit for purposes of error checking, to confirm that the updated song list information was sent to and received by the correct playback unit. The next byte contains packet type data, which is necessary to let the playback unit know how to interpret the data it receives. That is, the packet type data for this transmission lets the playback unit know that an updated song list is being sent. The most significant bit (MSB) position indicates whether or not this is the last packet of data that will be sent with this type of information. An error code (EC) byte is next, which provides the error code that (if necessary) is displayed on the display component. A two-byte packet ID field is next, and is used to let the playback unit know which area of the memory in which the data needs to be stored. That is, the song list data is organized according to a predetermined arrangement and the playback unit needs to conform its memory to that predetermined arrangement. Next is a two-byte field that provide the total number of packets to transmit the song list update information. This is needed so the playback unit can adjust the buffering scheme. The next field has a variable number of bytes, as it contains the songlist data. This number may vary depending on the network connection and the transmission protocol being used, among other considerations that will occur to those skilled in the art. Finally, the last two bytes of the updated song list packet comprise checksum data for identifying errors.

FIG. 9 shows the packet containing the URL of a requested song. The first eight bytes contain the user ID, which as before is returned to the playback unit for purposes of error checking, to confirm that the requested information was sent to and received by the correct playback unit. The next byte contains packet type data, which is necessary to let the playback unit know how to interpret the data it receives. In this case, the packet type data will indicate that a URL is being sent, and the MSB position will indicate whether or not this is the last packet of data that will be sent with this URL information. An EC byte is next, to provide any error code to be displayed on the display component. The next two bytes are an artist code (AC) that is sent to the playback unit to ensure that it can place the URL data in the correct memory buffer. A song code (SC) occupies the next two bytes, the code being used to ensure that the playback unit

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places the URL data in the correct memory buffer. The next four bytes contain URL data that identifies the audio material server that contains the desired song for playback. The last two bytes of the URI packet contain the checksum data for identifying errors that occur during transmission.

FIG. 10 shows the song data sent by an audio material server to the playback unit. The user ID is contained in the first eight bytes, returned as a form of error checking and to confirm that the requested song information was sent to and received by the correct playback unit. The packet type data is contained in the next byte, and in this case the MSB indicates whether or not this is the last packet that will be sent. The EC is contained in the next byte. The AC occupies the next two bytes, to ensure that the playback unit places the song information in the correct memory buffer. The SC occupies the following two bytes, again sent to ensure that the playback unit places the song information in the correct buffer. The next field contains the actual song data and has a variable number of bytes. The number of bytes of song data may vary depending on the network connection and the transmission protocol being used, among other considerations that will occur to those skilled in the art. The song data will be placed in a section of memory that depends on the artist, song, and packet number. Finally, the last two bytes of the song data packet comprise checksum data for identifying errors.

#### Memory Buffering Control

FIG. 11 is a representation of the buffering operations of the playback unit. The playback unit memory may be segregated into a number of sequential buffers, with each buffer preferably containing one song. Based on typical compression algorithms, the size of each buffer will be approximately two megabytes (2 MB). The number of buffers that can be accommodated by the playback unit is determined by the amount of memory (bytes) that the playback unit microprocessor can access, so the number of buffers available will be variable. Nevertheless, the functionality of the playback unit remains the same regardless of the available memory address space. The addressable portions that make up each buffer will contain data that, when processed, produces approximately ten seconds of audio listening.

The buffering of song data ensures that a song may be downloaded and temporarily stored in less time than needed to play the song. The speed of this buffering operation will depend on the speed of the network connection available. Buffering begins after the user selects one or more songs for listening. The playback unit downloads the selected songs in data packets, which in the preferred embodiment each contain approximately ten seconds of compressed digital audio information. As noted above, the number of data packets to be downloaded for each song is an undetermined number that depends on the song length. It is not necessary for song data download to be completed for one song before download for another song can begin. Preferably, portions of each selected song will be downloaded as the first one begins to play. This is illustrated in FIG. 11, which illustrates the multiple buffers 1102, 1104, 1106 into which the memory of the playback unit is segregated. The current song's buffer has priority over all other buffers; the data flow into this buffer is maintained such that continuous playback of the song is guaranteed. The buffers corresponding to the following musical selections are periodically updated with their songs' data.

For example, if a user wants to hear Song1, Song2, and Song3, the playback unit downloads a number of packets for

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Song1 into the first available buffer 1102. Once a sizeable amount of compressed audio information is stored for that song, the playback unit begins to process the information and play the song, providing the processed information to the home audio system. The audio information will be processed by the microprocessor and sound data DSP, if one is included in the playback unit. The amount of stored information needed before playback begins will depend on the microprocessor, DSP, and other sound components of the playback unit. As the first song (Song 1) is being played, the playback unit continues to operate and, in background operation, continues to download the Song 1 data into the first buffer 1102, and also downloads data for the other selected songs into the other buffers 1104, 1106 in an alternating fashion. Each song will be placed into a different sequential buffer. This ensures that some portion of each selected song will be downloaded and available as soon as possible, thereby permitting the user to skip to one of the other selected songs after playback has begun.

The playback unit preferably performs a loop buffering operation, which is illustrated in FIG. 12. The loop buffering operation progresses from left to right in FIG. 12. Loop buffering is used to limit the size needed for each buffer. In particular, a buffer is not expected to have sufficient capacity to contain the entire data needed for one song. Rather, data in a given buffer is overwritten as it is processed and played. Thus, after the last segment of memory in a buffer for a song has been filled with a song data packet and that buffer is processed for listening, the next song data packet will be written to the first segment in that buffer. As described above, this writing will be directed by setting the various fields in the song data packet illustrated in FIG. 9.

Three exemplary stages of loop buffering are illustrated in FIG. 12 from left to right, showing the contents of a buffer at a first stage 1202 of buffering, at a second stage 1204 of buffering, and at a third stage of buffering 1206. As the song is downloaded at the first stage 1202, the buffer is filled with data bytes for Segment 1, Segment 2, Segment 3, and so forth. Eventually, the last available segment in the buffer is filled 1204 with Segment N, before the song has been completely downloaded. Therefore, the next segments of incoming data, Segment N+1, Segment N+2, Segment N+3, and so forth, will overwrite the prior data in the buffer 1206. Buffering will continue looping in this fashion, overwriting repeatedly until the song is completely downloaded.

Loop buffering ensures that the user can scan a song in a backward direction, such as might be done for review to hear missed lyrics or other reason. If a user decides not to listen to the current song and skips it entirely on playback, it remains in the playback unit memory so the user can return to the skipped song and listen to it. In all cases, loop buffering and overwriting of buffer data will not begin until the first segment of the buffer has been processed for listening. That is, listening to a song cannot begin until the buffer for that song is initially filled, and overwriting will not begin until listening to that song has begun. However, if the user adds more songs to the playback unit than can be downloaded into the available memory, then a newer song on the playback list will begin overwriting the oldest song in memory after the last segment of the last available buffer is filled with song data.

#### System Data Flow Diagram

FIG. 13 is a data flow diagram of the system of FIG. 1, showing the information that is transmitted among the system components and how those components interact. In

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a preliminary stage of information flow, music is submitted for digital conversion, data compression, and encoding by commercial music interests, such as a record company or an entertainment music company, or by an artist. This flow from the submitted music to the compression technology is indicated by the FIG. 13 data flow arrow marked "1". After the compression and encoding, the digital information in the form of music files is uploaded to servers, such as the audio material servers described above. The servers maintain file organization, for example, according to musical genre, artist, album or compilation name, and song title. In addition, the servers may store information pertaining to users, such as usual or preferred selection patterns, so that a predictive loading scheme can be used to direct downloads in of music files. For example, the first ten seconds of a user's one-hundred most frequent selections may be downloaded immediately upon receipt of that user's identification number, to minimize any delay associated with the typical query and response processing. The data flow from the compression technology to the servers is indicated by the FIG. 13 data flow arrow marked "2".

After a user requests a song, the system responds by sending a data stream from a server through any established data transfer line to the music information network. In the preferred embodiment, this network is the Internet. Connecting the users and the servers through the Internet provides a convenient and easily accessible means of transferring the music information from the servers to the users. The data stream includes a copy flag code indicating whether the requested audio material is for immediate listening only or if digital copying and recording rights are also requested. The data flow from the servers to the music information network is indicated by the FIG. 13 data flow arrow marked "3". At the playback unit, indicated as the "Home Audio Component" in FIG. 13, network interface is used to receive the data stream, as indicated by the data flow arrow marked "4". The data transfer methods may include, for example, use of analog telephone line communication, ISDN services, high-speed cable communications for video and digital data, and the like.

Next, the user identification information provides identification of the listener for billing purposes and for personalization features, such as described above. The user identification information can be entered, if desired, using a card with magnetically encoded user information, so such as a credit card, or the information can be entered manually through the user display interface. A default ID may also be associated with the unit itself. The data flow of personal information from the user to the playback unit is indicated by the FIG. 13 data flow arrow marked "5".

As described above, searching of available audio material may be carried out by a user through the user display interface. The data flow from the user display interface to the playback unit is indicated by the FIG. 13 data flow arrow marked "6" and contains commands issued from the user display interface to the main unit. In the preferred embodiment, the most commonly used controls of the playback unit closely resemble those of a conventional multiple-disc CD player, including disc select, play, fast forward, and the like. These controls, as well as the search functions, can be instantiations of objects that are part of the graphical user interface (GUI) of the user display. This GUI may be replicated on a remote control device, as indicated in FIG. 13.

After the user has used the GUI to select music, one of the options that can be permitted by the system is to send the digital output of audio material to a storage device for digital

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recording on storage media, as indicated by the FIG. 13 data flow arrow marked "7". Alternatively, an analog audio signal is sent from the playback unit to audio connections of the home audio system, as indicated by the FIG. 13 data flow arrow marked "8". While music is being delivered to the designated destinations, the user display interface shows information concerning the current and upcoming user selections. The data flow from the playback unit to the user display interface is indicated by the FIG. 13 data flow arrow marked "9".

During the time a user is cleared via the personal information for accessing the servers, the user may upload additional information and queries using the network communications, as indicated by the FIG. 13 data flow arrow marked "10". Using the appropriate network protocols, the correct server is contacted. For example, different servers may have different types of musical genres, or the servers may each store many different types of music. The data flow from the network to the servers is indicated by the FIG. 13 data flow arrow marked "11".

FIG. 14 is a data flow diagram of the playback unit illustrated in FIG. 1, showing the information that is transmitted among the playback unit components and how those components interact. As noted above in the discussion of FIG. 13, a network data stream is received at the playback unit. The FIG. 14 data flow arrow marked "1" indicates that the data stream is received at a network interface for the conversion of received data into a data stream that can be used by the playback unit. As noted above, the data may be received through an analog telephone line communication, ISDN services, high-speed cable communications for video and digital data, or similar scheme. Thus, two-way network communication is contemplated for the receipt of this information over the network. Next, the received identification data is provided to the processor of the playback unit. The data flow from the network interface to the processor is indicated by the FIG. 14 data flow arrow marked "2". Initially, the processor sends the received audio material to the memory, as indicated by the FIG. 14 data flow arrow marked "3". The processor then determines how to process and handle the audio material.

In the preferred embodiment, the playback unit includes a digital signal processor (DSP) that is specially designed to perform audio decompression. The processor determines when the received audio material in the form of compressed digital files are sent to the DSP and when the audio material is simply erased or overwritten. This action is represented by the FIG. 14 data flow arrow marked "4". At the DSP, the processed audio material is sent to the digital-to-analog converter (DAC) subsystem for output to the home audio system for listening. The data flow from the DSP to the DAC is indicated by the FIG. 14 data flow arrow marked "5". The data flow from the DAC to the home audio system is indicated by the FIG. 14 data flow arrow marked "6". If digital copying of the audio material has been authorized (such as described above in connection with the data flow arrow of FIG. 13 numbered "7"), then the DSP sends digital output to a digital media storage device. The data flow from the DSP to the storage device is indicated by the FIG. 14 data flow arrow marked "7".

In FIG. 13, it was noted that a user may upload additional information and queries during the time a user is cleared via the personal information for accessing the servers. It should be understood that such communications must first proceed from the user through the playback unit processor and through the network interface to the servers. In FIG. 14, the data flow of instruction and information from the user, via

the user display interface, is indicated by the data flow arrow marked "8". The data flow of user information and queries from the processor to the network interface is indicated by the data flow arrow marked "9". The processor may convey return information back to the user through the user display interface, as indicated by the FIG. 14 data flow arrow marked "10".

The information received by the processor includes a copy authorization flag that permits or prohibits digital copying. This permits, if needed, compliance with regulatory schemes such as the U.S.A. Serial Copy Management System (SCMS), or the SDMI format, or forms of digital signature or digital watermark authorizations. Thus, depending on the received information, the processor determines whether the DSP output will be sent to the DAC for output to the home audio system or to a storage device for digital recording. The data flow of processor command to the DSP for output control is indicated by the FIG. 14 data flow arrow marked "11".

The playback unit preferably includes an EEPROM that permits convenient updates of functionality and features. Thus, new programming code and data can be stored into the EEPROM under control of the processor. The data flow of processor command from the processor to the EEPROM is indicated by the data flow arrow marked "12". The data flow of programming instructions and data from the EEPROM to the processor is indicated by the data flow arrow marked "13".

Finally, the audio material, stored in compressed format, may include partial downloads of music files, as commanded by the received data packets (described above). These partial downloads may have been selected, for example, by the predictive downloading schemes that respond to user information (see the data flow arrow of FIG. 13 marked "2"). The partial downloads are received at the playback unit and stored in the memory. The data flow of audio to material from the network interface to the memory is indicated by the FIG. 14 data flow arrow marked "14".

Thus, the music playback system described above provides an interface between a conventional home audio system and a network source for audio material comprising a playback unit with a simple operating system that is not accessed by the user and does not require the launch of special software to initiate playback. Therefore, the playback unit can be operated without special computer skills and without navigating complicated PC-like display windows. Access to audio material and distribution rights are controlled by the DUL servers and audio material servers, thereby enabling the playback unit to retrieve a wide range of digital audio material from the network on demand and vastly expanding the range of music available for playback. In this way, the system permits the reproduction of music using the home audio system, for high quality playback in a comfortable setting, and provides controlled access to audio material and controlled distribution and duplication of the material.

The present invention has been described above in terms of a presently preferred embodiment so that an understanding of the present invention can be conveyed. There are, however, many configurations for network-based music playback systems not specifically described herein but with which the present invention is applicable. The present invention should therefore not be seen as limited to the particular embodiments described herein, but rather, it should be understood that the present invention has wide applicability with respect to network-based music playback systems

generally. All modifications, variations, or equivalent arrangements and implementations that are within the scope of the attached claims should therefore be considered within the scope of the invention.

We claim:

1. A playback apparatus for receiving digital audio material from a network server and providing it to a home audio system for playback, the apparatus comprising:

a user interface that receives commands from a user for selection of an audio composition from a network server, for initiating receipt of the digital audio material comprising portions of the selected audio composition, and for controlling playback of the received digital audio material, wherein the user interface includes a display that shows status of the playback;

a memory that contains operating system instructions and that temporarily stores the digital audio material comprising portions of the selected audio composition, such that digital audio material comprising the complete selected audio composition is not available to the user from the memory; and

a processor that executes the operating system instructions stored in the memory to perform apparatus functions in response to the user commands and to initiate the playback of received digital audio material.

2. A playback apparatus as defined in claim 1, wherein the apparatus functions performed by the processor include display of a menu selection list, from which the user will make the selection of the audio composition.

3. A playback apparatus as defined in claim 2, wherein the apparatus functions performed by the processor include sending a current song list version for the selected musical category to a network server and receiving an indication from the network server if the current song list is in need of updating.

4. A playback apparatus as defined in claim 2, wherein the apparatus functions performed by the processor include sending the user selection to a network server and receiving from the network server the network address of audio material comprising the user selection.

5. A playback apparatus as defined in claim 4, wherein the apparatus sends the user selection to a network directory and user list server and a network audio material server, wherein the directory and user list server checks user information against a list of authorized users to control download of audio material and the audio material server provides the audio material comprising the selected composition.

6. A playback apparatus as defined in claim 5, wherein the directory and user list server sets a copy authorization flag that is provided to the audio material server, and the audio material server checks the copy authorization flag to determine if digital copying at the apparatus will be permitted.

7. A playback apparatus as defined in claim 6, wherein the apparatus functions performed by the processor include processing the received audio material to provide an analog output signal to the home audio system for playback and listening, and processing the received audio material to provide a digital output stream to a storage media only if digital copying is permitted by the copy authorization flag.

8. A playback apparatus as defined in claim 6, wherein the playback apparatus receives the audio material from the audio material server in a plurality of packets that are temporarily stored in the playback apparatus memory.

9. A playback unit that receives digital audio material from a network server and provides it to a home audio system for playback, the apparatus comprising:

a user interface that receives commands from a user for selection of an audio composition from a network

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server, for initiating receipt of the digital audio material comprising portions of the selected audio composition, and for controlling playback of the received digital audio material, wherein the user interface includes a display that shows status of the playback;

a memory that contains operating system instructions and that temporarily stores the digital audio material comprising portions of the selected audio composition, such that digital audio material comprising the complete selected audio composition is not available to the user from the memory; and

a processor that executes the operating system instructions stored in the memory to perform apparatus functions in response to the user commands and to initiate the playback of received digital audio material, wherein the apparatus functions performed by the processor include (1) display of a menu selection list from which the user will make the selection of the audio composition, (2) sending the user selection to a network server and receiving the audio material comprising the user selection, (3) processing the received audio material to provide an analog output signal to the home audio system for playback and listening, and (4) processing the received audio material to provide a digital output stream to a storage media only if digital copying permission was granted by a received copy authorization flag.

10. A playback apparatus as defined in claim 9, wherein the playback apparatus receives the audio material from the audio material server in a plurality of packets that are temporarily stored in the playback apparatus memory.

11. A playback apparatus as defined in claim 9, wherein the apparatus functions performed by the processor include sending a current song list version for the selected musical category to a network server and receiving an indication from the network server if the current song list is in need of updating.

12. A playback apparatus as defined in claim 11, wherein the apparatus sends the user selection to a network directory and user list server and a network audio material server, wherein the directory and user list server checks user information against a list of authorized users to control download of audio material and the audio material server provides the audio material comprising the selected composition.

13. A playback apparatus as defined in claim 12, wherein the directory and user list server sets a copy authorization flag that is provided to the audio material server, and the audio material server checks the copy authorization flag to determine if digital copying at the apparatus will be permitted.

14. A playback apparatus as defined in claim 13, wherein the playback apparatus receives the audio material from the audio material server in a plurality of packets that are temporarily stored in the playback apparatus memory.

15. A method of operating a playback apparatus that receives digital audio material from a network server and provides it to a home audio system for playback, comprising the steps of:

selecting an available music category through a user interface supported by an operating system that is stored in memory of the playback apparatus;

sending a current song list version for the selected music category to a network server and receiving an updated song list if the current song list is in need of updating;

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selecting an available composition, sending the selected composition title to a network server, and receiving from the network server the network address of a network audio material server at which audio material comprising the user selection is stored;

receiving the audio material from the network audio material server; and

processing the received audio material to provide an analog output signal to the home audio system for playback and listening, and processing the received audio material to provide a digital output stream to a digital storage media only if digital copying is permitted by a copy authorization flag.

16. A method as defined in claim 15, wherein the step of receiving the audio material comprises receiving the audio material from the network audio material server in a plurality of packets that are temporarily stored in memory of the playback apparatus.

17. A method as defined in claim 15, further including the steps of sending the user selection to a network directory and user list server and the network audio material server, wherein the directory and user list server checks user information against a list of authorized users to control download of audio material.

18. A method as defined in claim 17, wherein the copy authorization flag that is checked in the step of processing the received audio material is set by the directory and user list server and is provided to the network audio material server, and the audio material server checks the copy authorization flag to determine if digital copying at the apparatus will be permitted.

19. A method of operating a playback apparatus that receives digital audio material from a network server and provides it to a home audio system for playback, the method comprising:

receiving user commands through an operating system that is stored in semiconductor memory for selection of an audio composition from a network server;

receiving digital audio material from the network server; temporarily storing the digital audio material comprising portions of the selected audio composition in playback apparatus memory, such that digital audio material comprising the complete selected audio composition is not stored in the memory at the same time; and

processing the received audio material to provide an analog output signal to the home audio system for playback and listening, processing the received audio material to provide a digital output stream to a storage media only if digital copying permission was granted by a received copy authorization flag.

20. A method as defined in claim 19, wherein the step of receiving digital audio material comprises receiving the audio material from an audio material server in a plurality of packets that are temporarily stored in the playback apparatus memory.

21. A playback apparatus as defined in claim 19, wherein the apparatus functions performed by the processor include sending a current song list version for the selected musical category to a network server and receiving an indication from the network server if the current song list is in need of updating.

22. A method as defined in claim 21, wherein the playback apparatus forwards the user request to a network directory and user list server and to a network audio material server,

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wherein the directory and user list server checks user information against a list of authorized users to control download of audio material and the audio material server provides the audio material comprising the selected composition upon authorization from the directory and user list server.

23. A method as defined in claim 22, wherein the directory and user list server sets a copy authorization flag that is provided to the audio material server, and the audio material

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server checks the copy authorization flag to determine if digital copying at the playback apparatus will be permitted.

24. A method as defined in claim 23, wherein the playback apparatus receives the audio material from the audio material server in a plurality of packets that are temporarily stored in the playback apparatus memory.

\* \* \* \* \*

# **EXHIBIT 10**



Back Home to JustSoft Show/Hide

United States Change | All Microsoft Sites



Search Microsoft.com



Learning Home

Worldwide Sites

**Training**

- Find Training
- Manage My Learning
- Training Options
- Browse by Subject
- Guide My Training

**Certifications**

- Certification Overview
- Browse by Subject
- Browse by Name
- Find an Exam
- Prepare for an Exam
- Register for an Exam

**Books**

- Books Overview
- New and Upcoming
- Find Books
- Where to Buy

**Special Offers**

- What's New

**Community**

- Learning Community
- Member Sites
- Worldwide Sites
- Help and Support

**Microsoft® Windows Media™ Player 7 Handbook**



Author: Seth McEvoy  
 Pages: 320  
 Disk: 1 Companion CD(s)  
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  - [File menu](#)
  - [View menu](#)
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**Chapter 2 How Does the Player Work?**

In this chapter you'll learn how to operate Windows Media Player 7. You'll see how to play files, use the buttons to navigate, change the settings, use the menus, and switch to different views and modes. You'll also be shown how to find files on the Internet, copy music from CDs, and use playlists.

**Playing a file in only three steps**

Playing music or video on the Player is a simple 1-2-3 process:

1. Go to the **Now Playing** view.
2. Pick a song from a playlist and click the song title.
3. Then click the **Play** button to begin playing.

The three steps to playing a song are shown below in more detail.

**Step 1: Start with the full mode Player**

When you start Windows Media Player 7 for the first time, and you are connected to the Internet, you should see the full mode Player in the **Media Guide** view. Figure 2.1a shows a typical **Media Guide** view.



Click to view graphic

**Figure 2.1a:** Full mode Player in **Media Guide** view with Internet connection.

The **Media Guide** is a Web site that gives you a doorway into the world of audio and video on the Internet. The contents change nearly every day, giving you new audio and video selections, current entertainment news, and free downloads.

If you are *not* connected to the Internet, you'll see a screen similar to Figure 2.1b.





Click to view graphic

**Figure 2.1b: Media Guide view without an Internet connection.**

You can now get started using Windows Media Player. Click **Now Playing** on the left side of the full mode Player. You should see a view similar to Figure 2.2.



Click to view graphic

**Figure 2.2: Windows Media Player in full mode in the Now Playing view.**

If you don't see something like Figure 2.2, you're probably looking at a skin. A skin may have been loaded by the last person to use the Player; you won't be able to see the **Now Playing** view when a skin is running. If you are viewing a skin, you will want to return to the full mode of Windows Media Player.

Windows Media Player comes in two modes: full mode and compact mode. The compact mode is used to display skins, and the full mode displays the standard Player. To return to full mode from any skin, right-click anywhere on the skin and then click **Return to Full Mode** on the shortcut menu that appears.

The full mode has several different views it can display. Right now, all you want to do is play a file, so click **Now Playing** at the left side of the full mode Player. You should now see something that looks close to Figure 2.2. You probably will have a different visualization or a different playlist loaded on your computer, but you're ready to start.

**Step 2: Choose a song**

There are several ways to choose a file to play, but the easiest way is to use a playlist. Playlists will be covered in greater detail later in this chapter, but to get you started, use the playlist that should be visible on the right side of the **Now Playing** view.

Figure 2.3 shows a **Now Playing** view with a playlist named "All Audio" that contains all the songs that the Player has information about. The third song, "Laure", is selected and playing. You can double-click any item in the playlist to start playing that item.



Click to view graphic

**Figure 2.3:A playlist with more than one item.**

You can learn more about using playlists later in this chapter. There are other ways to choose audio and video files as well, and they will also be covered in this chapter.

**Step 3: Click Play**

Now that you've selected a song title, click the **Play** button. It looks like an arrow that is pointing to the right. You can see it in Figure 2.4.



**Figure 2.4: The Play button of the full mode Player.**

When you click the **Play** button, two things happen. The music starts playing and the button changes. The button now looks like Figure 2.5.



**Figure 2.5: The Pause button of the full mode Player.**

This new button is the **Pause** button. Any time you want to stop the Player, just click the **Pause** button. That will stop the music playing and change the **Pause** button back to a **Play** button.

**Using the navigation buttons**

Windows Media Player has several other buttons you can use to enhance your playing experience. The following buttons are always at the bottom of the window in the full mode Player and are listed here from left to right:

- **Play/Pause**
- **Stop**
- **Seek**
- **Mute**
- **Volume**
- **Previous**
- **Fast Reverse**
- **Fast Forward**
- **Next**
- **Switch to compact mode**

If you hover over a button with the mouse pointer, the name of the button will appear.

Figure 2.6 shows the navigation buttons for the full mode Player. These buttons are also called transport buttons and use symbols that are common to the electronic industry for controlling tape recorders, VCRs, and CD players. You'll often see the same button symbols in skins, but because every artist designs skins his own way, and the artwork varies widely, you won't necessarily find all the same buttons in each skin, or the buttons may not be in the same order.





Click to view graphic

**Figure 2.6:** *Navigation buttons.*

Here is a brief explanation of each button.

**Play/Pause**

This button toggles back and forth between two states: **Play** and **Pause**. **Play** starts the selected music or video playing, and **Pause** pauses it. Clicking **Play** from a paused state will start the program playing from the same position it was paused at.

**Stop**

This button stops a currently playing program. If you click **Play** after clicking **Stop**, the program will start over at the beginning.

**Seek**

This is the long bar that extends above the other buttons. The **Seek** bar shows the current position in the file. If you click and drag the tiny box, you can change the current position in the file to anywhere you want. The left end of the **Seek** bar represents the beginning of the file, and the right end represents the end of the file. So the midpoint of the bar represents the midpoint of the file, regardless of its length.

**Mute**

Click this to mute the sound of the currently playing file. Click it again to return the sound to its previous volume.

**Volume**

This is a short triangular bar with a box above it. Click and drag the box left or right to increase or decrease the volume of the sound.

**Previous**

Click this to go to the previous title in a playlist.

**Fast Reverse**

Click this to move the current seek position of the file backward. Click it again to start playing from the new seek position. This button only works for video files that use the Windows Media video file format.

**Fast Forward**

Click this to move the current seek position of the file forward. Click it again to start playing from the new seek position. This button only works for video files that use the Windows Media video file format.

**Next**

Click this to go to the next title in the playlist.

**Switch to compact mode**

Use this to change the Player display to compact mode. This will change the user interface to the default skin or the last skin you selected.

**Watching visualizations**

At the bottom of the left side of the **Now Playing** pane, you'll see two buttons. Click these to change visualization presets. These buttons are shown in Figure 2.7.



**Figure 2.7:** *Previous visualization and Next visualization preset buttons.*

Visualizations draw moving shapes and colors on the screen that rise and fall in time to the beat and tone of the music. Several visualizations are included with Windows Media Player, and more are available from the Windows Media Player Visualizations Gallery. Click **Download Visualizations** on the **Tools** menu to go there.

Each visualization has several presets. Each preset gives a different "flavor" or "twist" to the visualization; for example, one preset might make all the colors soft pastels and another preset would make them vivid primary colors. You can change visualizations and presets by clicking the **Previous visualization** and **Next visualization** buttons. The visualization and preset names are displayed to the right of the buttons, with the visualization name first, and the preset name following, separated by a colon.

You won't see a visualization if you're playing a video, because they both use the same display pane.

**Changing other settings**

There's one other button that can be useful when playing audio and video. At the top of the full mode Windows Media Player, just to the right of center, you'll see the **Show Equalizer & Settings** button that looks like Figure 2.8.



**Figure 2.8:** *Show/Hide Equalizer & Settings in Now Playing button.*

Clicking this button will show a new pane in the **Now Playing** area that is below the visualization/video pane. This pane covers several settings. To move to a new setting, click the **Previous setting** or **Next setting** button. These buttons are shown in Figure 2.9.



**Figure 2.9:** *Previous setting and Next setting buttons.*

The following settings are accessed from this pane by clicking the **Previous setting** and **Next setting** buttons:

- **SRS WOW Effects**
- **Graphic Equalizer**
- **Video Settings**
- **Windows Media Information**
- **Captions**

Here is a brief explanation of each setting.

**SRS WOW Effects settings**

This pane allows you to adjust the SRS WOW settings. SRS is a type of surround sound that makes your audio sound more lifelike and three-dimensional. You can see the **SRS WOW Effects** pane in Figure 2.10.



Figure 2.10: SRS WOW Effects pane.

On the right is the logo for SRS. Click it to find out more about SRS. On the left are two horizontal sliders that adjust the **TruBass** and **WOW Effect**. Between the two sliders and the SRS logo are two buttons: the top turns SRS on and off, and the bottom one toggles between various presets.

Here is a brief explanation of each button:

**TruBass**

Sliding this all the way to the right increases the bass enhancement of the audio. Sliding to the left decreases it.

**WOW Effect**

Sliding this to the right increases the perceived height and width of the audio image.

**On/Off**

Click this toggle button to turn the **SRS WOW Effects** on or off.

**Speaker Settings**

Click this to toggle through the following speaker settings: normal speakers, large speakers, and headphones.

**Graphic Equalizer settings**

This pane allows you to adjust the audio to make it sound exactly the way you'd like. If you want to boost the bass or cut out high notes, this is the place to do it. Figure 2.11 shows the **Graphic Equalizer** pane.



Figure 2.11: Graphic Equalizer pane.

On the left you see ten sliders that correspond to ten divisions of the audio spectrum. Move the leftmost slider up to increase the power of the lowest frequencies, move it down to reduce them. Similarly, the rightmost slider controls the upper tenth of the spectrum (the highest frequencies). Play with the sliders to see what sounds good to you.

To the immediate right of the sliders are two buttons. The top one turns the graphic equalizer on or off. If it is off, the settings are completely "flat," that is, no modification is made to the sounds. The bottom button toggles through several presets that are based on popular styles of music. For example, the **Jazz** preset will boost the middle frequencies more than the **Acoustic** setting. If you make changes in the **Custom** preset, those changes will be saved for the next time you use the Player.

To the right of those two buttons is a final horizontal slider that allows you to adjust the stereo balance. Move it to the left to increase the apparent volume of the left channel and to the right to increase the right volume.

**Video settings**

This pane allows you to adjust the video to make it look the way you like it. If you want to adjust the brightness or the intensity of the color, this is the place to do it. Figure 2.12 shows the **Video Settings** pane.



Figure 2.12: Video Settings pane.

On the left side of the pane are four horizontal sliders. They adjust the **Brightness**, **Contrast**, **Hue**, and **Saturation** of the video picture. To the right of these sliders is a button that resets all the sliders to their *default* (centered) positions.

Here is a brief explanation of each slider:

**Brightness**

This adjusts the brightness of the video picture. Slide it all the way to the left to make the picture completely black and all the way to the right to make it completely white. Usually you'll want it somewhere in between.

**Contrast**

Use this to sharpen or blur video images. Moving this slider all the way to the left makes the picture sharper. This effect is sometimes known as posterization. Moving it to the right makes the image look blurry, as if everything was photographed in a dense fog or underwater.

**Hue**

Adjust the hue for basic color changes. Slide it to the left to make everything more red/purple and to the right for green.

**Saturation**

This adjusts how much color is shown in the video. Slide the slider all the way to the left, and only the gray tones are used, with no color at all. Slide it all the way to the right, and the colors are extremely intense (saturated).

**Windows Media Information**



This pane isn't really a setting, but shows additional information about a particular item. For example, if you load the **Sample Playlist**, and open the **Windows Media Information** pane, you'll see something like Figure 2.13.

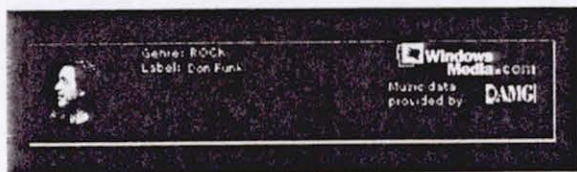


Figure 2.13: *Windows Media Information* pane.

The **Windows Media Information** pane can display details such as genre and label, but can also display pictures, links, and other useful information. In this example, if you click the album cover or the link to the right of it, you'll be taken to a Web page that gives more details about the artist, album, label, and so on. For more information on how to create advertising information such as the kind you see in the **Windows Media Information** pane, see Chapter 13.

### Captions

This pane isn't really a setting either, but shows captions for video files. See Figure 2.14 for a typical caption file.

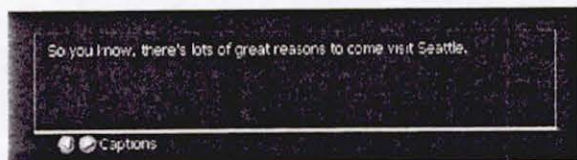


Figure 2.14: *Captions* pane.

For more information about captions, see Chapter 13.

### Using menus

Many of the operations you can perform with buttons can also be done through menus. The **File** menu is always available in the full mode view but is also available in skins that provide menus. Here is a brief listing of each menu item and what it does.

#### File menu

The **File** menu helps you work with files. The following commands are available on the **File** menu:

##### Open

Use this to load a file, using the standard Windows **Open** dialog box. The file you select will be loaded into a new playlist, and the file will start playing.

##### Open URL

Use this to load a file from a Web site or over a network. A URL (Uniform Resource Locator) is a path to a file; for example, <http://internalsite/laure.wma> is a URL. You must type a URL that links to an audio or video file. If you type a URL to a Web page, you will get an error.

##### Close

This doesn't close the Player; it closes the media file that is playing. It stops the Player and deselects the current item in the current playlist.

##### Add to Library

Use this to add a track to the media library. The media library is the collection of all audio and video that the Player has information about. When you select this option, you are given three choices: **Add Currently Playing Track**, **Add File**, and **Add URL**. The first choice is useful when you want to add the content that is currently playing to the media library. The second and third choices are similar to the **Open** and **Open URL** commands on the **File** menu except that instead of playing the file, the Player just adds it to the media library.

##### Import Playlist to Library

Use this to import a playlist into the media library. Playlists are Windows Media metafiles that have an extension of `.asx`, `.wax`, or `.wvx`. You can also import a `.m3u` file which will automatically be converted to a playlist.

##### Export Playlist to File

Use this to save a selected playlist in a text file. If you don't have any playlists selected (or any playlists at all), the media library will be saved as a playlist.

##### Copy to CD

Use this to copy files to a CD. You must have a CD-ROM that is recordable and a CD drive capable of recording. For more information about copying files to a CD-ROM, see Chapter 3. You may not see this menu item if you do not have a recordable CD drive installed on your computer.

##### Properties

Selecting this will display information about the audio or video that is currently playing.

##### Work Offline

Use this option if you don't want the Player to go out to the Internet to gather information about CDs.

##### Exit

This will shut down Windows Media Player.

#### View menu

The **View** menu helps you see all the different parts of Windows Media Player and work with visual elements. The following commands are available through the **View** menu:

##### Full Mode

This option returns you to the full mode view.

##### Compact Mode

Use this to change from full mode to a skin. Whatever skin you used last will be the default skin.

##### Now Playing Tools

Select this to change how the **Now Playing** area looks. You can choose to hide or display the playlist, title, and visualization portions of the pane. You can also show or hide the following settings: **SRS WOW Effects**, **Graphic Equalizer**, **Video**, **Windows Media Information**, and **Captions**. Finally, you can also hide or show the resize bars, which are the bars that separate the sub-panes of the **Now Playing** area.

##### Task Bar

The **Task Bar** menu command provides access to the same features found on the **Task Bar** tabs at the left side of the full mode Player. The following features are provided: **Now Playing**, **Media Guide**, **CD Audio**, **Media Library**, **Radio Tuner**, **Portable Device**, and **Skin Chooser**. For more information about the **Task Bar**, see

the "Changing views in full mode" section of this chapter.

#### Visualizations

Selecting this option provides a list of the currently loaded visualizations. Selecting a visualization shows you the presets that are available for each visualization.

#### File Markers

Use this to go to a specific position in a file that has markers. If a file doesn't have markers, you can't select this option. For more information about file markers, see Chapter 12.

#### Statistics

Selecting this option can show you how well the file is playing. This can be particularly useful if you want to report problems with files that you are receiving in real time through the Internet (called streaming). If there are problems, you usually will know, but this option can give you exact answers, such as how many packets are being lost during transmission.

#### Full Screen

If you are playing a visualization that supports it, use this option to have the visualization display over the full screen of your computer. Once in full screen, you can return to normal mode by pressing the ALT and ENTER keys simultaneously.

#### Refresh

Use this to refresh the page when you are using the **Media Guide**, **Portable Device**, or **Radio Tuner** panes. If you think you're looking at yesterday's Web page, you may be right. Some information in these task panes is cached, that is, stored on your hard disk, depending on the settings in Internet Explorer or your portable device.

#### Zoom

This allows you to change the size of a video that is playing. You can choose to make it fit the screen, or pick a specific percentage of the original. The percentages are 50%, 100%, and 200%.

#### Play menu

The **Play** menu gives you most of the same options that the transport buttons offer. The following commands are available through the **Play** menu:

#### Play/Pause

This starts the music or video program playing, or if it is already playing, pauses it. The Player must have at least one item in the media library in order to play. Playing a paused file starts the file playing at the same position it was paused at.

#### Stop

This stops the currently playing program. If you click **Play** after stopping the program, the song or video will start over at the beginning.

#### Skip Back

This stops the currently playing item in the playlist and plays the previous item in the same playlist. This corresponds to the **Previous** button in the Player buttons at the bottom of the full mode Player. If you are at the first item in a playlist and you select **Skip Back**, the last item in the playlist will be played.

#### Skip Forward

This stops the currently playing item in the playlist and plays the next item in the same playlist. This corresponds to the **Next** button in the Player buttons at the bottom of the full mode Player. If you are at the last item in a playlist and you select **Skip Forward**, the first item in the playlist will be played.

#### Rewind

This rewinds a video in short intervals. You can only rewind videos that are encoded in Windows Media Format. This corresponds to the **Fast Reverse** button in the Player buttons at the bottom of the full mode Player.

#### Fast Forward

This fast forwards a video in short intervals. You can only fast forward videos that are encoded in Windows Media Format. This corresponds to the **Fast Forward** button in the Player buttons at the bottom of the full mode Player.

#### Shuffle

This plays the items in the current playlist in a random order. It does not change the order of the items in the playlist, only the order in which they are played while the shuffle option is selected.

#### Repeat

This repeats the playing of the entire current playlist, not specific items in a playlist. If you want to repeat only one item, create a new playlist, put only that item in it, and repeat that playlist.

#### Volume

This lets you nudge the volume up or down by a small amount. It also allows you to mute the volume.

#### Tools menu

The **Tools** menu is for advanced features of Windows Media Player. The following commands are available through the **Tools** menu:

#### Download Visualizations

Select this to go to a Web page that will let you download new visualizations.

#### Search Computer for Media

Use this to search your computer for all audio and video files. The Player will add the files it finds to your media library and divide them between the audio and video collections. If you choose the option to search for WAV and MIDI files, you will add a lot of Windows sound effects that you may not want to play with the Player; on the other hand, you may discover some interesting MIDI files that are hidden away inside your Windows folder. You can choose to load from local drives, network drives, all drives, or a specific drive, and even a specific directory. If you have mapped a network drive to your computer, you can search that drive as well. For example, if drive X: is mapped to a network drive, you can search that drive, or directories on that drive.

#### License Management

If you download music that requires a license, or make copies of CD tracks, this option specifies where you want to store the licenses on your computer. You might want to pick a folder that you can find easily so you can conveniently back up your licenses to another drive or storage medium. If you pay for a song and the song needs a license to play, you'll want to take good care of your licenses. For more information about licensing, see "Understanding digital rights" in Chapter 3.

#### Options

This is the option for everything else not covered in other menu items. The following section, "Options dialog box," provides more information about this menu item.

#### Options dialog box

If you go to the **Tools** menu and click **Options**, the **Options** dialog box is displayed. It covers various options you may want to change. The following tabs are included in the **Options** dialog box:

#### Player

This tab lets you set how often you want Windows Media Player to check for software upgrades (daily, weekly, monthly), whether you want the Player to automatically download codecs it needs (See Chapter 3 for more about codecs.), whether you want the Player to identify itself to Web sites and download licenses automatically, whether you want the Player to start up in **Media Guide** (instead of whatever you mode you used last time), and whether you want skins to be on top of other windows. You can also decide whether you want the anchor to be displayed when using skins. The anchor window is a small window that appears in the lower right corner of the screen when Windows Media Player is in compact mode. You can click the anchor window, and then click **Return to Full Mode** to return to the full mode of the Player. Most of the time you'll want to leave these options the way they were initially set.

#### Network

If you are an advanced networking user, you can use this tab to set proxies, ports, and protocols.

#### CD Audio

Use this to set up how you will play or record CDs. For playing CDs, you can choose whether to use digital playback, if your computer supports it, and whether to use error



correction. Change these options if you are having problems playing CDs. For copying music from CDs, you can select how much compression to use when converting music from CD format to music file formats. You'll have to choose between smaller file sizes and better quality. You can also choose whether to use digital copying or error correction, and whether to use personal rights management. Finally, you can choose what folder you want the copied audio files to be created in. For more information about copying CDs and digital rights, see Chapter 3.

**Portable Device**

If you have a portable device, you can use this pane to decide whether to let the Player convert the music automatically or let you pick a tradeoff between file size and audio quality. You can also click a button and find out what devices are supported by Windows Media Player. For more information about portable devices, see Chapter 5.

**Performance**

You might want to use this tab if you are having trouble with viewing live files (streaming). You can tell the Player what network connection you have, how much buffering to do, whether you want to use hardware acceleration with video, and how to adjust digital video settings. For more information about streaming, see Chapter 4.

**Media Library**

Use this tab to set access rights to your media library. You can specify what levels of access you want to grant outside Web sites to read or modify the media in your library. This involves both security and privacy issues. This also specifies whether you want Internet music purchases to be added to your library automatically.

**Visualizations**

If you have installed a visualization that has properties you can change, go to this tab to change them. For example, the Ambience visualization will let you set the full-screen size and offscreen buffer size. You can also use this tab to load a visualization that is stored on your computer but that is not registered with the Player. Be sure you know the source of any visualization before loading, and load them from only trusted sites, so that you can avoid viruses.

**Formats**

Use this tab to make sure the Player plays the file formats you want it to play. If another brand of player starts playing a file that you want Windows Media Player to play, change the file association here, if it is a file format the Player can play.

**Help menu**

The **Help** menu gives you help and information. This menu has the following three commands:

**Help Topics**

This command launches the Help file that comes with Windows Media Player. The Help file covers all the features you need to know about to use the Player. You can also get the Help file by pressing the F1 key on your computer at any time while Window Media Player is the active Window.

**Check For Player Upgrades**

Use this command any time you're curious about upgrades to Windows Media Player. The Player will do this automatically for you, but you may want to do it yourself if you've heard news of a new version.

**About Windows Media Player**

This will display the name, copyright, version number, and product ID of Windows Media Player.

**Compact mode shortcut menu**

When Windows Media Player is in compact mode, you can right-click the skin and get a menu. Each of the commands on the menu corresponds to a similarly named command on one of the menus of the full mode Player. Table 2.1 shows the commands on the menu of the compact mode along with their corresponding full mode menu commands.

**Table 2.1: Menu commands of the compact mode Player.**

Compact mode menu command	Full mode menu command
Open	File menu <b>Open</b> option
Open URL	File menu <b>Open URL</b> option
Shuffle	Play menu <b>Shuffle</b> option
Repeat	Play menu <b>Repeat</b> option
Volume	Play menu <b>Volume</b> option
Play/pause	Play menu <b>Play/pause</b> option
Stop	Play menu <b>Stop</b> option
Skip Back	Play menu <b>Skip Back</b> option
Skip Forward	Play menu <b>Skip Forward</b> option
Return to Full Mode	View menu <b>Full Screen</b> option
Full Screen	File menu <b>Properties</b> option
Properties	View menu <b>Statistics</b> option
Statistics	Tools menu <b>Options</b> option
Options	Help menu <b>Help Topics</b> option
Help	Help menu <b>Windows Media Player</b> option
About	File menu <b>Exit</b> option
Exit	

**Changing views in full mode**

The full mode of Windows Media Player has seven views that are accessed by clicking tabs on the **Task Bar**, which is on the left side of the window. Each view gives you a different way to interact with audio and video. Here is a list of the views:

**Now Playing**

This view shows a visualization or video on the left pane and a playlist on the right. You can also display a hidden settings pane to make various adjustments or see additional information. You'll spend most of your time in this view.

**Media Guide**

This is the default view of the Player and opens up a world of audio and video through the Internet. You can get daily news of new audio and video releases, tune in to Internet radio stations, and download tons of things to see and hear, most of it free! For more help with downloading, see the "Finding files on the Internet" section in this chapter.

**CD Audio**

If you have a CD player in your computer, you can play your CD tracks using Windows Media Player. For more information about using CDs, see the "Copying music from CDs" section in this chapter. For more information about creating your own CDs, see Chapter 3.

**Media Library**

This is where you can organize all your audio and video. You can search for audio and video files on your computer, create playlists, and change your Internet radio presets here. For more information about working with playlists, see the "Using playlists" section of this chapter.

**Radio Tuner**

Use this feature to search out and sort Internet radio stations. From around the world or around the block, you can listen to music every hour of every day and never hear the same thing twice!



**Portable Devices**

Use this pane to download music to your Pocket PC or other portable device. For more information about portable devices, see Chapter 5.

**Skin Chooser**

Use this to apply skins that came with your installation. You can also use this feature to download new skins from the Windows Media Skins Gallery Web site. Once you try one skin, you'll never want to stop! New skins will be appearing frequently, so check this site often.

**Finding files on the Internet**

Now that you know how to use the Windows Media Player, you can go out on the Web and find more music. You can use a browser to do this of course, but Windows Media Player gives you a special window to the world of music and video. This window is called the **Media Guide**. Earlier in this chapter you saw a typical view of the **Media Guide** in Figure 2.1a.

The Player will start up with the **Media Guide** view. You can always get to it by using the full mode of the Player and clicking **Media Guide** on the **Task Bar** on the left side of the Player. If you don't want **Media Guide** to be the default view, go to the **Tools** menu and click **Options**; then click the **Player** tab and clear the **Start Player in Media Guide** check box.

The **Media Guide** is a window to the WindowsMedia.com Web site. The **Media Guide** has hundreds of links to new audio and video files to play and download, and gives you lots of information about what's new in the world of audio and video. You can spend hours and hours exploring the **Media Guide**.

For more information about file formats you can download, see Chapter 3. For information about seeing and hearing files without waiting to download them (streaming), see Chapter 4.

**Copying music from CDs**

If you want to listen to music from different CDs without inserting and removing your CDs all the time, Windows Media Player can save you a lot of time. All you have to do is copy the CD (or just the tracks you want) onto your computer, then assemble the tracks into playlists and create your own customized musical experience.

Also, you can have the Player compress the files so they won't take up as much room on your hard disk. You can control the amount of compression you need. Choosing high compression will create files that won't sound as good but will take up less space.

**Copying tracks**

Copying CD tracks is extremely easy. All you need to do is load a CD into your CD-ROM drive and start Windows Media Player. When the Player starts, it loads the CD tracks into a playlist and displays the **CD Audio** pane of the full mode Player. Figure 2.15 shows a typical **CD Audio** pane, which you can always get to from the full mode view of the Player by clicking the **CD Audio** tab of the **Task Bar** on the left side of the Player.

If you are connected to the Internet, the Player will go out to a database and get information about each track on the CD, showing you not only track names and lengths, but artist, genre, style, and so on. On many CDs, you can even click the **Album Details** and go to a Web site that contains more information about the CD.

After you've loaded your CD, all you have to do is decide which tracks you want to copy to your computer. After you've decided, select the check box at the left of each track to select the tracks you want to copy.



Click to view graphic

Figure 2.15: Audio CD pane.

When you're ready to copy, just click the red **Copy Music** button. You'll see that the Player starts copying because there is a **Copy Status** column in the **CD Audio** playlist, and the status will be displayed. Files that are being copied will have a percent-copied display; files that will be copied are labeled "Pending" and when a file is finished copying, it will be labeled "Copied to Library" in the status column.

**Selecting copy options**

There are several options you can select that will allow you to change the way that the Player copies files from a CD to your computer. Click **Options** on the **Tools** menu, and then click the **CD Audio** tab. You'll see the following choices:

**Digital playback** (under Playback Settings)

This setting only applies to playback, not to copying CDs. If your computer supports digital playback, select this check box and see how digital playback sounds. If you don't select this option, you will not be able to see visualizations.

**Use error correction** (under Playback Settings)

This setting only applies to playback, not to copying CDs. If you are experiencing a lot of errors, selecting this check box may help correct them during playback. You'll know you're getting errors if the audio sounds as if parts are missing or the video starts jumping around and missing frames. You can only select this if you have also selected the **Digital playback** check box.

**Copy music at this quality** (under Copying Settings)

Windows Media Player can compress the digital information in the files it creates so that the files will be smaller. It does this using a variety of techniques. Depending on the type of music you're copying, you may or may not notice the difference. You can choose the amount of compression with a slider bar. An average music CD can be compressed from as small as 28 MB to as large as 70 MB. The larger the file, the better the sound quality.

**Digital copying** (under Copying Settings)

Select this check box to copy CD tracks to audio files that enable digital playback. Not all computers and sound cards have digital playback. If yours do, this is a good option to use, and the sound doesn't need to be converted to analog and back to digital. If you're not sure, try a track both ways and see what you like.

**Use error correction** (under Copying Settings)

You can only select this check box if you've also selected the **Digital copying** option. Use this if your tracks are producing errors. Once again, if you're not sure whether to use this, try a track both ways and listen to the results.

**Enable Personal Rights Management** (under Copying Settings)

If this check box is selected, the files you create will have information attached to them indicating that they were created on your computer. You will definitely want to keep this option checked if you want to copy your files to a portable device such as a Pocket PC; many portable devices will not play music if you have not licensed the appropriate rights for a particular file. However, if you keep this option checked, you cannot play files you have copied on another computer. So if you want to copy files from your CD and then transfer them to another computer, you should not select this option. Of course, before copying and transferring, be sure you have the legal right to do so. The issues of digital rights are covered in Chapter 3.

**Using playlists**

A playlist is a convenient way to organize groups of audio and video files. The term comes from the radio industry and refers to the list of songs that a disc jockey plays on a particular radio program.

You might want to make up playlists for different performers or different kinds of music or videos. You can shuffle playlists or repeat them endlessly. This way, you can create a media experience that is continuously entertaining.

You can see which playlist is playing by looking in the upper-right corner of the full mode Player. You will see a drop-down list box, which shows the current playlist.

**Using the Media Library**

The **Media Library** is the key to understanding playlists. The **Media Library** is where you create your playlists. You can get to the **Media Library** by choosing the **Media**



Library tab on the Task Bar of the full mode Windows Media Player. Figure 2.16 shows a typical view of the Media Library.



Click to view graphic

Figure 2.16: Media Library.

On the left side of the Media Library you'll see a tree-like list of all the audio and video that the Player has information about, as well as all playlists and radio presets. This is set up similar to Microsoft Windows Explorer in that you click an item on the left and the contents of that item appear on the right.

The Media Library is divided into the following sections:

- Audio
- Video
- My Playlists
- Radio Tuner Presets
- Deleted Items

Each section is a node in the tree. Figure 2.17 shows the five nodes of the Media Library.



Figure 2.17: Five nodes of the Media Library.

Figure 2.18 shows the nodes expanded by one level for each node. You can expand a node to show the items inside it by clicking the plus sign to the left of the node name.



Figure 2.18: Media Library nodes expanded by one level.

You can explore the contents of the Media Library by expanding the nodes. Any time you click one of the node item names, the contents of that node, if it is a folder, will be displayed in the right pane of the Media Library.

#### Understanding the audio collection

The audio collection is the part of the library that keeps track of audio files on your computer and other audio files that the Player has information about (for example, files on the Internet).

#### Adding Audio Files

You can add to the audio collection in several ways:

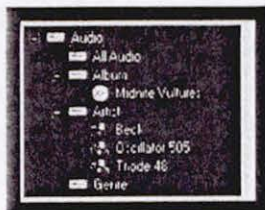
- Click the File menu, click Open, and then choose an audio file.
- Click the File menu, click Open URL, and then choose an audio file.
- Click the File menu, click Add to Library, and then choose an audio file.
- Click the File menu, and click Import Playlist to Library (if the playlist has links to audio files in it).
- From the CD Audio task pane, copy a CD track to your computer.
- Start an audio file playing by double-clicking it.
- Start an audio file playing by right-clicking it and selecting the Play option.

#### Sorting audio files

You can find a file by clicking the Search button at the top of the Media Library pane.

The Audio collection is a database of audio files, and like other databases, it stores not only the file name and location of audio files, but additional information such as artist, album, and genre. This additional information is used to sort the Audio collection into at least four categories. You can see the categories by clicking the nodes to

the left of the **Audio** label. Figure 2.19 shows the four nodes inside the Audio collection.



**Figure 2.19:** The four nodes of the audio collection.

Here is an explanation of each category:

**All Audio**

This includes a list of all audio that Windows Media Player has information about.

**Album**

This shows a list of all music that is associated with albums. The album information can come from a CD, from a playlist, or can be embedded in the file itself. The Player can get album information about CDs from Internet databases.

**Artist**

You can see a list of all the artists that are associated with the audio files in the Audio collection.

**Genre**

If you want to find audio files that have a genre associated with them, this is the place to look.

**Understanding the video collection**

The video collection uses the same concepts as the audio collection except that it keeps track of video files. Instead of **All Audio**, the video collection will refer to **All Clips**, **Artist** becomes **Author**, and there is no album or genre equivalent for videos.

**Understanding My Playlists**

This is a collection of all playlists that the Player has information about. Playlists are lists that you create of audio and video content.

**Creating playlists**

Creating playlists couldn't be simpler. Click the **New Playlist** button at the top left of the **Media Library** and enter the new playlist name.

**Adding to playlists**

You can add to playlists by doing the following:

1. Create your playlist.
2. Find the audio or video file you want to add. You must open an Audio or Video collection and select a file from the collection. For example, open the Audio collection, then open the Artist collection, choose an artist you like, displaying all the songs by that artist in the right pane.
3. Select the audio or video file, and add it to the playlist. You can do this in one of two ways. The easy way is to right-click the file and choose the **Add to Playlist** option. You'll be provided with a list of playlists. Pick one and you're done. There's also an **Add to Playlist** button at the top of the **Media Library** pane if you prefer to click a button.
4. You can also select the audio or video file and drag it to the playlist in the left pane. This requires a bit of opening and closing of nodes in the collection, but after you get used to it, you'll find that this is a useful way to work with complicated playlists.

**Deleting and renaming playlists**

You can also delete and rename playlists by right-clicking a playlist and choosing the delete or rename option. Deleted playlists aren't really deleted, they are transferred to the **Deleted Items** part of the **Media Library**.

**Deleting media items and playlists**

If you delete an item in the audio or video collection, the item is transferred to the **Deleted Items** part of the **Media Library**. The same is true for deleted playlists. This is similar to the Recycle Bin in Windows.

**Restoring media items and playlists**

You can get the file or playlist back by right-clicking it and selecting the **Restore** option. The file or playlist will return to the place you deleted it from.

**Permanently deleting media items and playlists**

If you want to permanently erase the media items and playlists you deleted, you can reclaim their disk space by right-clicking the **Deleted Items** node and choosing the **Empty Deleted Items** option. Be careful! After you do this, you can't go back! But at least you're given an option to change your mind before the media files and playlists are gone forever.

**Using the Radio Tuner**

The **Radio Tuner** feature lets you use the Player to listen to Internet radio stations from around the world. Thousands of stations broadcast audio programs of music, news, and commentary.

Figure 2.20 shows the **Radio Tuner** view, which you can get to by clicking **Radio Tuner** in the task bar on the left side of the full mode of Windows Media Player.



Click to view graphic

**Figure 2.20:** Radio Tuner view in the full mode Player.

The **Radio Tuner** view has two panes: **Station Finder** and **Presets**.

**Using Station Finder**

The **Station Finder** can help you tune in to Internet Radio stations. Even though there are thousands of stations around the globe, you can easily find one you like with



only a few clicks. The contents of the **Station Finder** are updated frequently by WindowsMedia.com so that as new stations go on the air, you can tune in to them right away.

All the stations are listed in a table that sorts them by station name, speed, frequency, and format or city. You can sort the table rows by clicking the column heading you want to sort on. Double-click a station listing to start it playing.

Above the table of radio stations is one or more list boxes. The box on the left has several categories that you can use to find particular radio stations, including the following:

**Format**

This gives you a set of predefined radio station formats ranging from Alternative Rock to Classical to News Radio.

**Band**

You can choose to search through the AM band or FM band, or choose Internet-only.

**Language**

There are several spoken languages to choose from, including Chinese, English, Latvian, and 20 others.

**Location**

Countries such as the United States, Finland, Korea, and 30 others are represented in the table listings with radio stations. If you choose the United States, you can search by state.

**Call sign**

If you know the call letters of a radio station, you can find the station by typing the call letters in the search box. For example, if you type "CKWW", you'll listen to station CKWW in Detroit, Michigan, that specializes in big band music.

**Frequency**

You can tune in to a station by typing the frequency; for example, 88.5 on the FM dial would give you radio station KPLU in the Seattle, Washington, area.

**Keyword**

If a station has a slogan, you can find it with a keyword. For example, searching for "oldies" will give you several stations to choose from.

**Using station presets**

There are two default presets that you can use to sort radio stations that you will want to use often. One is called Featured and has stations that are currently featured by Windows Media Player. You can't add stations to Featured. But you can add radio stations that you want to use frequently to My Presets.

You can create your own preset categories by clicking the **Edit** button above the **Presets** list.

**Working with radio stations in the Media Library**

All presets created in the **Radio Tuner** are automatically copied to the **Media Library** in the **Radio Tuner Presets** category.

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# **EXHIBIT 11**

**Microsoft**



**SETH McEVoy**

**MICROSOFT<sup>®</sup>**  
**WINDOWS MEDIA**  
**PLAYER 7**  
**HANDBOOK**



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# How Does the Player Work?

In this chapter you'll learn how to operate Windows Media Player 7. You'll see how to play files, use the buttons to navigate, change the settings, use the menus, and switch to different views and modes. You'll also be shown how to find files on the Internet, copy music from CDs, and use playlists.

## Playing a file in only three steps

Playing music or video on the Player is a simple 1-2-3 process:

1. Go to the **Now Playing** view.
2. Pick a song from a playlist and click the song title.
3. Then click the **Play** button to begin playing.

The three steps to playing a song are shown below in more detail.

### Step 1: Start with the full mode Player

When you start Windows Media Player 7 for the first time, and you are connected to the Internet, you should see the full mode Player in the **Media Guide** view. Figure 2.1a shows a typical **Media Guide** view.



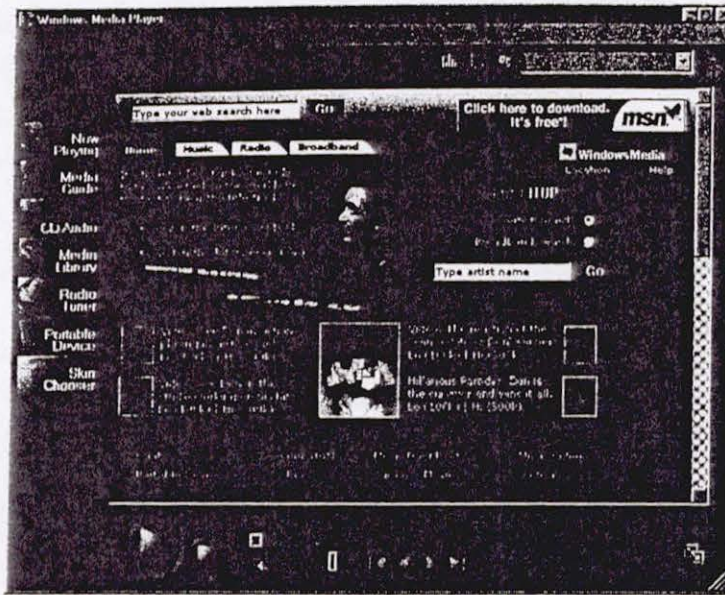


Figure 2.1a - Full mode Player in *Media Guide* view with Internet connection.

The **Media Guide** is a Web site that gives you a doorway into the world of audio and video on the Internet. The contents change nearly every day, giving you new audio and video selections, current entertainment news, and free downloads.

If you are *not* connected to the Internet, you'll see a screen similar to Figure 2.1b.

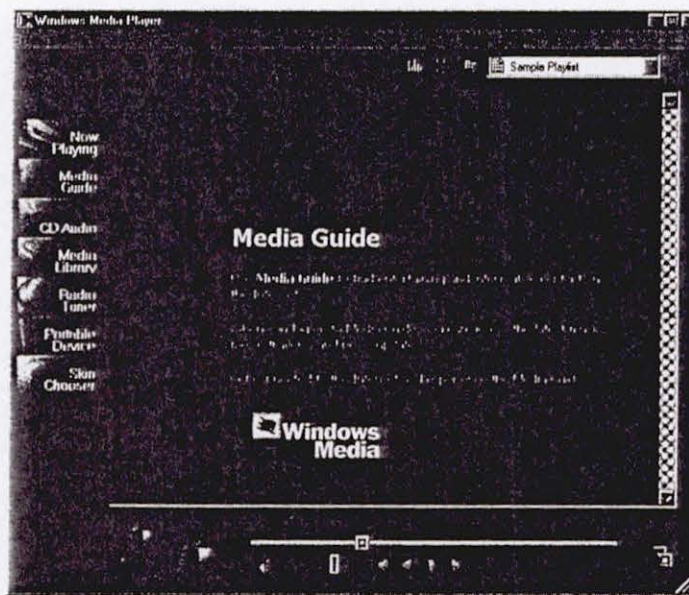


Figure 2.1b - *Media Guide* view without an Internet connection.



You can now get started using Windows Media Player. Click **Now Playing** on the left side of the full mode Player. You should see a view similar to Figure 2.2.



**Figure 2.2** – Windows Media Player in full mode in the *Now Playing* view.

If you don't see something like Figure 2.2, you're probably looking at a skin. A skin may have been loaded by the last person to use the Player; you won't be able to see the **Now Playing** view when a skin is running. If you are viewing a skin, you will want to return to the full mode of Windows Media Player.

Windows Media Player comes in two modes: full mode and compact mode. The compact mode is used to display skins, and the full mode displays the standard Player. To return to full mode from any skin, right-click anywhere on the skin and then click **Return to Full Mode** on the shortcut menu that appears.

The full mode has several different views it can display. Right now, all you want to do is play a file, so click **Now Playing** at the left side of the full mode Player. You should now see something that looks close to Figure 2.2. You probably will have a different visualization or a different playlist loaded on your computer, but you're ready to start.



## Step 2: Choose a song

There are several ways to choose a file to play, but the easiest way is to use a playlist. Playlists will be covered in greater detail later in this chapter, but to get you started, use the playlist that should be visible on the right side of the **Now Playing** view.

Figure 2.3 shows a **Now Playing** view with a playlist named “All Audio” that contains all the songs that the Player has information about. The third song, “Laure”, is selected and playing. You can double-click any item in the playlist to start playing that item.

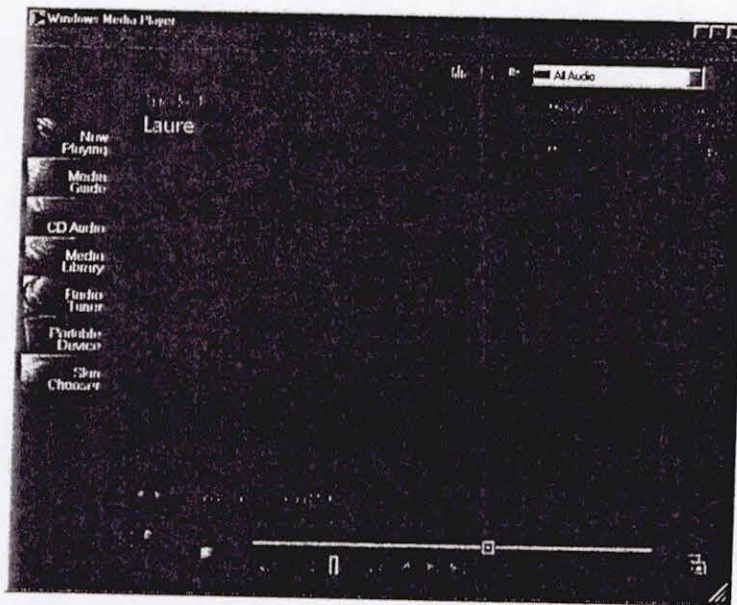


Figure 2.3 – A playlist with more than one item.

You can learn more about using playlists later in this chapter. There are other ways to choose audio and video files as well, and they will also be covered in this chapter.

## Step 3: Click Play

Now that you’ve selected a song title, click the **Play** button. It looks like an arrow that is pointing to the right. You can see it in Figure 2.4.



**Figure 2.4** – *The Play button of the full mode Player.*

When you click the **Play** button, two things happen. The music starts playing and the button changes. The button now looks like Figure 2.5.



**Figure 2.5** – *The Pause button of the full mode Player.*

This new button is the **Pause** button. Any time you want to stop the Player, just click the **Pause** button. That will stop the music playing and change the **Pause** button back to a **Play** button.

## Using the navigation buttons

Windows Media Player has several other buttons you can use to enhance your playing experience. The following buttons are always at the bottom of the window in the full mode Player and are listed here from left to right:

- **Play/Pause**
- **Stop**
- **Seek**
- **Mute**
- **Volume**
- **Previous**
- **Fast Reverse**
- **Fast Forward**
- **Next**
- **Switch to compact mode**

If you hover over a button with the mouse pointer, the name of the button will appear.



Figure 2.6 shows the navigation buttons for the full mode Player. These buttons are also called transport buttons and use symbols that are common to the electronic industry for controlling tape recorders, VCRs, and CD players. You'll often see the same button symbols in skins, but because every artist designs skins his own way, and the artwork varies widely, you won't necessarily find all the same buttons in each skin, or the buttons may not be in the same order.



Figure 2.6 – Navigation buttons.

Here is a brief explanation of each button.

### Play/Pause

This button toggles back and forth between two states: **Play** and **Pause**. **Play** starts the selected music or video playing, and **Pause** pauses it. Clicking **Play** from a paused state will start the program playing from the same position it was paused at.

### Stop

This button stops a currently playing program. If you click **Play** after clicking **Stop**, the program will start over at the beginning.

### Seek

This is the long bar that extends above the other buttons. The **Seek** bar shows the current position in the file. If you click and drag the tiny box, you can change the current position in the file to anywhere you want. The left end of the **Seek** bar represents the beginning of the file, and the right end represents the end of the file. So the midpoint of the bar represents the midpoint of the file, regardless of its length.

### Mute

Click this to mute the sound of the currently playing file. Click it again to return the sound to its previous volume.

### Volume

This is a short triangular bar with a box above it. Click and drag the box left or right to increase or decrease the volume of the sound.



**Previous**

Click this to go to the previous title in a playlist.

**Fast Reverse**

Click this to move the current seek position of the file backward. Click it again to start playing from the new seek position. This button only works for video files that use the Windows Media video file format.

**Fast Forward**

Click this to move the current seek position of the file forward. Click it again to start playing from the new seek position. This button only works for video files that use the Windows Media video file format.

**Next**

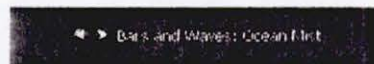
Click this to go to the next title in the playlist.

**Switch to compact mode**

Use this to change the Player display to compact mode. This will change the user interface to the default skin or the last skin you selected.

## Watching visualizations

At the bottom of the left side of the **Now Playing** pane, you'll see two buttons. Click these to change visualization presets. These buttons are shown in Figure 2.7.



**Figure 2.7** – *Previous visualization and Next visualization preset buttons.*

Visualizations draw moving shapes and colors on the screen that rise and fall in time to the beat and tone of the music. Several visualizations are included with Windows Media Player, and more are available from the Windows Media Player Visualizations Gallery. Click **Download Visualizations** on the **Tools** menu to go there.

Each visualization has several presets. Each preset gives a different “flavor” or “twist” to the visualization; for example, one preset might make all the colors soft pastels and another preset would make them vivid primary colors. You can change visualizations and presets by clicking the **Previous visualization** and **Next visualization** buttons. The visualization and preset names are displayed to the right of the buttons, with the visualization name first, and the preset name following, separated by a colon.



You won't see a visualization if you're playing a video, because they both use the same display pane.

## Changing other settings

There's one other button that can be useful when playing audio and video. At the top of the full mode Windows Media Player, just to the right of center, you'll see the **Show Equalizer & Settings** button that looks like Figure 2.8.



**Figure 2.8** – *Show/Hide Equalizer & Settings in Now Playing button.*

Clicking this button will show a new pane in the **Now Playing** area that is below the visualization/video pane. This pane covers several settings. To move to a new setting, click the **Previous setting** or **Next setting** button. These buttons are shown in Figure 2.9.



**Figure 2.9** – *Previous setting and Next setting buttons.*

The following settings are accessed from this pane by clicking the **Previous setting** and **Next setting** buttons:

- **SRS WOW Effects**
- **Graphic Equalizer**
- **Video Settings**
- **Windows Media Information**
- **Captions**

Here is a brief explanation of each setting.

### **SRS WOW Effects settings**

This pane allows you to adjust the SRS WOW settings. SRS is a type of surround sound that makes your audio sound more lifelike and three-dimensional. You can see the **SRS WOW Effects** pane in Figure 2.10.



Figure 2.10 – *SRS WOW Effects pane.*

On the right is the logo for SRS. Click it to find out more about SRS. On the left are two horizontal sliders that adjust the **TruBass** and **WOW Effect**. Between the two sliders and the SRS logo are two buttons: the top turns SRS on and off, and the bottom one toggles between various presets.

Here is a brief explanation of each button:

### TruBass

Sliding this all the way to the right increases the bass enhancement of the audio. Sliding to the left decreases it.

### WOW Effect

Sliding this to the right increases the perceived height and width of the audio image.

### On/Off

Click this toggle button to turn the **SRS WOW Effects** on or off.

### Speaker Settings

Click this to toggle through the following speaker settings: normal speakers, large speakers, and headphones.

## Graphic Equalizer settings

This pane allows you to adjust the audio to make it sound exactly the way you'd like. If you want to boost the bass or cut out high notes, this is the place to do it. Figure 2.11 shows the **Graphic Equalizer** pane.



Figure 2.11 – *Graphic Equalizer pane.*

On the left you see ten sliders that correspond to ten divisions of the audio spectrum. Move the leftmost slider up to increase the power of the lowest fre-



quencies, move it down to reduce them. Similarly, the rightmost slider controls the upper tenth of the spectrum (the highest frequencies). Play with the sliders to see what sounds good to you.

To the immediate right of the sliders are two buttons. The top one turns the graphic equalizer on or off. If it is off, the settings are completely “flat,” that is, no modification is made to the sounds. The bottom button toggles through several presets that are based on popular styles of music. For example, the **Jazz** preset will boost the middle frequencies more than the **Acoustic** setting. If you make changes in the **Custom** preset, those changes will be saved for the next time you use the Player.

To the right of those two buttons is a final horizontal slider that allows you to adjust the stereo balance. Move it to the left to increase the apparent volume of the left channel and to the right to increase the right volume.

## Video settings

This pane allows you to adjust the video to make it look the way you like it. If you want to adjust the brightness or the intensity of the color, this is the place to do it. Figure 2.12 shows the **Video Settings** pane.



Figure 2.12 – *Video Settings* pane.

On the left side of the pane are four horizontal sliders. They adjust the **Brightness**, **Contrast**, **Hue**, and **Saturation** of the video picture. To the right of these sliders is a button that resets all the sliders to their default (centered) positions.

Here is a brief explanation of each slider:

### **Brightness**

This adjusts the brightness of the video picture. Slide it all the way to the left to make the picture completely black and all the way to the right to make it completely white. Usually you’ll want it somewhere in between.



## Contrast

Use this to sharpen or blur video images. Moving this slider all the way to the left makes the picture sharper. This effect is sometimes known as posterization. Moving it to the right makes the image look blurry, as if everything was photographed in a dense fog or underwater.

## Hue

Adjust the hue for basic color changes. Slide it to the left to make everything more red/purple and to the right for green.

## Saturation

This adjusts how much color is shown in the video. Slide the slider all the way to the left, and only the gray tones are used, with no color at all. Slide it all the way to the right, and the colors are extremely intense (saturated).

## Windows Media Information

This pane isn't really a setting, but shows additional information about a particular item. For example, if you load the **Sample Playlist**, and open the **Windows Media Information** pane, you'll see something like Figure 2.13.



Figure 2.13 – *Windows Media Information* pane.

The **Windows Media Information** pane can display details such as genre and label, but can also display pictures, links, and other useful information. In this example, if you click the album cover or the link to the right of it, you'll be taken to a Web page that gives more details about the artist, album, label, and so on. For more information on how to create advertising information such as the kind you see in the **Windows Media Information** pane, see Chapter 13.

## Captions

This pane isn't really a setting either, but shows captions for video files. See Figure 2.14 for a typical caption file.

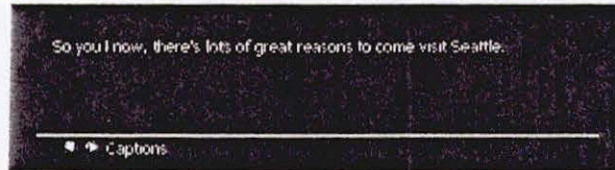


Figure 2.14 – *Captions pane.*

For more information about captions, see Chapter 13.

## Using menus

Many of the operations you can perform with buttons can also be done through menus. The **File** menu is always available in the full mode view but is also available in skins that provide menus. Here is a brief listing of each menu item and what it does.

### File menu

The **File** menu helps you work with files. The following commands are available on the **File** menu:

#### Open

Use this to load a file, using the standard Windows **Open** dialog box. The file you select will be loaded into a new playlist, and the file will start playing.

#### Open URL

Use this to load a file from a Web site or over a network. A URL (Uniform Resource Locator) is a path to a file; for example, *http://internalsite/laure.wma* is a URL. You must type a URL that links to an audio or video file. If you type a URL to a Web page, you will get an error.

#### Close

This doesn't close the Player; it closes the media file that is playing. It stops the Player and deselects the current item in the current playlist.



### **Add to Library**

Use this to add a track to the media library. The media library is the collection of all audio and video that the Player has information about. When you select this option, you are given three choices: **Add Currently Playing Track**, **Add File**, and **Add URL**. The first choice is useful when you want to add the content that is currently playing to the media library. The second and third choices are similar to the **Open** and **Open URL** commands on the **File** menu except that instead of playing the file, the Player just adds it to the media library.

### **Import Playlist to Library**

Use this to import a playlist into the media library. Playlists are Windows Media metafiles that have an extension of **.asx**, **.wax**, **.wvx**. You can also import a **.m3u** file which will automatically be converted to a playlist.

### **Export Playlist to File**

Use this to save a selected playlist in a text file. If you don't have any playlists selected (or any playlists at all), the media library will be saved as a playlist.

### **Copy to CD**

Use this to copy files to a CD. You must have a CD-ROM that is recordable and a CD drive capable of recording. For more information about copying files to a CD-ROM, see Chapter 3. You may not see this menu item if you do not have a recordable CD drive installed on your computer.

### **Properties**

Selecting this will display information about the audio or video that is currently playing.

### **Work Offline**

Use this option if you don't want the Player to go out to the Internet to gather information about CDs.

### **Exit**

This will shut down Windows Media Player.

## **View menu**

The **View** menu helps you see all the different parts of Windows Media Player and work with visual elements. The following commands are available through the **View** menu:



### **Full Mode**

This option returns you to the full mode view.

### **Compact Mode**

Use this to change from full mode to a skin. Whatever skin you used last will be the default skin.

### **Now Playing Tools**

Select this to change how the **Now Playing** area looks. You can choose to hide or display the playlist, title, and visualization portions of the pane.

You can also show or hide the following settings: **SRS WOW Effects**, **Graphic Equalizer**, **Video**, **Windows Media Information**, and **Captions**.

Finally, you can also hide or show the resize bars, which are the bars that separate the sub-panes of the **Now Playing** area.

### **Task Bar**

The **Task Bar** menu command provides access to the same features found on the **Task Bar** tabs at the left side of the full mode Player. The following features are provided: **Now Playing**, **Media Guide**, **CD Audio**, **Media Library**, **Radio Tuner**, **Portable Device**, and **Skin Chooser**. For more information about the **Task Bar**, see the “Changing views in full mode” section of this chapter.

### **Visualizations**

Selecting this option provides a list of the currently loaded visualizations. Selecting a visualization shows you the presets that are available for each visualization.

### **File Markers**

Use this to go to a specific position in a file that has markers. If a file doesn't have markers, you can't select this option. For more information about file markers, see Chapter 12.

### **Statistics**

Selecting this option can show you how well the file is playing. This can be particularly useful if you want to report problems with files that you are receiving in real time through the Internet (called streaming). If there are problems, you usually will know, but this option can give you exact answers, such as how many packets are being lost during transmission.

### **Full Screen**

If you are playing a visualization that supports it, use this option to have the visualization display over the full screen of your computer. Once in



full screen, you can return to normal mode by pressing the ALT and ENTER keys simultaneously.

### Refresh

Use this to refresh the page when you are using the **Media Guide**, **Portable Device**, or **Radio Tuner** panes. If you think you're looking at yesterday's Web page, you may be right. Some information in these task panes is cached, that is, stored on your hard disk, depending on the settings in Internet Explorer or your portable device.

### Zoom

This allows you to change the size of a video that is playing. You can choose to make it fit the screen, or pick a specific percentage of the original. The percentages are 50%, 100%, and 200%.

## Play menu

The **Play** menu gives you most of the same options that the transport buttons offer. The following commands are available through the **Play** menu:

### Play/Pause

This starts the music or video program playing, or if it is already playing, pauses it. The Player must have at least one item in the media library in order to play. Playing a paused file starts the file playing at the same position it was paused at.

### Stop

This stops the currently playing program. If you click **Play** after stopping the program, the song or video will start over at the beginning.

### Skip Back

This stops the currently playing item in the playlist and plays the previous item in the same playlist. This corresponds to the **Previous** button in the Player buttons at the bottom of the full mode Player. If you are at the first item in a playlist and you select **Skip Back**, the last item in the playlist will be played.

### Skip Forward

This stops the currently playing item in the playlist and plays the next item in the same playlist. This corresponds to the **Next** button in the Player buttons at the bottom of the full mode Player. If you are at the last item in a playlist and you select **Skip Forward**, the first item in the playlist will be played.



### **Rewind**

This rewinds a video in short intervals. You can only rewind videos that are encoded in Windows Media Format. This corresponds to the **Fast Reverse** button in the Player buttons at the bottom of the full mode Player.

### **Fast Forward**

This fast forwards a video in short intervals. You can only fast forward videos that are encoded in Windows Media Format. This corresponds to the **Fast Forward** button in the Player buttons at the bottom of the full mode Player.

### **Shuffle**

This plays the items in the current playlist in a random order. It does not change the order of the items in the playlist, only the order in which they are played while the shuffle option is selected.

### **Repeat**

This repeats the playing of the entire current playlist, not specific items in a playlist. If you want to repeat only one item, create a new playlist, put only that item in it, and repeat that playlist.

### **Volume**

This lets you nudge the volume up or down by a small amount. It also allows you to mute the volume.

## **Tools menu**

The **Tools** menu is for advanced features of Windows Media Player. The following commands are available through the **Tools** menu:

### **Download Visualizations**

Select this to go to a Web page that will let you download new visualizations.

### **Search Computer for Media**

Use this to search your computer for all audio and video files. The Player will add the files it finds to your media library and divide them between the audio and video collections. If you choose the option to search for WAV and MIDI files, you will add a lot of Windows sound effects that you may not want to play with the Player; on the other hand, you may



discover some interesting MIDI files that are hidden away inside your Windows folder. You can choose to load from local drives, network drives, all drives, or a specific drive, and even a specific directory. If you have mapped a network drive to your computer, you can search that drive as well. For example, if drive X: is mapped to a network drive, you can search that drive, or directories on that drive.

### License Management

If you download music that requires a license, or make copies of CD tracks, this option specifies where you want to store the licenses on your computer. You might want to pick a folder that you can find easily so you can conveniently back up your licenses to another drive or storage medium. If you pay for a song and the song needs a license to play, you'll want to take good care of your licenses. For more information about licensing, see "Understanding digital rights" in Chapter 3.

### Options

This is the option for everything else not covered in other menu items. The following section, "Options dialog box," provides more information about this menu item.

## Options dialog box

If you go to the **Tools** menu and click **Options**, the **Options** dialog box is displayed. It covers various options you may want to change. The following tabs are included in the **Options** dialog box:

### Player

This tab lets you set how often you want Windows Media Player to check for software upgrades (daily, weekly, monthly), whether you want the Player to automatically download codecs it needs (See Chapter 3 for more about codecs.), whether you want the Player to identify itself to Web sites and download licenses automatically, whether you want the Player to start up in **Media Guide** (instead of whatever you mode you used last time), and whether you want skins to be on top of other windows. You can also decide whether you want the anchor to be displayed when using skins. The anchor window is a small window that appears in the lower right corner of the screen when Windows Media Player is in compact mode. You can click the anchor window, and then click **Return to Full Mode** to return to the full mode of the Player. Most



of the time you'll want to leave these options the way they were initially set.

### **Network**

If you are an advanced networking user, you can use this tab to set proxies, ports, and protocols.

### **CD Audio**

Use this to set up how you will play or record CDs. For playing CDs, you can choose whether to use digital playback, if your computer supports it, and whether to use error correction. Change these options if you are having problems playing CDs. For copying music from CDs, you can select how much compression to use when converting music from CD format to music file formats. You'll have to choose between smaller file sizes and better quality. You can also choose whether to use digital copying or error correction, and whether to use personal rights management. Finally, you can choose what folder you want the copied audio files to be created in. For more information about copying CDs and digital rights, see Chapter 3.

### **Portable Device**

If you have a portable device, you can use this pane to decide whether to let the Player convert the music automatically or let you pick a tradeoff between file size and audio quality. You can also click a button and find out what devices are supported by Windows Media Player. For more information about portable devices, see Chapter 5.

### **Performance**

You might want to use this tab if you are having trouble with viewing live files (streaming). You can tell the Player what network connection you have, how much buffering to do, whether you want to use hardware acceleration with video, and how to adjust digital video settings. For more information about streaming, see Chapter 4.

### **Media Library**

Use this tab to set access rights to your media library. You can specify what levels of access you want to grant outside Web sites to read or modify the media in your library. This involves both security and privacy issues. This also specifies whether you want Internet music purchases to be added to your library automatically.



## Visualizations

If you have installed a visualization that has properties you can change, go to this tab to change them. For example, the Ambience visualization will let you set the full-screen size and offscreen buffer size. You can also use this tab to load a visualization that is stored on your computer but that is not registered with the Player. Be sure you know the source of any visualization before loading, and load them from only trusted sites, so that you can avoid viruses.

## Formats

Use this tab to make sure the Player plays the file formats you want it to play. If another brand of player starts playing a file that you want Windows Media Player to play, change the file association here, if it is a file format the Player can play.

## Help menu

The **Help** menu gives you help and information. This menu has the following three commands:

### Help Topics

This command launches the Help file that comes with Windows Media Player. The Help file covers all the features you need to know about to use the Player. You can also get the Help file by pressing the F1 key on your computer at any time while Windows Media Player is the active Window.

### Check For Player Upgrades

Use this command any time you're curious about upgrades to Windows Media Player. The Player will do this automatically for you, but you may want to do it yourself if you've heard news of a new version.

### About Windows Media Player

This will display the name, copyright, version number, and product ID of Windows Media Player.

## Compact mode shortcut menu

When Windows Media Player is in compact mode, you can right-click the skin and get a menu. Each of the commands on the menu corresponds to a similarly named command on one of the menus of the full mode Player.

Table 2.1 shows the commands on the menu of the compact mode along with their corresponding full mode menu commands.

<b>Compact mode menu command</b>	<b>Full mode menu command</b>
Open	File menu <b>Open</b> option
Open URL	File menu <b>Open URL</b> option
Shuffle	Play menu <b>Shuffle</b> option
Repeat	Play menu <b>Repeat</b> option
Volume	Play menu <b>Volume</b> option
Play/Pause	Play menu <b>Play/Pause</b> option
Stop	Play menu <b>Stop</b> option
Skip Back	Play menu <b>Skip Back</b> option
Skip Forward	Play menu <b>Skip Back</b> option
Return to Full Mode	Play menu <b>Skip Forward</b> option
Full Screen	View menu <b>Full Screen</b> option
Properties	File menu <b>Properties</b> option
Statistics	View menu <b>Statistics</b> option
Options	Tools menu <b>Options</b> option
Help	Help menu <b>Help Topics</b> option
About	Help menu <b>About Windows Media Player</b> option
Exit	File menu <b>Exit</b> option

Table 2.1 – *Menu commands of the compact mode Player.*



## Changing views in full mode

The full mode of Windows Media Player has seven views that are accessed by clicking tabs on the **Task Bar**, which is on the left side of the window. Each view gives you a different way to interact with audio and video. Here is a list of the views:

### Now Playing

This view shows a visualization or video on the left pane and a playlist on the right. You can also display a hidden settings pane to make various adjustments or see additional information. You'll spend most of your time in this view.

### Media Guide

This is the default view of the Player and opens up a world of audio and video through the Internet. You can get daily news of new audio and video releases, tune in to Internet radio stations, and download tons of things to see and hear, most of it free! For more help with downloading, see the "Finding files on the Internet" section in this chapter.

### CD Audio

If you have a CD player in your computer, you can play your CD tracks using Windows Media Player. For more information about using CDs, see the "Copying music from CDs" section in this chapter. For more information about creating your own CDs, see Chapter 3.

### Media Library

This is where you can organize all your audio and video. You can search for audio and video files on your computer, create playlists, and change your Internet radio presets here. For more information about working with playlists, see the "Using playlists" section of this chapter.

### Radio Tuner

Use this feature to search out and sort Internet radio stations. From around the world or around the block, you can listen to music every hour of every day and never hear the same thing twice!

### Portable Devices

Use this pane to download music to your Pocket PC or other portable device. For more information about portable devices, see Chapter 5.



### Skin Chooser

Use this to apply skins that came with your installation. You can also use this feature to download new skins from the Windows Media Skins Gallery Web site. Once you try one skin, you'll never want to stop! New skins will be appearing frequently, so check this site often.

## Finding files on the Internet

Now that you know how to use the Windows Media Player, you can go out on the Web and find more music. You can use a browser to do this of course, but Windows Media Player gives you a special window to the world of music and video. This window is called the **Media Guide**. Earlier in this chapter you saw a typical view of the **Media Guide** in Figure 2.1a.

The Player will start up with the **Media Guide** view. You can always get to it by using the full mode of the Player and clicking **Media Guide** on the **Task Bar** on the left side of the Player. If you don't want **Media Guide** to be the default view, go to the **Tools** menu and click **Options**; then click the **Player** tab and clear the **Start Player in Media Guide** check box.

The **Media Guide** is a window to the WindowsMedia.com Web site. The **Media Guide** has hundreds of links to new audio and video files to play and download, and gives you lots of information about what's new in the world of audio and video. You can spend hours and hours exploring the **Media Guide**.

For more information about file formats you can download, see Chapter 3. For information about seeing and hearing files without waiting to download them (streaming), see Chapter 4.

## Copying music from CDs

If you want to listen to music from different CDs without inserting and removing your CDs all the time, Windows Media Player can save you a lot of time. All you have to do is copy the CD (or just the tracks you want) onto your computer, then assemble the tracks into playlists and create your own customized musical experience.

Also, you can have the Player compress the files so they won't take up as much room on your hard disk. You can control the amount of compression you need. Choosing high compression will create files that won't sound as good but will take up less space.



## Copying tracks

Copying CD tracks is extremely easy. All you need to do is load a CD into your CD-ROM drive and start Windows Media Player. When the Player starts, it loads the CD tracks into a playlist and displays the **CD Audio** pane of the full mode Player. Figure 2.15 shows a typical **CD Audio** pane, which you can always get to from the full mode view of the Player by clicking the **CD Audio** tab of the **Task Bar** on the left side of the Player.

If you are connected to the Internet, the Player will go out to a database and get information about each track on the CD, showing you not only track names and lengths, but artist, genre, style, and so on. On many CDs, you can even click the **Album Details** and go to a Web site that contains more information about the CD.

After you've loaded your CD, all you have to do is decide which tracks you want to copy to your computer. After you've decided, select the check box at the left of each track to select the tracks you want to copy.

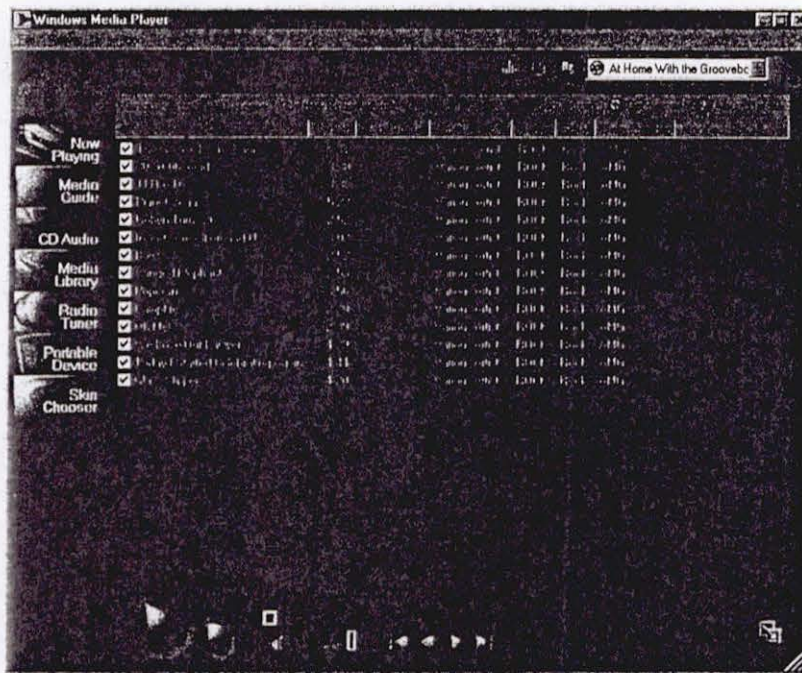


Figure 2.15 – Audio CD pane.

When you're ready to copy, just click the red **Copy Music** button. You'll see that the Player starts copying because there is a Copy Status column in the



**CD Audio** playlist, and the status will be displayed. Files that are being copied will have a percent-copied display; files that will be copied are labeled "Pending" and when a file is finished copying, it will be labeled "Copied to Library" in the status column.

## Selecting copy options

There are several options you can select that will allow you to change the way that the Player copies files from a CD to your computer. Click **Options** on the **Tools** menu, and then click the **CD Audio** tab. You'll see the following choices:

### **Digital playback** (under Playback Settings)

This setting only applies to playback, not to copying CDs. If your computer supports digital playback, select this check box and see how digital playback sounds. If you don't select this option, you will not be able to see visualizations.

### **Use error correction** (under Playback Settings)

This setting only applies to playback, not to copying CDs. If you are experiencing a lot of errors, selecting this check box may help correct them during playback. You'll know you're getting errors if the audio sounds as if parts are missing or the video starts jumping around and missing frames. You can only select this if you have also selected the **Digital playback** check box.

### **Copy music at this quality** (under Copying Settings)

Windows Media Player can compress the digital information in the files it creates so that the files will be smaller. It does this using a variety of techniques. Depending on the type of music you're copying, you may or may not notice the difference. You can choose the amount of compression with a slider bar. An average music CD can be compressed from as small as 28 MB to as large as 70 MB. The larger the file, the better the sound quality.

### **Digital copying** (under Copying Settings)

Select this check box to copy CD tracks to audio files that enable digital playback. Not all computers and sound cards have digital playback. If yours do, this is a good option to use, and the sound doesn't need to be converted to analog and back to digital. If you're not sure, try a track both ways and see what you like.



**Use error correction** (under Copying Settings)

You can only select this check box if you've also selected the **Digital copying** option. Use this if your tracks are producing errors. Once again, if you're not sure whether to use this, try a track both ways and listen to the results.

**Enable Personal Rights Management** (under Copying Settings)

If this check box is selected, the files you create will have information attached to them indicating that they were created on your computer. You will definitely want to keep this option checked if you want to copy your files to a portable device such as a Pocket PC; many portable devices will not play music if you have not licensed the appropriate rights for a particular file. However, if you keep this option checked, you cannot play files you have copied on another computer. So if you want to copy files from your CD and then transfer them to another computer, you should not select this option. Of course, before copying and transferring, be sure you have the legal right to do so. The issues of digital rights are covered in Chapter 3.

## Using playlists

A playlist is a convenient way to organize groups of audio and video files. The term comes from the radio industry and refers to the list of songs that a disc jockey plays on a particular radio program.

You might want to make up playlists for different performers or different kinds of music or videos. You can shuffle playlists or repeat them endlessly. This way, you can create a media experience that is continuously entertaining.

You can see which playlist is playing by looking in the upper-right corner of the full mode Player. You will see a drop-down list box, which shows the current playlist.

## Using the Media Library

The **Media Library** is the key to understanding playlists. The **Media Library** is where you create your playlists. You can get to the **Media Library** by choosing the **Media Library** tab on the **Task Bar** of the full mode Windows Media Player. Figure 2.16 shows a typical view of the **Media Library**.



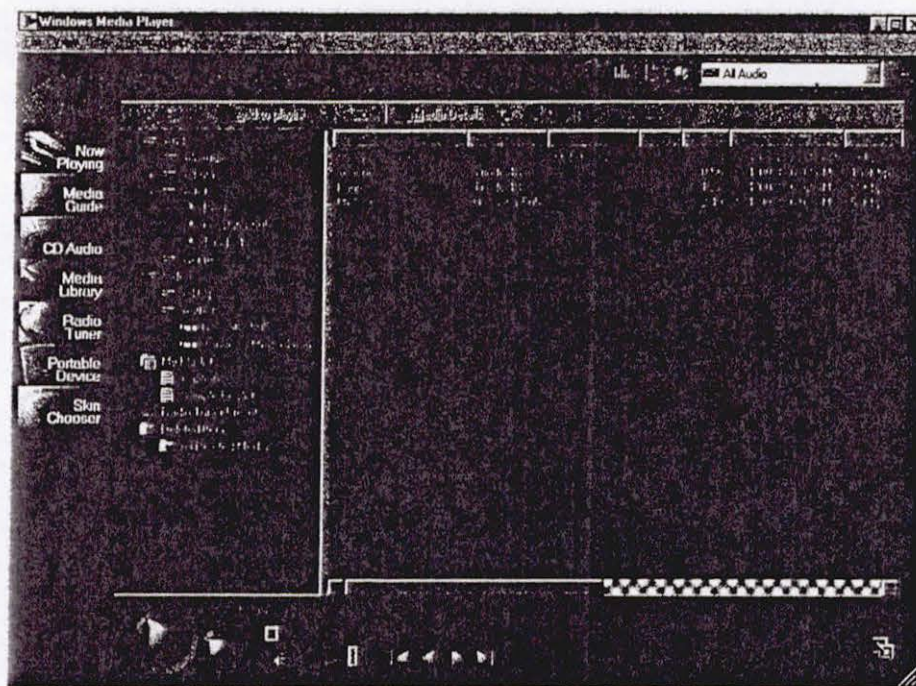


Figure 2.16 – *Media Library.*

On the left side of the **Media Library** you'll see a tree-like list of all the audio and video that the Player has information about, as well as all playlists and radio presets. This is set up similar to Microsoft Windows Explorer in that you click an item on the left and the contents of that item appear on the right.

The **Media Library** is divided into the following sections:

- Audio
- Video
- My Playlists
- Radio Tuner Presets
- Deleted Items

Each section is a node in the tree. Figure 2.17 shows the five nodes of the **Media Library**.





Figure 2.17 – Five nodes of the *Media Library*.

Figure 2.18 shows the nodes expanded by one level for each node. You can expand a node to show the items inside it by clicking the plus sign to the left of the node name.



Figure 2.18 – *Media Library* nodes expanded by one level.

You can explore the contents of the **Media Library** by expanding the nodes. Any time you click one of the node item names, the contents of that node, if it is a folder, will be displayed in the right pane of the **Media Library**.

## Understanding the audio collection

The audio collection is the part of the library that keeps track of audio files on your computer and other audio files that the Player has information about (for example, files on the Internet).

### Adding Audio Files

You can add to the audio collection in several ways:

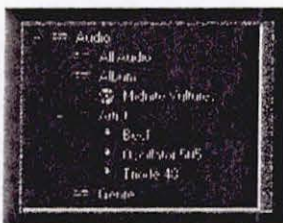
- Click the **File** menu, click **Open**, and then choose an audio file.
- Click the **File** menu, click **Open URL**, and then choose an audio file.
- Click the **File** menu, click **Add to Library**, and then choose an audio file.

- Click the **File** menu, and click **Import Playlist to Library** (if the playlist has links to audio files in it).
- From the **CD Audio** task pane, copy a CD track to your computer.
- Start an audio file playing by double-clicking it.
- Start an audio file playing by right-clicking it and selecting the **Play** option.

## Sorting audio files

You can find a file by clicking the **Search** button at the top of the **Media Library** pane.

The Audio collection is a database of audio files, and like other databases, it stores not only the file name and location of audio files, but additional information such as artist, album, and genre. This additional information is used to sort the Audio collection into at least four categories. You can see the categories by clicking the nodes to the left of the **Audio** label. Figure 2.19 shows the four nodes inside the Audio collection.



**Figure 2.19** – *The four nodes of the audio collection.*

Here is an explanation of each category:

### All Audio

This includes a list of all audio that Windows Media Player has information about.

### Album

This shows a list of all music that is associated with albums. The album information can come from a CD, from a playlist, or can be embedded in the file itself. The Player can get album information about CDs from Internet databases.



## Artist

You can see a list of all the artists that are associated with the audio files in the Audio collection.

## Genre

If you want to find audio files that have a genre associated with them, this is the place to look.

## Understanding the video collection

The video collection uses the same concepts as the audio collection except that it keeps track of video files. Instead of **All Audio**, the video collection will refer to **All Clips**, **Artist** becomes **Author**, and there is no album or genre equivalent for videos.

## Understanding My Playlists

This is a collection of all playlists that the Player has information about. Playlists are lists that you create of audio and video content.

## Creating playlists

Creating playlists couldn't be simpler. Click the **New Playlist** button at the top left of the **Media Library** and enter the new playlist name.

## Adding to playlists

You can add to playlists by doing the following:

1. Create your playlist.
2. Find the audio or video file you want to add. You must open an Audio or Video collection and select a file from the collection. For example, open the Audio collection, then open the Artist collection, choose an artist you like, displaying all the songs by that artist in the right pane.
3. Select the audio or video file, and add it to the playlist. You can do this in one of two ways. The easy way is to right-click the file and choose the **Add to Playlist** option. You'll be provided with a list of playlists. Pick one and you're done. There's also an **Add to Playlist** button at the top of the **Media Library** pane if you prefer to click a button.
4. You can also select the audio or video file and drag it to the playlist in the left pane. This requires a bit of opening and closing of nodes in the collection, but after you get used to it, you'll find that this is a useful way to work with complicated playlists.

## Deleting and renaming playlists

You can also delete and rename playlists by right-clicking a playlist and choosing the delete or rename option. Deleted playlists aren't really deleted, they are transferred to the **Deleted Items** part of the **Media Library**.

## Deleting media items and playlists

If you delete an item in the audio or video collection, the item is transferred to the **Deleted Items** part of the **Media Library**. The same is true for deleted playlists. This is similar to the Recycle Bin in Windows.

## Restoring media items and playlists

You can get the file or playlist back by right-clicking it and selecting the **Restore** option. The file or playlist will return to the place you deleted it from.

## Permanently deleting media items and playlists

If you want to permanently erase the media items and playlists you deleted, you can reclaim their disk space by right-clicking the **Deleted Items** node and choosing the **Empty Deleted Items** option. Be careful! After you do this, you can't go back! But at least you're given an option to change your mind before the media files and playlists are gone forever.

# Using the Radio Tuner

The **Radio Tuner** feature lets you use the Player to listen to Internet radio stations from around the world. Thousands of stations broadcast audio programs of music, news, and commentary.

Figure 2.20 shows the **Radio Tuner** view, which you can get to by clicking **Radio Tuner** in the task bar on the left side of the full mode of Windows Media Player.



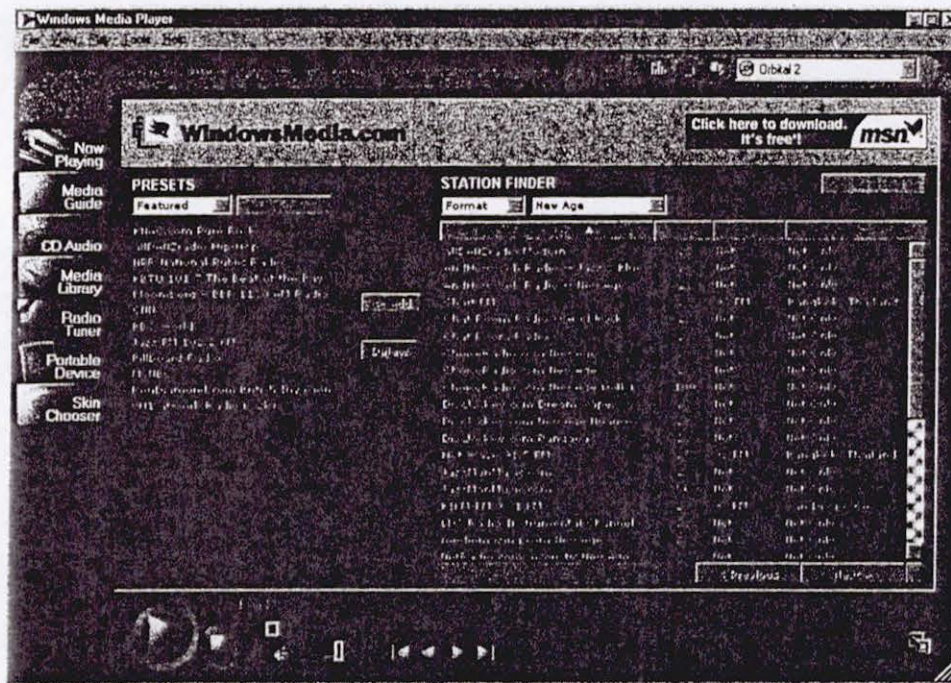


Figure 2.20 – *Radio Tuner* view in the full mode Player.

The **Radio Tuner** view has two panes: **Station Finder** and **Presets**.

## Using Station Finder

The **Station Finder** can help you tune in to Internet Radio stations. Even though there are thousands of stations around the globe, you can easily find one you like with only a few clicks. The contents of the **Station Finder** are updated frequently by WindowsMedia.com so that as new stations go on the air, you can tune in to them right away.

All the stations are listed in a table that sorts them by station name, speed, frequency, and format or city. You can sort the table rows by clicking the column heading you want to sort on. Double-click a station listing to start it playing.

Above the table of radio stations is one or more list boxes. The box on the left has several categories that you can use to find particular radio stations, including the following:

### Format

This gives you a set of predefined radio station formats ranging from Alternative Rock to Classical to News Radio.



### **Band**

You can choose to search through the AM band or FM band, or choose Internet-only.

### **Language**

There are several spoken languages to choose from, including Chinese, English, Latvian, and 20 others.

### **Location**

Countries such as the United States, Finland, Korea, and 30 others are represented in the table listings with radio stations. If you choose the United States, you can search by state.

### **Callsign**

If you know the call letters of a radio station, you can find the station by typing the call letters in the search box. For example, if you type "CKWW", you'll listen to station CKWW in Detroit, Michigan, that specializes in big band music.

### **Frequency**

You can tune in to a station by typing the frequency; for example, 88.5 on the FM dial would give you radio station KPLU in the Seattle, Washington, area.

### **Keyword**

If a station has a slogan, you can find it with a keyword. For example, searching for "oldies" will give you several stations to choose from.

## **Using station presets**

There are two default presets that you can use to sort radio stations that you will want to use often. One is called **Featured** and has stations that are currently featured by Windows Media Player. You can't add stations to **Featured**. But you can add radio stations that you want to use frequently to **My Presets**.

You can create your own preset categories by clicking the **Edit** button above the **Presets** list.

## **Working with radio stations in the Media Library**

All presets created in the **Radio Tuner** are automatically copied to the **Media Library** in the **Radio Tuner Presets** category.

# **EXHIBIT 12**



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(54) **AUDIO CONVERTER DEVICE AND METHOD FOR USING THE SAME**

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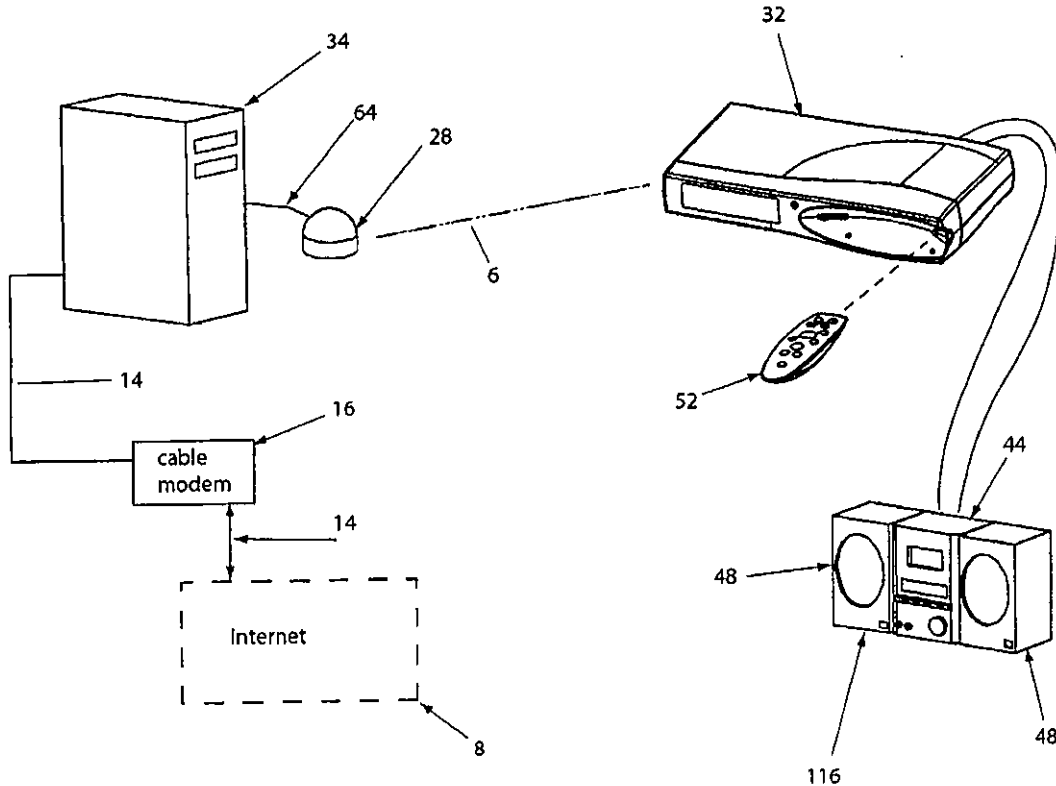
**12400 Wilshire Boulevard**

**Los Angeles, CA 90025-1026 (US)**

(57) **ABSTRACT**

An audio converter device and a method for using the same are provided. In one embodiment, the audio converter device receives the digital audio data from a first device via a local area network. The audio converter device decompresses the digital audio data and converts the digital audio data into analog electrical data. The audio converter device transfers the analog electrical data to an audio playback device.

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**EXHIBIT**  
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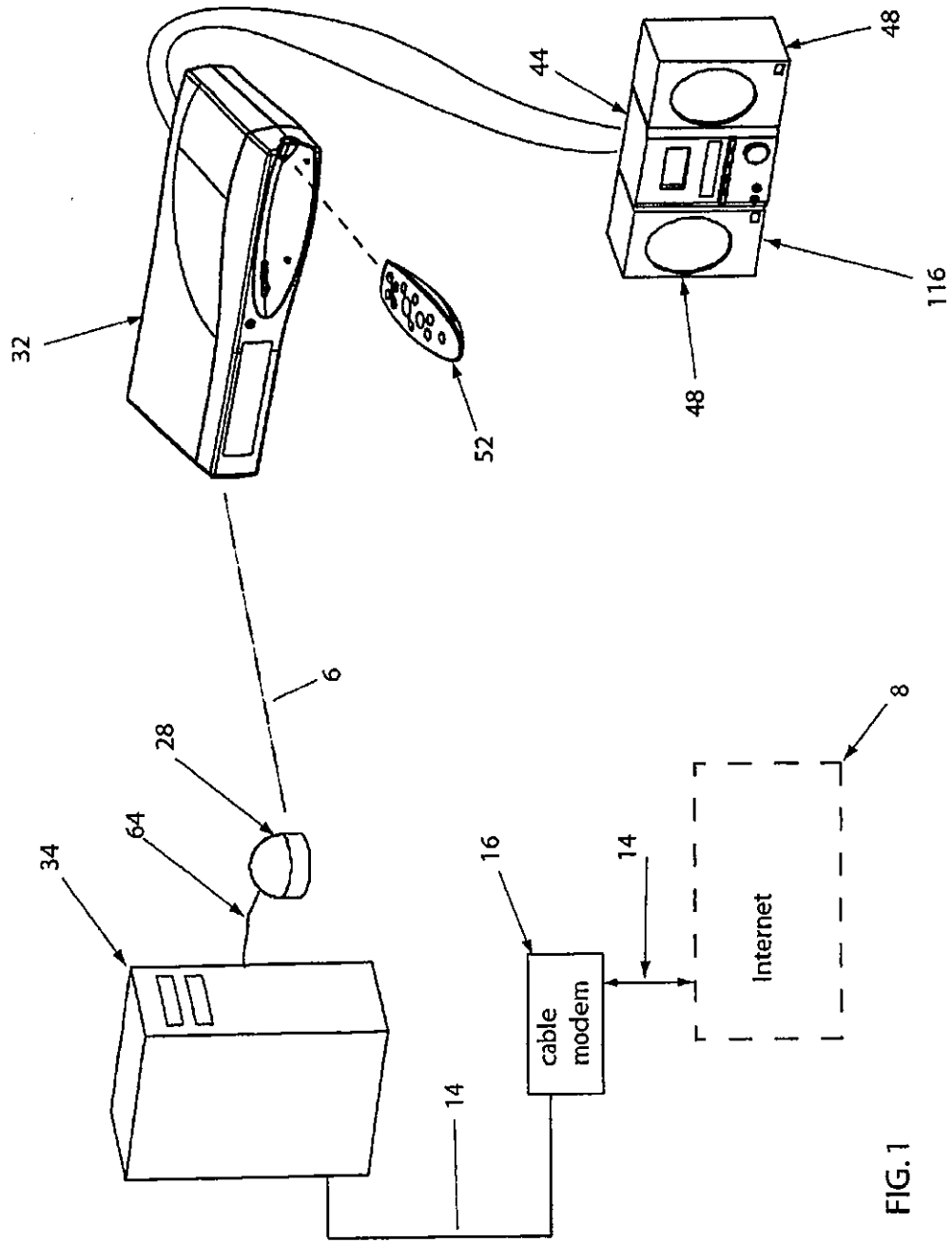


FIG. 1

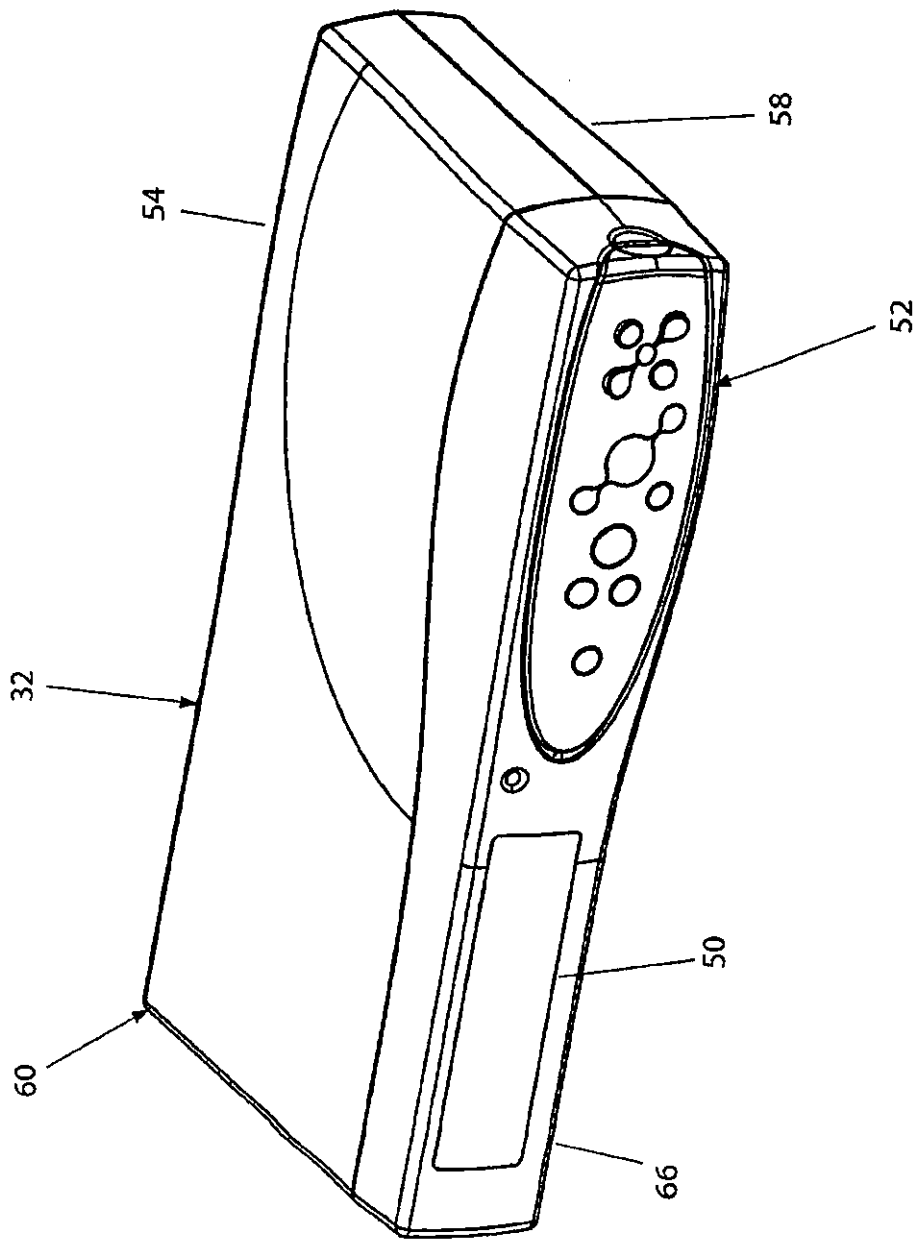


FIG. 2

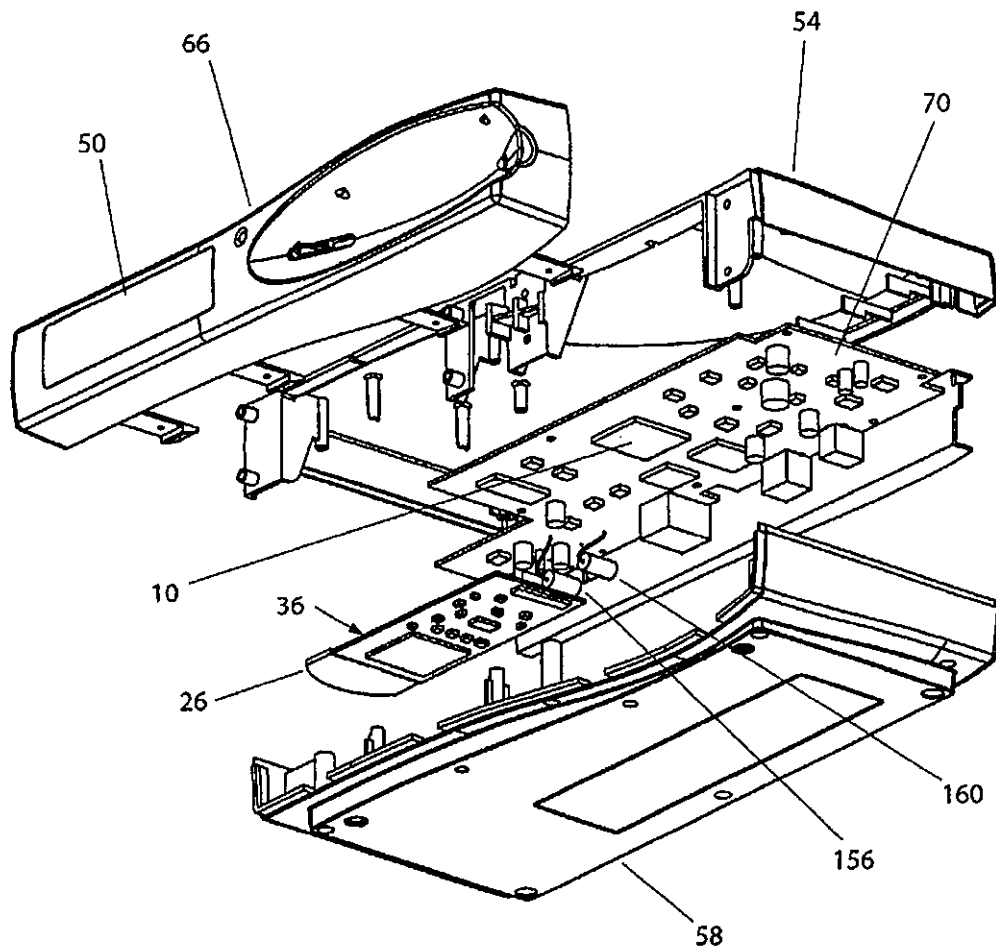


FIG. 3

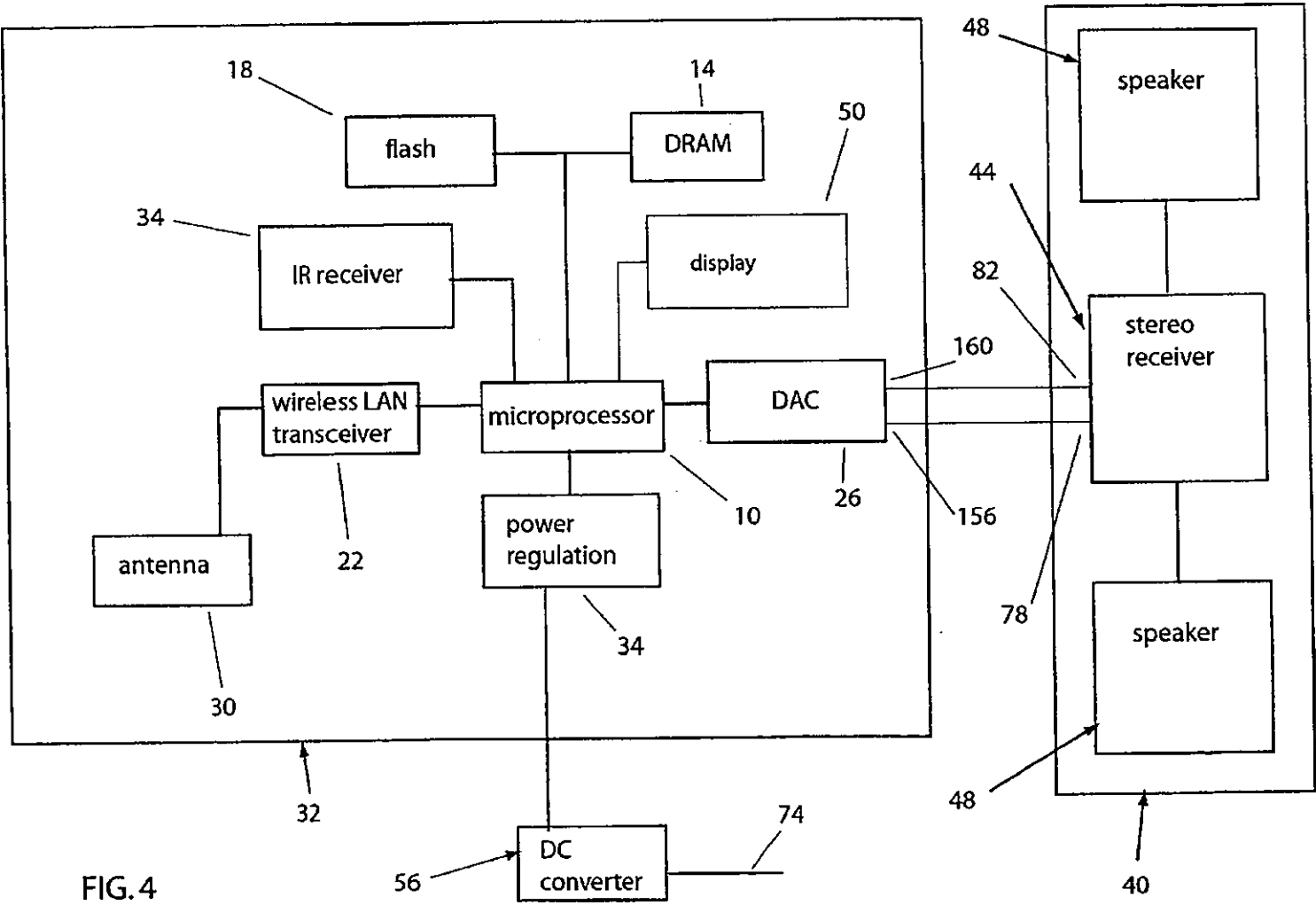


FIG. 4

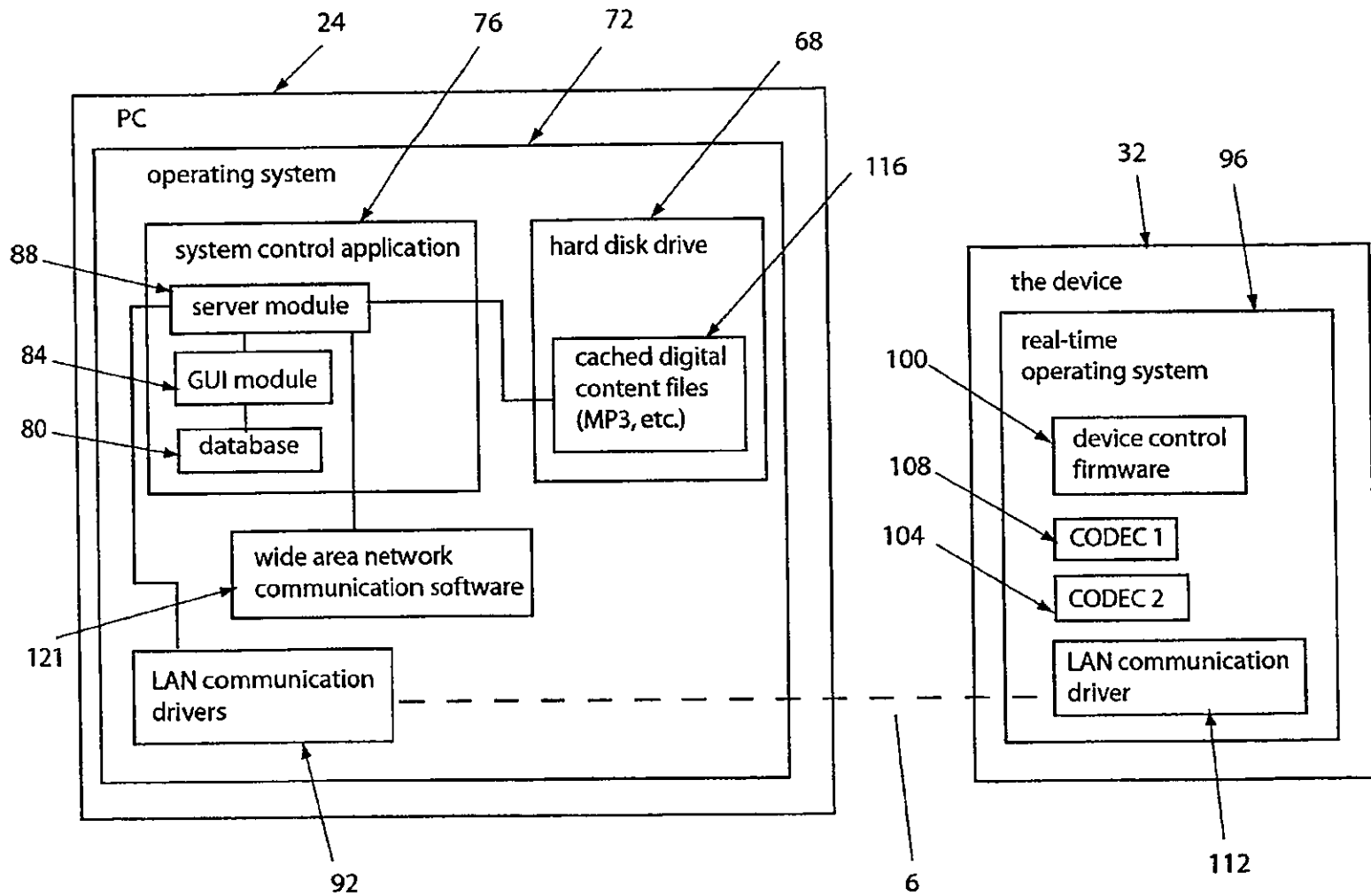


FIG. 5

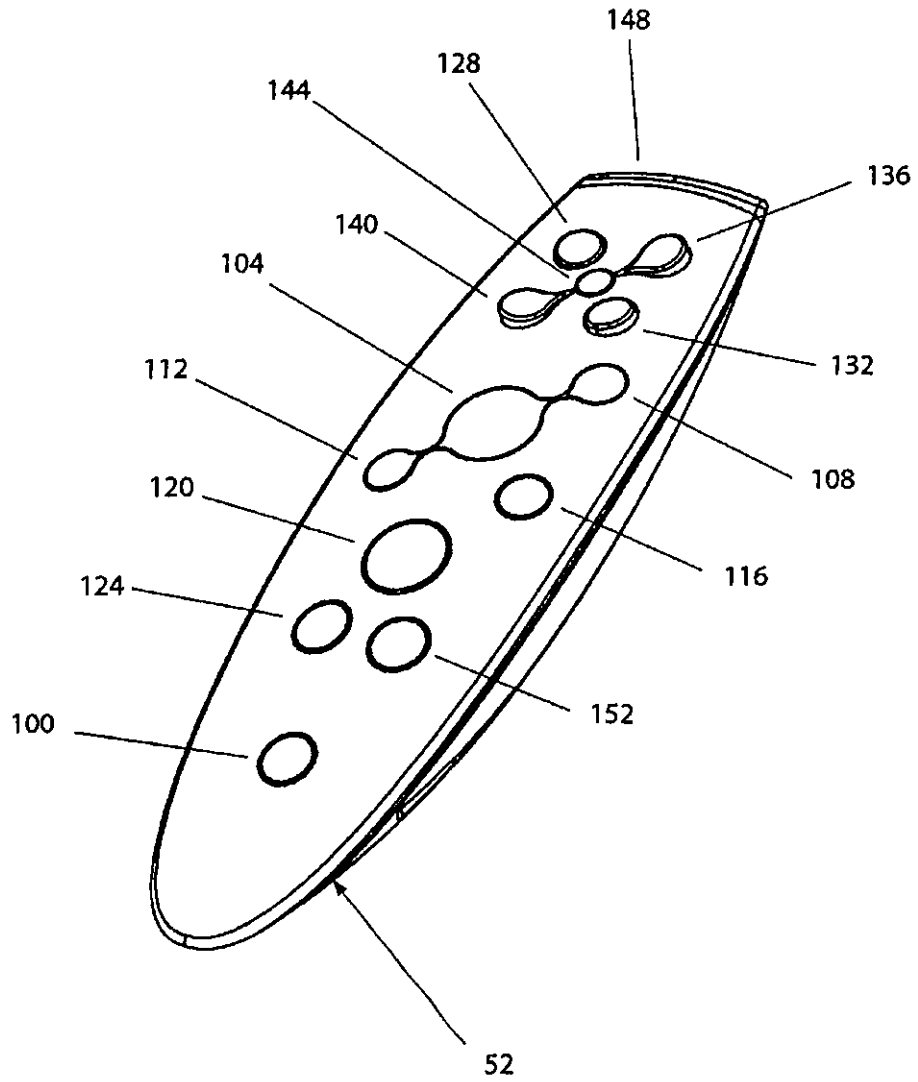


FIG. 6

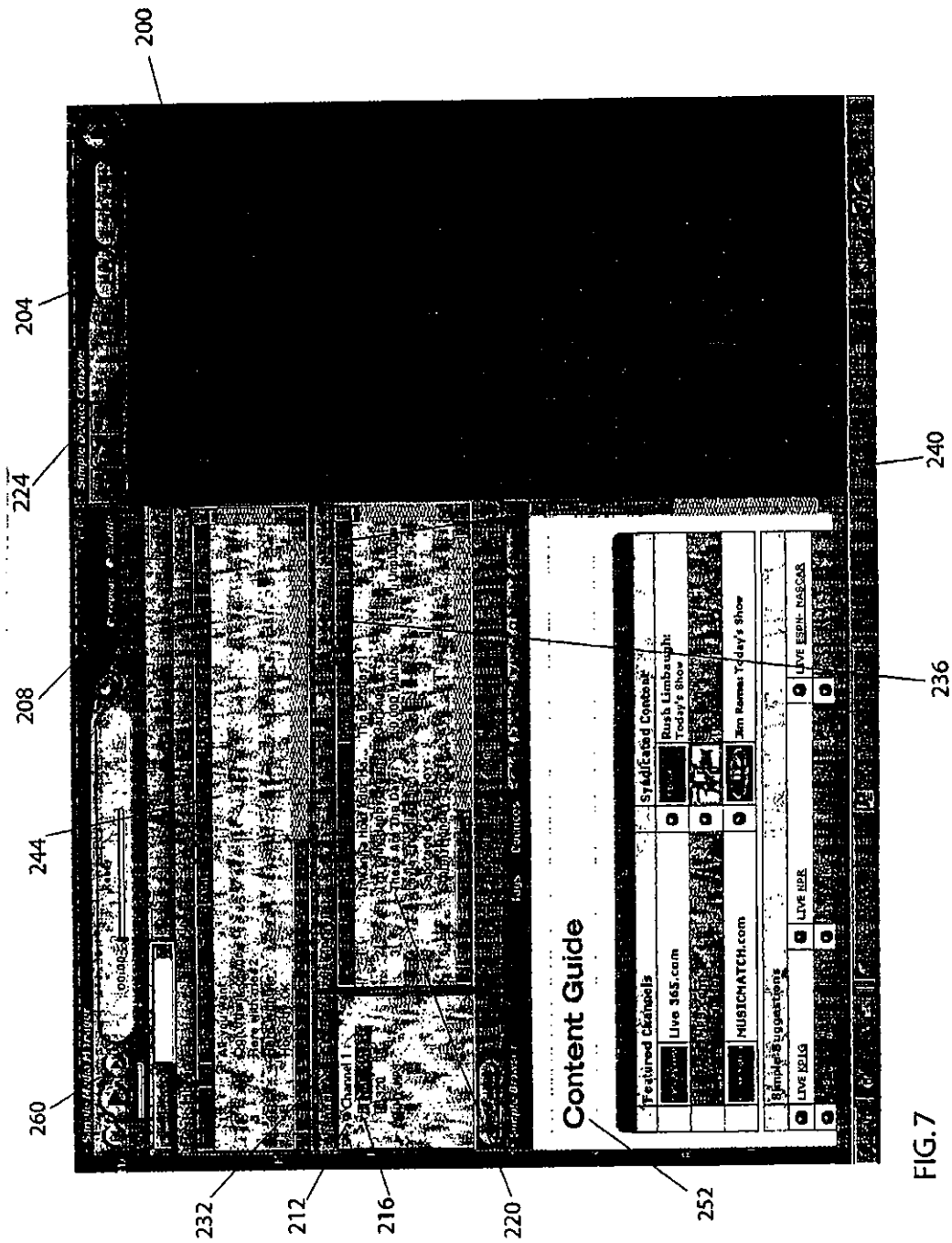


FIG. 7

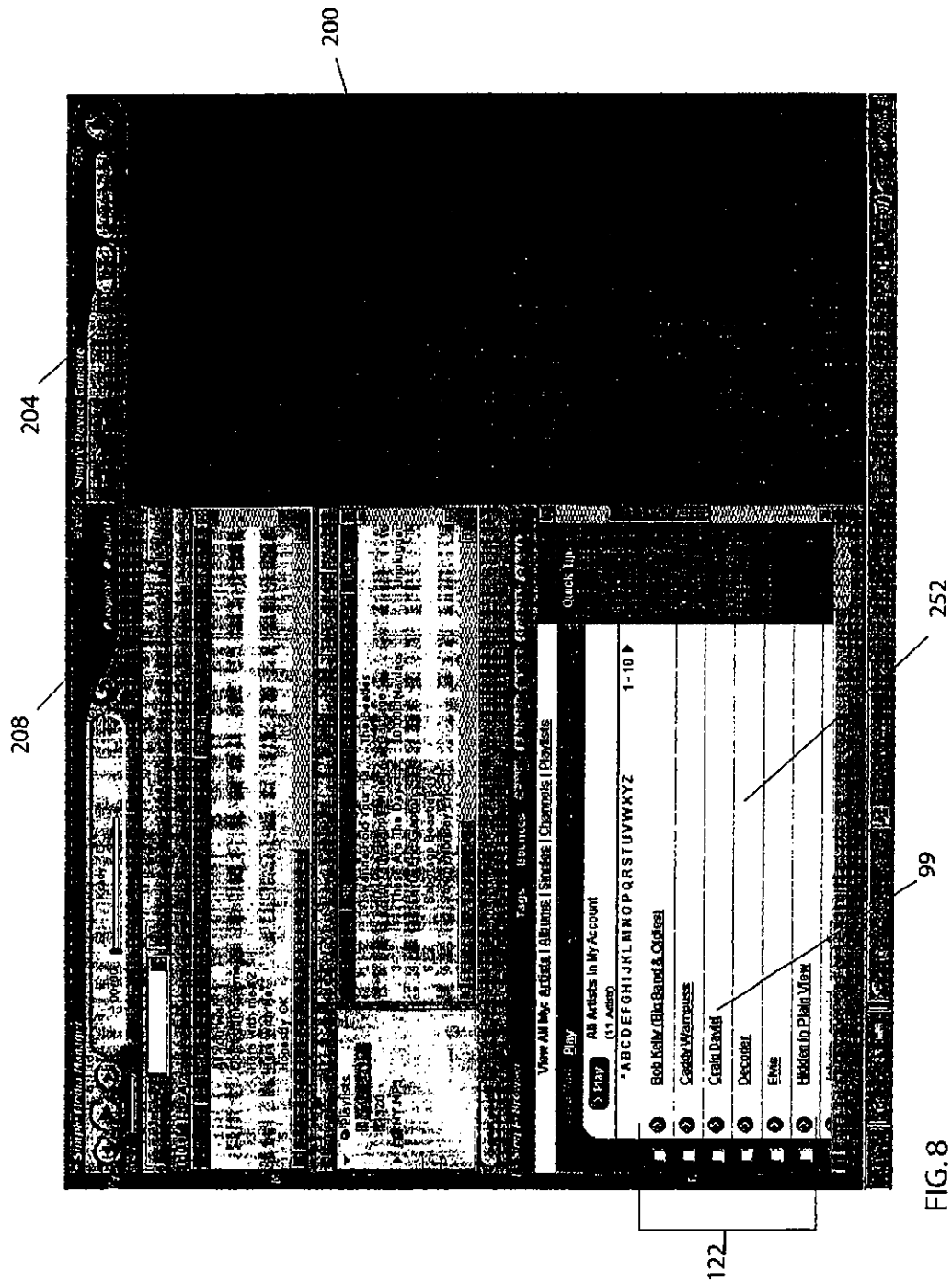


FIG. 8



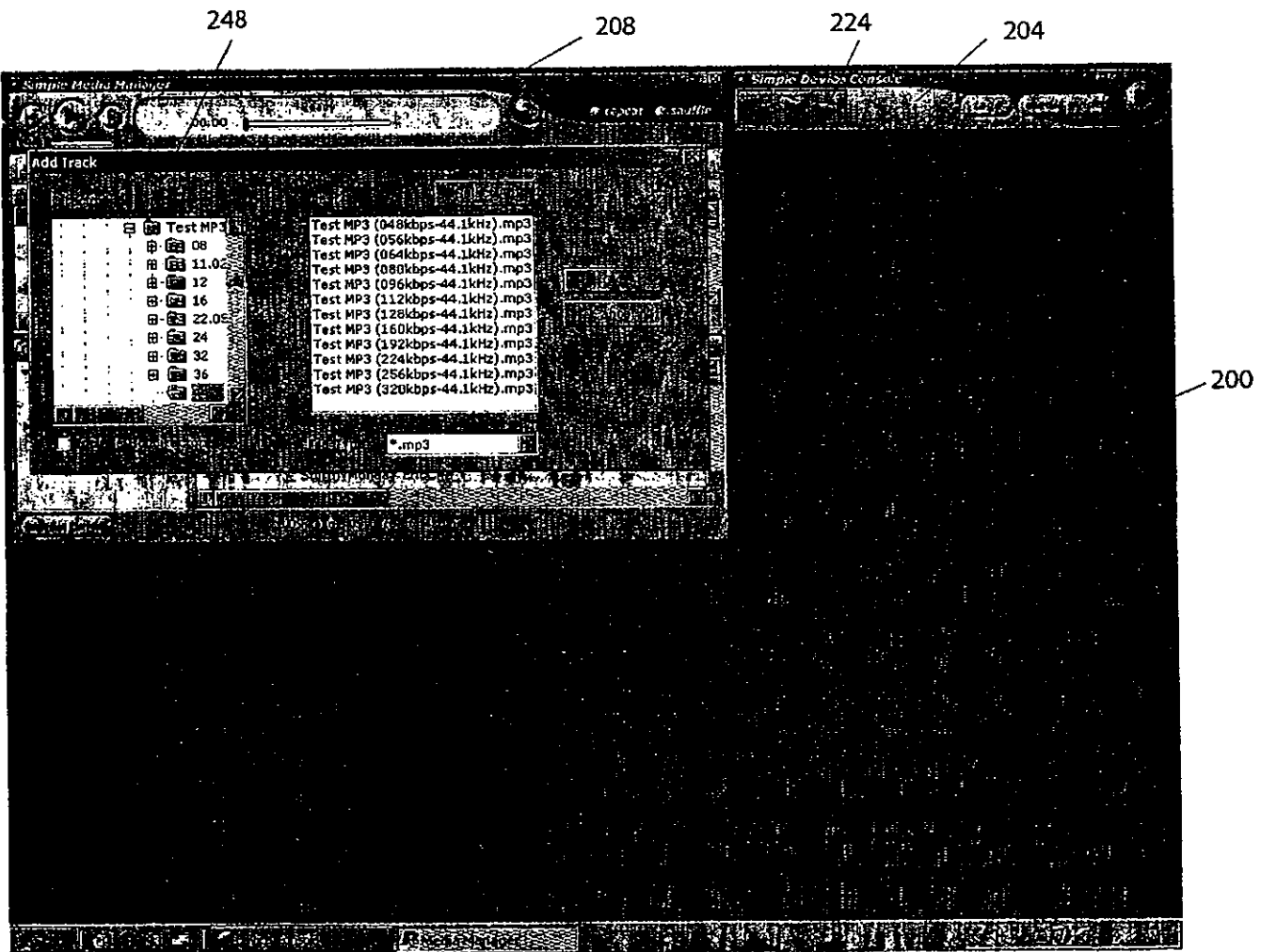


FIG. 9

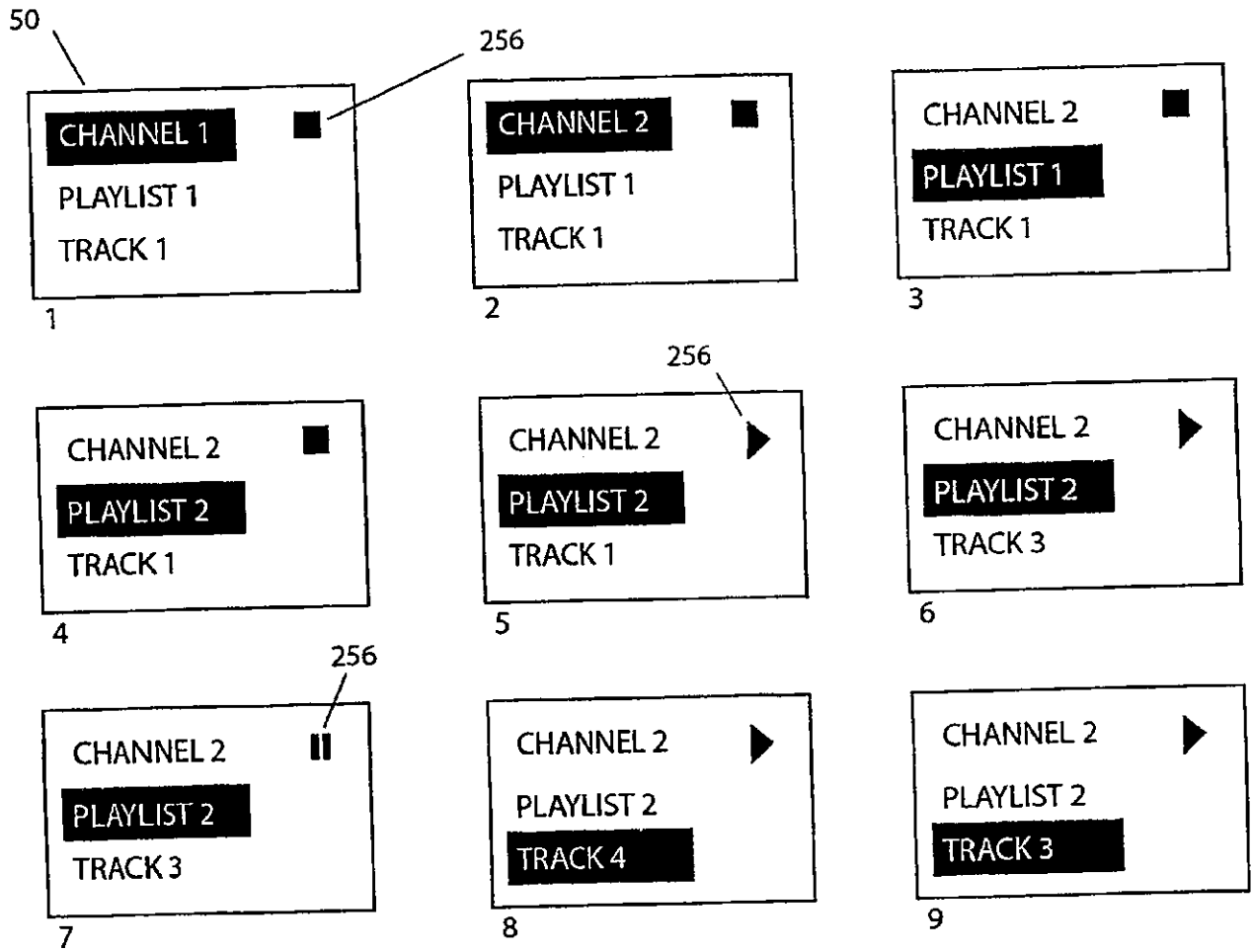


FIG. 10

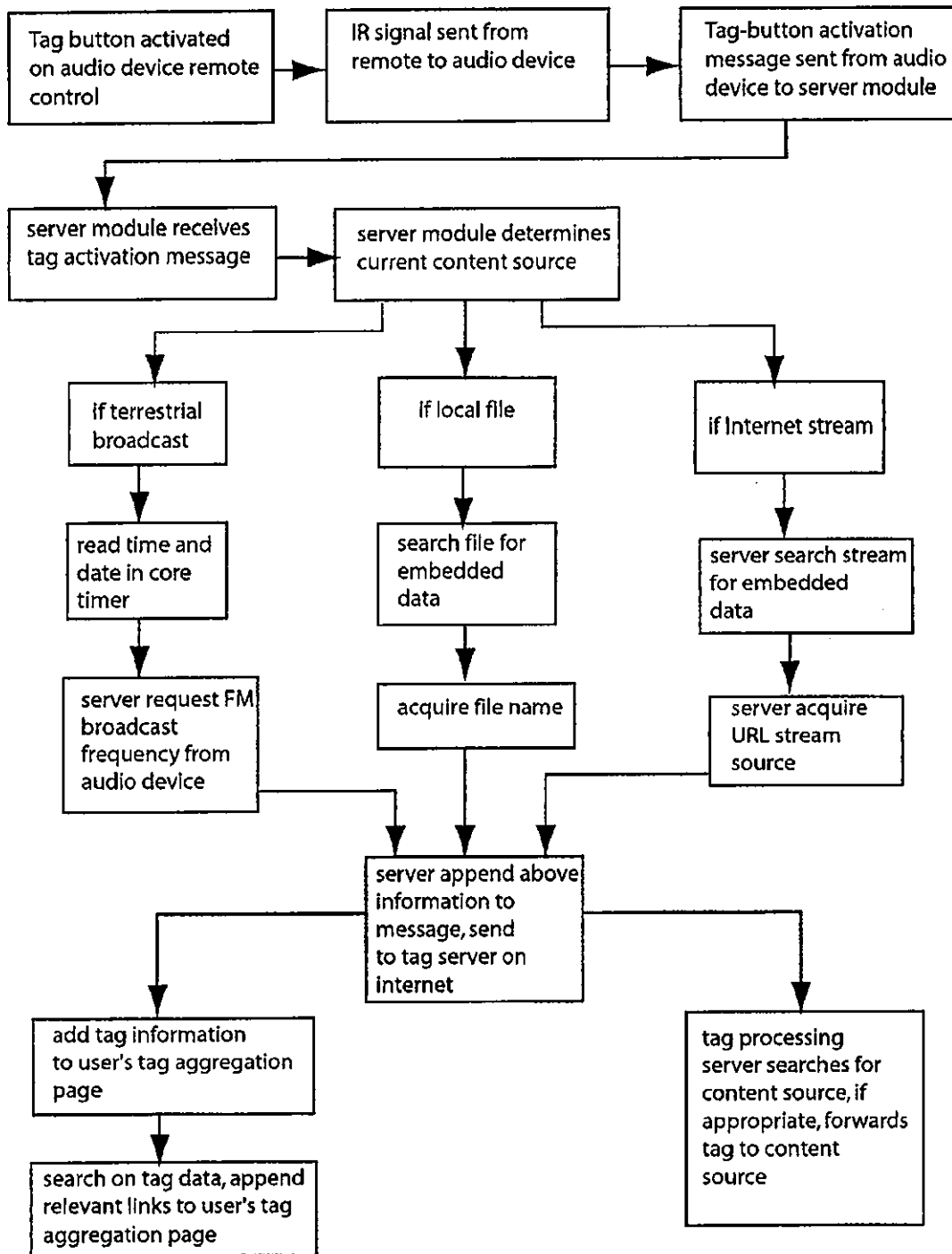


FIG. 11

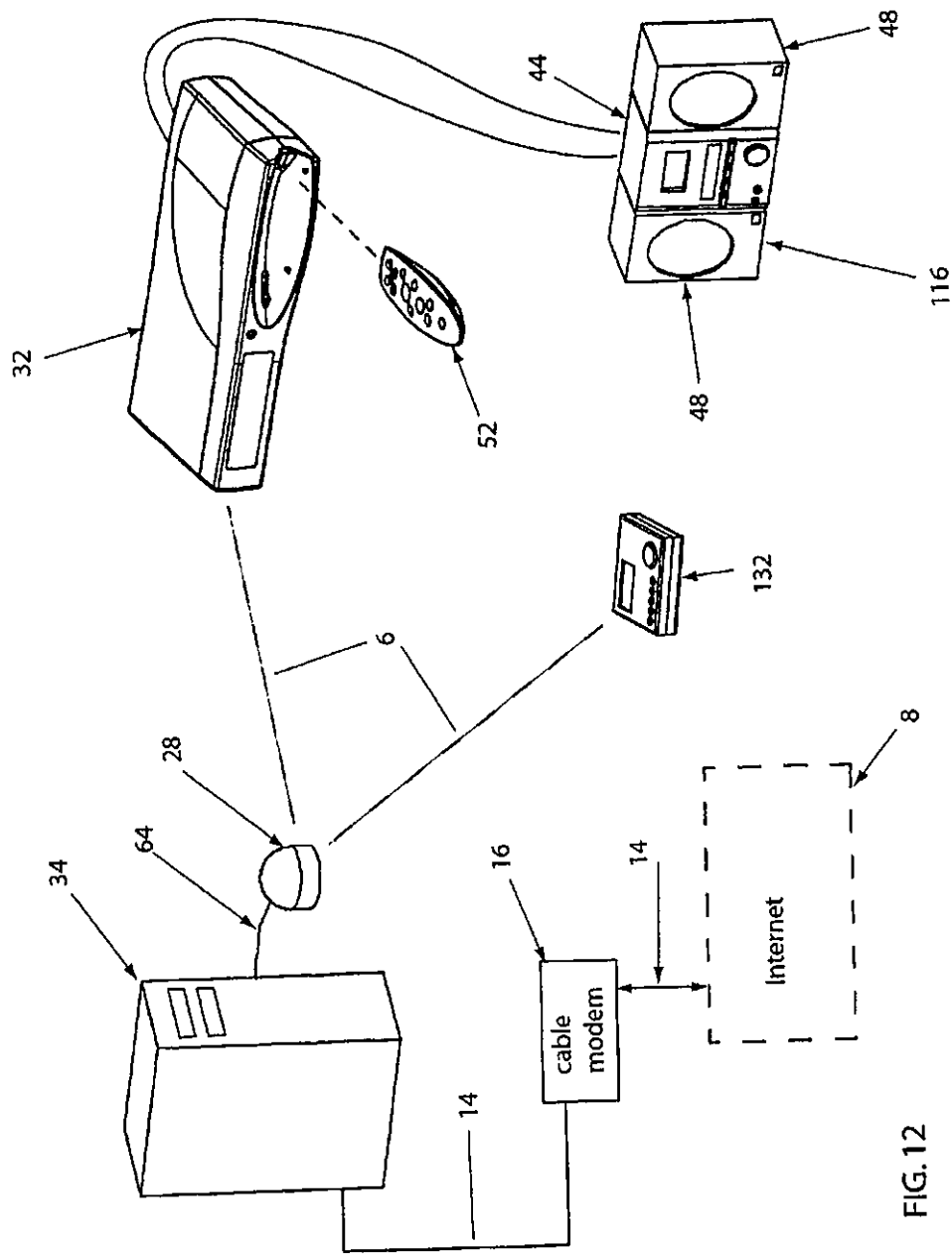


FIG. 12

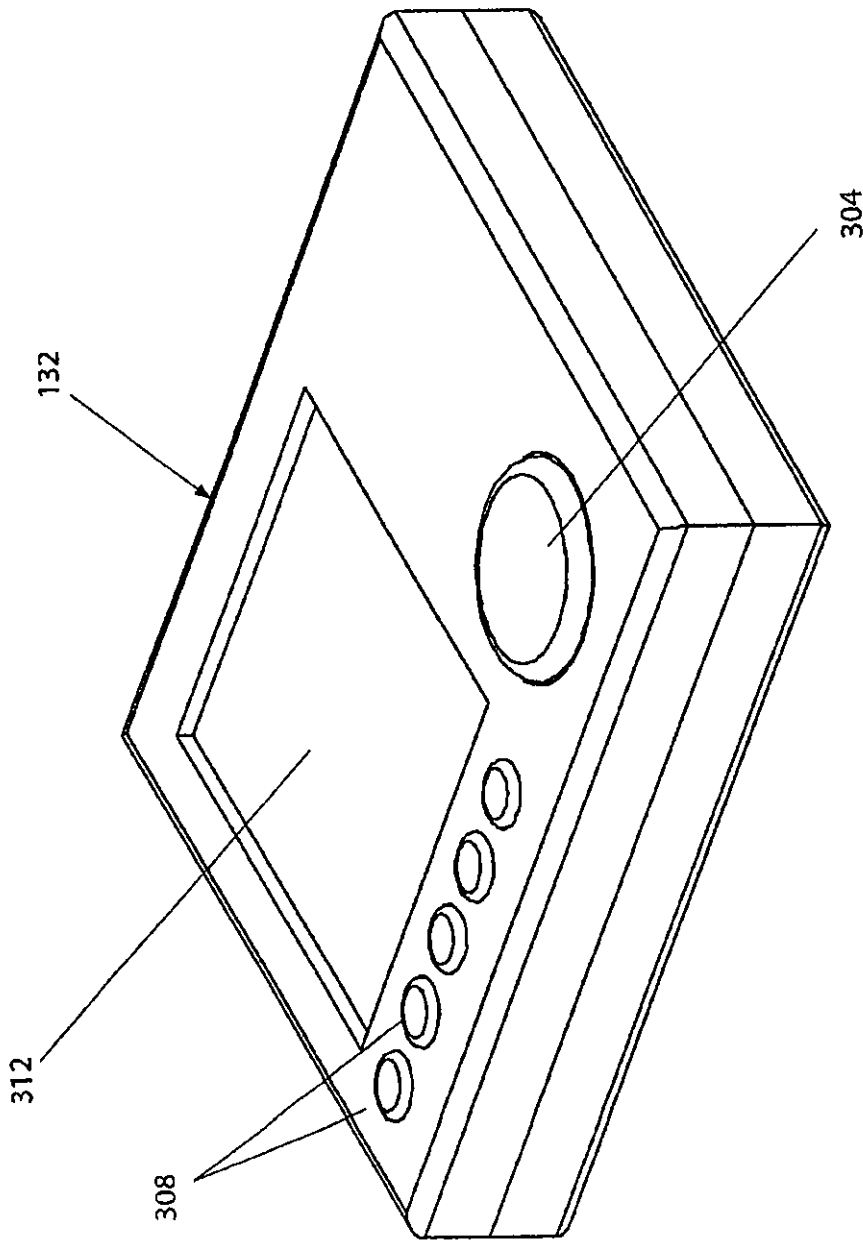


FIG. 13

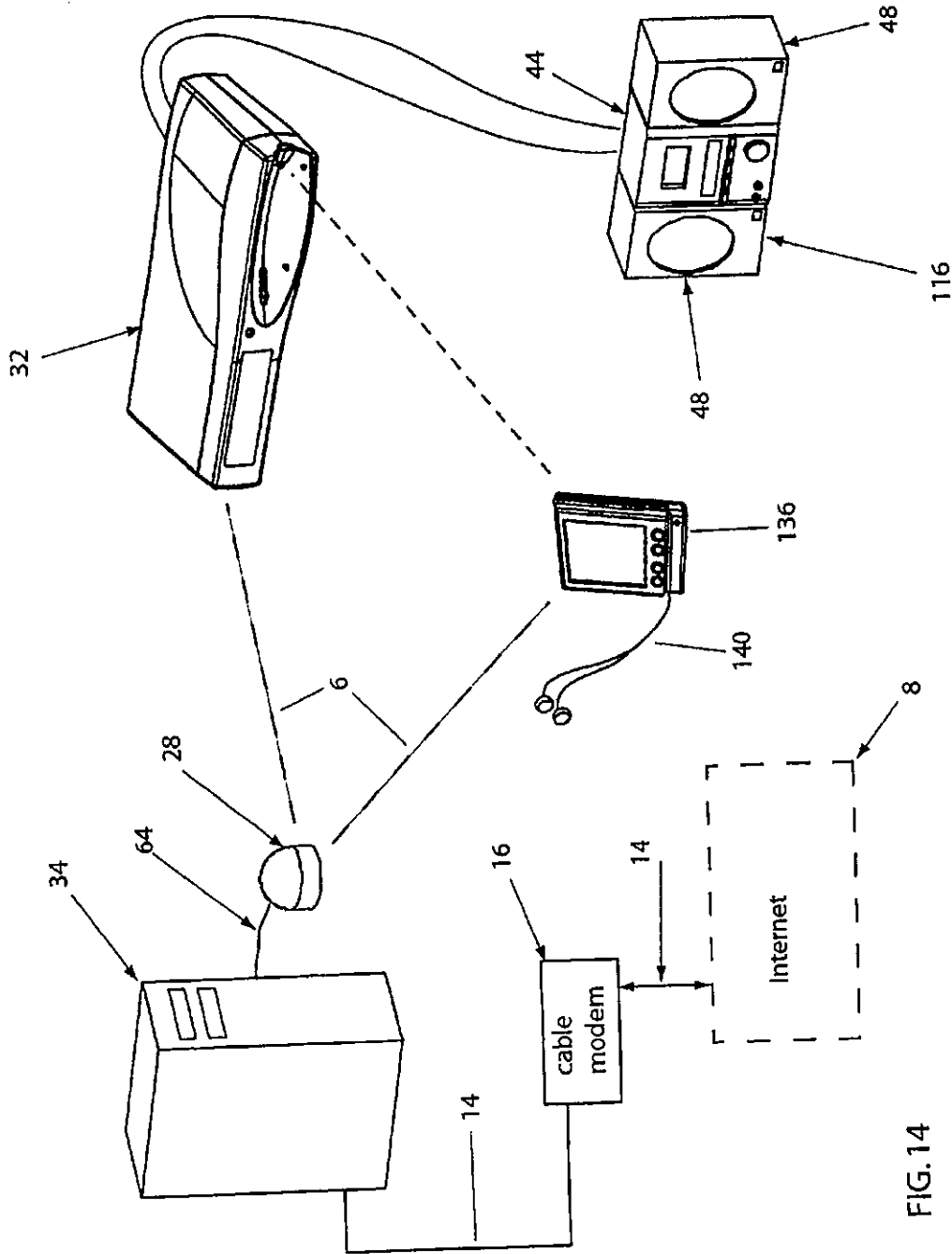


FIG. 14

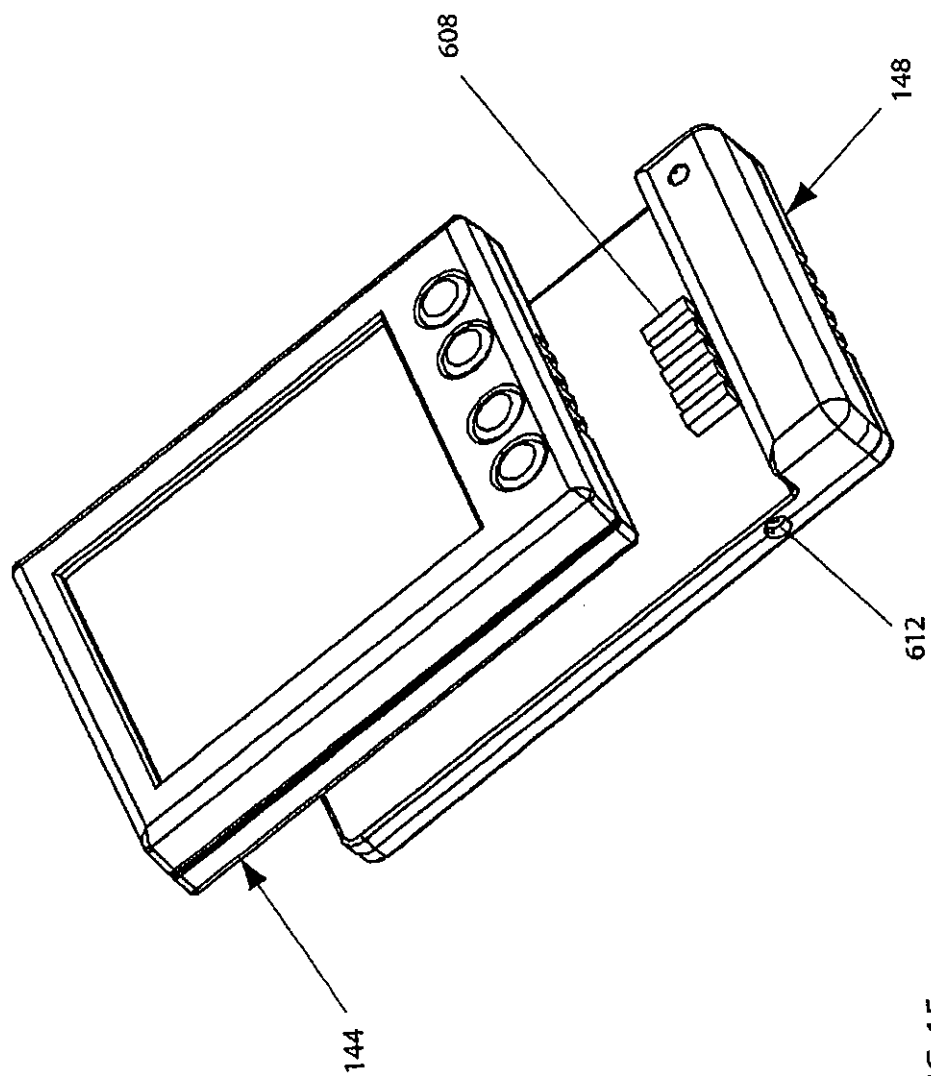


FIG. 15

## AUDIO CONVERTER DEVICE AND METHOD FOR USING THE SAME

### FIELD OF THE INVENTION

[0001] The present invention relates generally to audio playback devices, and more particularly, to an audio converter device to convert digital audio data received from a computer system to analog electrical data to be played on an audio playback device.

### BACKGROUND

[0002] The rapid buildup of telecommunications infrastructure combined with substantial investment in Internet-based businesses and technology has brought Internet connectivity to a large segment of the population. Recent market statistics show that a majority of households in the U.S. own at least one personal computer (PC), and a significant number of these PCs are connected to the Internet. Many households include two or more PCs, as well as various PC productivity peripherals such as printers, scanners, and the like. Decreases in the cost of PC components such as microprocessors, hard disk drives, memory, and displays, have driven the commoditization of PCs. Although the majority of household PCs are connected to the Internet by dialup modem connections, broadband connectivity is being rapidly adopted, and is decreasing in price as a variety of technologies are introduced and compete in the marketplace. A large majority of households in the U.S. and Europe are viable for at least one or more type of broadband connection, such as cable, DSL, optical networks, fixed wireless, or two-way satellite transmission.

[0003] A market for home networking technology has emerged, driven by the need to share an Internet connection between two or more PCs, and to connect all the PCs to productivity peripherals. There has been innovation in local area network (LAN) technology based on end-user desire for simplicity and ease of installation. Installing Ethernet cable is impractical for a majority of end-users, therefore a number of no-new-wires technologies have been introduced. The Home Phoneline Networking Association (HPNA) promotes networking products that turn existing phone wiring in the home into an Ethernet physical layer. Adapters are required that allow each device to plug into any RJ-11 phone jack in the home. The adapter modifies the signal from devices so that it can be carried by the home phone lines. Existing HPNA products provide data-rates equivalent to 10base-T Ethernet, approximately 10 Mbps. Networking technology that uses the AC power wiring in the home to carry data signals has also appeared. Similar to HPNA devices, adapters are required to convert data signals from devices into voltage fluctuations carried on to and off of the AC wires, allowing any AC outlet to become a network interface. Although both HPNA and power line networking products are convenient to use because they require no new wires, the advantage of AC power line products over HPNA is that AC power outlets are more ubiquitous than RJ-11 phone jacks.

[0004] Wireless radio-frequency (RF) LAN technology has also been introduced into the home networking market. Theoretically, wireless technology is the most convenient for the end user to install. There are currently two prevalent standards for wireless networking, Institute of Electrical and Electronics Engineers (IEEE) 802.11b and HomeRF. Both of

these systems utilize the unlicensed 2.4 Ghz ISM band as the carrier frequency for the transmission of data. Both of these technologies have effective ranges of approximately 150 feet in a typical household setting. IEEE 802.11b is a direct sequence spread spectrum technology. HomeRF is a frequency-hopping spread spectrum technology. Adapters that are RF transceivers are required for each device to communicate on the network. In addition to utilizing Transmission Control Protocol/Internet Protocol (TCP/IP) protocols, IEEE 802.11b and HomeRF include additional encryption and security protocol layers so that the user's devices have controlled access to data being sent through the LAN.

[0005] Due to market competition and the effect of Moore's Law, home networking technology is greatly increasing in performance and availability, while decreasing in price. For example, the current data-rate roadmap shows HomeRF increasing from 10 Mbps to 20 Mbps, utilizing the 5 Ghz band. The IEEE 802.11 technology roadmap shows the introduction of 802.11a at 54 Mbps, also utilizing the 5 Ghz band. It is important to note that LAN data-rates are increasing much faster than wide-area data-rates, such as the data-rates provided by "last mile" technologies including DSL, DOCSIS. Wireless wide area data-rates are also improving slowly. Current digital cellular technology provides less than 64 Kbps data-rates, with most systems providing throughput in the 20 Kbps range.

[0006] The MP3 digital audio format is an audio encoding technology that allows consumers to further compress digital audio files such as those found on Compact Disks, to much smaller sizes with very little decrease in sound quality. The MP3 format is the audio layer of MPEG-2 digital audio and video compression and transmission standard. For example, the MP3 format allows for compression of audio content to approximately 1 million bytes per minute of audio, at near Compact Disk quality. This capability, combined with a decrease in the cost of flash memory, a type of non-volatile silicon-based mass memory, has made it possible to develop portable digital audio playback devices. These are devices that are significantly smaller than portable CD players because they contain no moving parts, only flash memory, a microprocessor for decoding MP3 compressed audio content, and batteries. However, the cost per bit of audio content with portable digital audio playback devices is still very high because of the high cost of flash memory. The typical portable digital audio playback device includes enough flash memory to store about one CD's worth of digital music. The result is that the user is burdened with having to continually manually change the music files in the device by plugging the device into the PC and operating a user interface, if they want to listen to a wide range of music.

[0007] PC-based MP3 software players have been created that provide a convenient graphical user interface and software decoding of MP3 files. Some technology allows users to play MP3 files on their PC, using an existing sound card with external speakers. However, to listen to MP3s the user must interface with the PC, using a mouse and keyboard, and must be nearby the PC sound output equipment.

[0008] The smaller size of MP3 encoded audio files has also enabled these files to be shared by users across the Internet, since the transfer of these files takes an acceptable amount of time. Internet-based digital music access and distribution service businesses have appeared that provide various means for users to gain access to digital audio files.



[0009] In addition to music, many other types of audio content are now available in digital format, such as spoken-word content, news, commentary, and educational content. Digital files containing audio recordings of books being read aloud are available for download directly from their website.

[0010] At the same time, there is a very large installed base of stereo systems in households throughout the world. The majority of these systems are capable of producing high fidelity audio if the audio inputs into the stereo system are of high quality.

[0011] What is needed is a system that allows users to play all of the digital content that is stored on their PC, on their existing audio equipment. This system should include an audio content management system, and should allow the user to control and manipulate the content that is stored on the PC, at the stereo system.

[0012] This system should also provide the ability to stream audio from sources beyond the PC on the Internet. There should be a seamless interface that allows user to manage both locally cached content and Internet streams.

#### SUMMARY OF THE INVENTION

[0013] An audio converter device and a method for using the same are provided. In one embodiment, the audio converter device receives the digital audio data from a first device via a local area network. The audio converter device decompresses the digital audio data and converts the digital audio data into analog electrical data. The audio converter device transfers the analog electrical data to an audio playback device.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The present invention will be understood more fully from the detailed description given below and from the accompanying drawings of various embodiments of the invention, which, however, should not be taken to limit the invention to the specific embodiments, but are for explanation and understanding only:

[0015] FIG. 1 shows a schematic of one embodiment of the digital streaming audio system hardware components;

[0016] FIG. 2 shows an isometric view of one embodiment of a digital audio converter;

[0017] FIG. 3 shows an isometric exploded view of one embodiment of a digital audio converter;

[0018] FIG. 4 shows a block diagram of one embodiment of a digital audio converter hardware components;

[0019] FIG. 5 shows a block diagram of one embodiment of the digital streaming audio system software components;

[0020] FIG. 6 shows an isometric view of one embodiment of a digital audio converter remote control;

[0021] FIG. 7 shows one embodiment of a PC desktop with the console and media manager GUI;

[0022] FIG. 8 shows one embodiment of a PC desktop with the mini-browser open to a content portal;

[0023] FIG. 9 shows one embodiment of a PC desktop with the media manager GUI open with a dialog box;

[0024] FIG. 10 shows a flowchart of one embodiment of the GUI at digital audio converter;

[0025] FIG. 11 shows one embodiment of a tag sequence flowchart;

[0026] FIG. 12 shows a schematic of one embodiment of a digital audio converter with alarm clock function;

[0027] FIG. 13 shows an isometric view of one embodiment of the alarm clock controller;

[0028] FIG. 14 shows a schematic of one embodiment of a digital streaming audio system incorporating a PDA with an attached wireless LAN adapter module which functions as the system controller and, or player device; and

[0029] FIG. 15 shows an isometric view of one embodiment of the PDA removed from the LAN adapter.

#### DETAILED DESCRIPTION

[0030] An audio converter device and a method for using the same are described. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, to one skilled in the art that the present invention can be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to avoid obscuring the present invention.

[0031] A set of definitions is provided below to clarify the present invention.

[0032] Definitions

[0033] The Internet is used interchangeably with the term web or worldwide web. Both of these are defined as the worldwide network of PCs, servers, and other devices.

[0034] Broadband connection is defined as a communications network in which the frequency bandwidth can be divided and shared by multiple simultaneous signals. A broadband connection to the Internet typically provides minimum upstream and downstream data-rates of approximately 200K or more bits per second. There are many different types of broadband connections including DSL, cable modems, and fixed and mobile wireless connections.

[0035] A Data Over Cable System Interface Specification (DOCSIS) modem is an industry standard type of cable modem that is used to provide broadband access to the Internet over a coaxial cable physical layer that is also used for the delivery of cable TV signals (CATV).

[0036] A Digital Subscriber Line (DSL) modem is also an industry standard type of modem that is used to provide broadband access to the Internet, but over conventional copper phone lines (local loops).

[0037] The term gateway, used interchangeably with broadband gateway, is defined as an integral modem and router, and may include hub functionality. The modem function is used to change voltage fluctuations on an input carrier line (a DSL line input or a cable TV input) into digital data.

[0038] Routers are devices that connect one distinct network to another by passing only certain IP addresses that are

targeted for specific networks. Hubs allow one network signal input to be split and thus sent to many devices.

[0039] Gateway storage peripheral is defined as an add-on storage device with processing power, an operating system, and a software application that manages the downloading and storage of data. An example scenario for the use of a gateway storage peripheral is a system where a user has a DOCSIS modem and would like to add an always-on storage capability. The gateway storage peripheral is connected to the DOCSIS modem via a USB port or an Ethernet port in the DOCSIS modem. A gateway storage peripheral in combination with a DOCSIS modem or any type of broadband modem is considered a storage gateway system. A PC that is always left on and connected to an always-on gateway with a DSL or broadband cable connection is considered a storage gateway system.

[0040] The term "message" is defined as information that is sent digitally from one computing device to another for various purposes. The term "content" is used to mean the information contained in digital files or streams. For example, content may be entertainment or news, or audio files in MP3 format. "Data" is used to mean information such as digital schedule contents, responses from devices sent back through the system, or digital messages and email. "Content" and "data" are sometimes used interchangeably. "Client devices" are those devices that are not fully functional without a host device such as a personal computer.

[0041] Local Area Network (LAN) is defined as a network structure that includes two or more devices that can communicate with other devices utilizing a shared communication infrastructure, including wired network technologies, such as Ethernet, or wireless network technologies such as Institute of Electrical and Electronics Engineers (IEEE) 802.11b or HomeRF technology. Wireless LAN technology such as IEEE 802.11b and HomeRF are based on the unlicensed 2.4 Ghz ISM (Industrial, Scientific, and Medical) frequency band and are well known the telecommunications and LAN industries. These networking technologies utilize Transmission Control Protocol/Internet 8 Protocols (TCP/IP) protocols. A LAN typically constitutes a group of interconnected devices that share a common geographic location and are typically grouped together as a subnet. A local network, for example, would be a home network where several computers and other smart devices would be digitally connected for the purpose of transferring content and data, controlling each other, sharing programming, or presenting data and content to a user.

[0042] Codec (Compression/Decompression algorithm) is a software application that is used to decode (uncompress) encoded (compressed) media files or streams. Most content is stored and sent in a compressed format so that the content files are smaller and thus take up less storage space and use less bandwidth when being transferred via the Internet. The content is then decoded at the playback device. For example, MP3 audio files are encoded and must be decoded by a microprocessor running the codec in order for the audio content to be presented to the user in an analog format.

[0043] HTTP is Hyper-text transfer protocol, the protocol used by Web browsers and Web servers to transfer files, such as text and graphic files.

[0044] Data-rate is defined as the data throughput of a telecommunications system or technology, and is measured in a quantity of bits per second, such as millions of bits per second (Mbps).

[0045] Overview of Operation

[0046] The fundamental operation of the digital streaming audio system involves LAN transmission of digital audio files 116 from a local source that is a personal computer (PC 34) 24, to a digital audio converter 32 that receives the stream and converts it into a signal that can be input into a conventional stereo system 40. Referring now to FIG. 1, the key hardware components in the system are PC 34 connected to the Internet 8. The PC 34 is also functionally connected via a USB connection 64 to a wireless radio frequency (RF) LAN access point 28, such that digital content from PC 34 is transmitted to nodes on the LAN. Digital audio converter 32, shown in FIG. 2, is located within communication range of the wireless LAN access point 28, and is connected to a conventional stereo receiver 44 via the right and left RCA jack inputs. Stereo receiver 44 is part of a stereo system 40 that includes a left speaker 48 and a right speaker 48. 0 is a block diagram of a portion of the digital streaming audio system including digital audio converter 32 and the stereo system 40, showing how left analog output 156 and right analog output 160 included in digital audio converter 32 are connected respectively to the left line input 78 and right line input 82 on existing stereo receiver 44. Digital audio converter 32 also includes a remote control 52 that communicates with digital audio converter 32 via an IR communication link 38. Stereo system 40 functions in the conventional way, pre-amplifying and amplifying the audio signals and delivering them to the left speaker 48 and the right speaker 48.

[0047] The function of the PC 34 in the digital streaming audio system is to acquire, store, manage, and serve digital audio content to digital audio converter 32. The PC 34 gains access to digital audio content several ways. In one embodiment the PC 34 is also connected to the Internet 8 via a broadband cable modem 16. Thus the PC 34 has access via content services to both downloadable digital audio files 116 such as MP3 formatted content files, as well as digital audio streams from Internet 8 servers. For example, some radio stations provide access to their programming via digital audio streams.

[0048] In other embodiments, PC 34 is connected to Internet 8 through a dial-up modem connection to an ISP, or Digital Subscriber Line (DSL), or a fixed wireless broadband connection.

[0049] Wireless LAN transceivers are capable of sending and receiving data using radio frequencies via a wireless data transfer protocol. Technology for such a LAN is currently available and includes the Symphony wireless networking access point provided by Proxim, Inc. of Sunnyvale Calif. LAN systems such as this are based on RF modulation centered on the 2.4 GHz frequency band. Such LANs have a practical range of approximately 150 feet and are capable of reaching most areas in an average sized house were a stereo system 40 and digital audio converter 32 are located. In another embodiment, the wireless LAN access point 28 is a PCI card that is located internal to the PC 34, with an external antenna. In another embodiment, the wireless LAN communication link 6 is provided using IEEE 802.11b protocols.

[0050] The function of digital audio converter 32 is to receive digital audio streams sent from the PC 34, decode and de-compress the digital audio in real time, convert it from a digital format into analog electrical signals, specifically a left analog audio signal and a right analog audio signal. Through the use of digital audio converter 32, the stereo system 40 is the output device for digital audio content that was initially stored on the PC 34 or on the Internet 8.

[0051] Digital audio converter 32 includes an LCD 50 that is used to display data relevant to the audio content being played, such as track 220 titles. In one embodiment, digital audio converter 32 includes one set of control buttons on the remote control 52, which attaches onto to the enclosure 60 of digital audio converter 32. In another embodiment, control buttons are included on both an IR remote control 52 and integral to the main enclosure 60. The purpose of the control buttons is to provide a user interface for controlling the digital streaming audio system, as well as a tag button 120 used to maintain a record of certain audio content on the PC 34 for later use, and control of other features.

[0052] The control buttons include the conventional controls that are found on audio playback devices including power on/off button 100; track forward button 108 and track backward button 112—for advancing through and selecting tracks for playback; menu button 152; play/pause button 104—for starting and pausing (stopping at point in the middle of a playback of an audio track); stop button 116—for stopping playback of audio content; tag button 120—for triggering the transmission of information about a currently playing digital audio content back through the system for delivery to the end user on a website or for delivery to the content creator or content originator; user-defined button 124—a button that may be associated with a variety of functions as selected by the user using the audio playback device setup GUI. A four-way navigation control 144 including navigate up button 128, navigate down button 132, navigate left button 140, and navigate right button 136. A select button is included in the center of the four-way navigation control 144. These control buttons are also shown on a remote control 52 in FIG. 6.

#### [0053] Mechanical Description

[0054] Referring now to FIGS. 2 and 3, one embodiment of digital audio converter 32 includes a three-piece plastic injection-molded enclosure 60 including a top housing 54, a bottom housing 58, and a front bezel 66. Internal hardware also includes LCD 50 that contains an integral backlight 52 so that the LCD 50 may be read in low light, a power regulation sub-system 30, an infrared (IR) receiver 34 and related circuitry, and a printed circuit board (PCB) 70 that contains the electronic components that constitute the functional data-manipulating aspect of digital audio converter 32. In one embodiment, the wireless LAN transceiver 36 antenna 26 is located internal to the digital audio converter 32 housing as shown in FIG. 3. The entire assembly is held together with threaded fasteners.

[0055] The construction of the remote control 52 is a typical two-piece plastic shell construction as shown in FIG. 6. Internal hardware includes an infrared (IR) transceiver 148 and batteries, as well as a printed circuit board that contains the electronic components that constitute the func-

tional data-manipulating aspect of digital audio converter 32. In one embodiment, the remote control 52 is removably attached to the enclosure 60.

#### [0056] Electrical Description

[0057] FIG. 4 shows a block diagram of the electrical components in digital audio converter 32. PCB electrically connects components including a microprocessor 10 with dynamic memory (DRAM) 14, programmable (flash) memory 18 for storage of control firmware 100 when power is turned off, a power regulation sub-system 30, and a plurality of input/output terminals including an Ethernet port and a right analog output 160 and a left analog output 156. A wireless LAN transceiver 36 is functionally connected to the PCB. PCB also functionally connects an infra-red (IR) control sub-system 34 for processing IR commands from the remote control 52. Digital audio converter 32 also includes a digital-to-analog converter (DAC) 22 for converting the uncompressed digital information into analog signals that are presented at the standard left analog output 156 and right analog output 160 RCA connectors. A display driving sub-system 53 is also included for presenting text and graphical information to the user. Microprocessor 10 in combination with DRAM memory 14 executes instructions from its real time operating system 96 and control firmware 100.

[0058] In another embodiment, digital audio converter 32 includes a terrestrial broadcast tuner subsystem for tuning local AM and FM broadcast radio.

[0059] In another embodiment, power to the stereo system 40 is supplied via a switched power line from the converter box so that the system has the capability of turning the stereo on and off. The on/off function is controlled via software on the PC 34 or through the remote control 52, so that when the digital audio converter 32 is powered on, the stereo system 40 is also automatically powered on.

#### [0060] System Software Description

[0061] FIG. 5 displays the relevant software components of the digital streaming audio system. In one embodiment, the software required on the PC 34 includes an operating system 72, such as the WindowsXP operating system provided by Microsoft of Redmond, Oreg. Wide area communication software 121 is also required for connecting to the Internet 8, which is typically provided as drivers in operating system 72. LAN communication drivers 92 are required for connecting the PC 34 to the LAN. Digital audio files 116 such as MP3 formatted files are stored on the hard disk drive 68.

#### [0062] Software Module—System Control Application 76

[0063] The system control application 76 is software executing on PC 34 that manages communication and streaming from PC 34 to digital audio converter 32. System control application 76 includes a server module 88 that is a Java application. System control application 76 also includes a database module 80 that is written to or accessed by server module 88, and a graphical user interface (GUI) module 84, that provides a user interface for setting up content to be streamed to digital audio converter 32 and played on the stereo system 40. In one embodiment, the GUI module 84 is a native Windows 32-bit application.

[0064] In another embodiment, the GUI module 84 is available on a web page, implemented as HTML and Java Server Pages (JSP).

[0065] The GUI module 84 provides a user interface that is used to organize audio content into lists. The lists that are created using the GUI module 84 at PC 34 are accessible at digital audio converter 32 via the use of control buttons on remote control 52 and visual output on LCD 50.

[0066] FIG. 7 shows a PC desktop 200 with the media manager GUI 208 running. The console 204 is a GUI element that appears when server module 88 is running. Console 204 shows icons for any devices that are actively communicating on the LAN. Digital audio converter icon 224 is shown present on console 204. Media manager GUI 208 is launched from digital audio converter icon 224 on console 204 by clicking on digital audio converter icon 224 on console 204 with a mouse.

[0067] The media manager GUI 208 features a three-level nested list structure. The three levels are labeled as channels 212, playlists 216, and tracks 220. Channels 212 are lists of playlists 216, and playlists 216 are lists of tracks 220. Track 220 is a GUI representation of a locally cached digital audio file 116 or a digital audio stream from Internet 8. Channels 212 can be added by right-clicking with the mouse on the channel bar 232. A menu is displayed that allows the user to create and label channel 212 by typing in text. Playlists 216 can be added to channels 212 by right clicking on a channel 212 label and selecting the option to add playlist 216. Playlists 216 can also be added to channels 212 by left clicking with the mouse on the add playlist button 236. Tracks 220 can be added to playlists 216 by using the mouse to click on the add track button 240. FIG. 9 shows the result of left clicking on add track button 240. A conventional Windows dialog box 248 is displayed. The left side of dialog box 248 includes a navigation window that allows the user to navigate to any directory on local PC 34 or to any other PC that are accessible on the LAN.

[0068] Tracks 220 can also be added to playlists 216 by dragging and dropping an audio file icon from a window on the desktop, onto track 220 list.

[0069] Tracks 220 can also be added to playlists 216 by dragging and dropping track 220 icon from the music library 244. Music library 244 is a window that shows all of the digital audio files 116 stored on the local hard disk drive 68 that can be decoded by digital audio converter 32. A software agent included in server module 88 of system control application 76 searches hard disk drive 68 for compatible audio files, enters the names and locations of those files into database module 80, and places labels of the files in music library 244.

[0070] Audio content services are also available through online services accessed through a browser interface. FIG. 8 shows a web-based content selection guide 252 that provides the ability to make a playlist online. The online digital audio files associated with online playlist titles 99 in the online playlist 122 are streamed to digital audio converter 32 via PC 34 and wireless LAN communication link 6. Server module 88 includes software that interfaces with the protocols of each online audio service provider to allow online playlists 122 to be downloaded and transferred into database module 80. Thus, playlist structures and playlist titles created online using the web-based content selection guide 252 are available and can be interacted with by the user with the user interface at digital audio converter 32.

[0071] Referring now to FIG. 7, media manager GUI also includes a PC audio device control interface 260, which

includes the conventional controls for controlling an audio player device. PC audio device control interface 260 allow the user to control digital audio converter remotely from PC 34. Using a preference setting, the audio sound playing that is controlled by PC audio device control interface 260 can be directed to the local PC 34 speakers 48. In other words, the digital audio file 116 that is selected to be played can be decoded locally at PC 34 and played on PC24 speakers 48.

[0072] Device Software—Digital Audio Converter 32 Operating System

[0073] In one embodiment digital audio converter 32 operates using VxWorks, a real-time operating system 96 provided by WindRiver Systems. Digital audio converter 32 control firmware 100 is a software application that is run on real time operating system 96 and manages the processing of messages from the IR sub-system 34, communication with system control application 76 via LAN 6, stream buffering, and decoding of digital audio.

[0074] Device Software—Device GUI

[0075] A GUI is provided at digital audio converter 32. The GUI is operated using remote control 52 and LCD 50. FIG. 10 shows a graphical user interface flow chart to describe the user interface structure. The three levels of content organization provided by the media manager GUI 208 correspond to three display lines on digital audio converter 32 LCD 50. The display lines are manipulated by using the four-way navigation control 144 on remote control 52. Referring now to FIG. 10, each screen is described below:

[0076] Initial state of digital audio converter 32 is shown. The top line of text shows the current channel, the second line of text shows the current playlist, and the third line of text shows the current track. Digital audio converter 32 status icon 256 shows the filled square symbol, which is the conventional symbol for a playback system that is in "stop" mode, i.e., nothing is playing. The channel level is depicted as the current channel by being graphically reversed (text is white with black background).

[0077] This screen shows the result of activating the right navigation button. The channel level label changes to "channel 2". The labels at the playlist level and the tracks level also update to reflect the new items in "channel 2".

[0078] This screen shows the result of activating the down navigation button. The highlight moves from the channel level to the playlist level.

[0079] This screen shows the result of next activating the right navigation button. The playlist level changes to "playlist2", the next playlist organized under "channel 2". The track level text also updates to reflect the actual first track included in "track 1" under "playlist 2".

[0080] This screen shows the result of next activating the play/pause button on the remote control 52. "Track 1" begins to play.

[0081] This screen shows the result of next activating the next track button on digital audio converter 32 remote control 52. "Track 3" begins to play. Status icon 256 changes from a black square to a right-pointing triangle.

[0082] This screen shows the result of next activating the play/pause button while a track is playing. The track stops playing and status icon 256 is the "pause" icon.

[0083] This screen shot shows the result of a few different actions. First, the play/pause button was activated, thus "Track 3" begins to play where it left off when the play/pause button was activated. Next, the right navigation button is activated once. The track line advances to show the next track, or "Track 4" in "Playlist 2". "Track 3" continues to play. This feature allows the user to browse through the channel/playlist/track list structure while continuing to listen to a currently playing track.

[0084] This screen shows the result if no other buttons are activated for six seconds. The display reverts back to display the channel, playlist, and track that are currently being played.

[0085] The corresponding other buttons, such as the up navigation and left navigation buttons move the highlight to the corresponding label.

[0086] Device Software—CODECs

[0087] In one embodiment, digital audio converter 32 includes the Fraunhofer CODEC 104, licensed for use by Thomson Electronics for decoding the digital audio file that is streamed to it from PC 34. CODEC 104 is an executable file stored in memory, launched by control firmware 100, executed by real time operating system 96 running on digital audio converter 32. Digital audio converter 32 may store a multiple CODECs in memory 18 for decoding variously formatted digital audio files 116 that may be selected by the user. For example, the WindowsMedia CODEC, provided by Microsoft may be stored in memory 18 at digital audio converter 32.

[0088] Software Functions—Communication/Message Processing

[0089] The communication and streaming functions of the system will now be described. A user uses remote control 52 to control the function of digital audio converter 32. Button activations on remote control 52 result in IR pulse codes that are received by the IR receiver sub-system 34 in digital audio converter 32. These IR pulse codes are deciphered by the computer sub-system in digital audio converter 32 and are converted into messages that are interpreted by the control firmware 100 running on digital audio converter 32 to invoke action at digital audio converter 32. Other IR pulses codes from remote control 52 are processed by control firmware 100 and are converted into XML-based messages 94 and sent via HTTP requests to PC 34 via the wireless LAN. These messages are interpreted by server module 88 running on PC 34 and specific actions are initiated.

[0090] For example, assume that digital audio converter 32 is currently in play mode, that is, a first digital audio file 116 is currently being streamed to digital audio converter 32, decoded, and corresponding analog signals are being produced at the analog outputs. The user activates forward one track button 108 and IR pulse code is generated by the IR sub-system 34 in remote control 52. IR pulse code 38 is received by the IR sub-system 34 in digital audio converter 32 and is interpreted by control firmware 100 running on digital audio converter 32 as a "forward one track" command. XML message 94 expressing the "forward one track" command is sent by microprocessor 10 to system control application 76 on PC 34. The "forward one track" XML message 94 is transmitted by wireless LAN transceiver 36

via the LAN, by an HTTP request, to wireless LAN access point 28 connected to PC 34. The HTTP request containing the "forward one track" message is received by server module 88, which accesses the next track name and location of the file associated with the next track name, in database 80. The text string for the track name is expressed in an XML message 94 and is sent to back to digital audio converter 32. This text string is interpreted by control firmware 100 running at digital audio converter 32 and the text string is then displayed on LCD 50.

[0091] The preferred embodiment also enables the streaming of digital audio files 116 with a buffer management function that controls the flow of portions of the digital audio file 116 from PC 34 into a local DRAM memory 14 of digital audio converter 32. The buffer management function insures that the local DRAM memory 14 buffer is filled as the contents of DRAM 14 are decoded by microprocessor 10 executing the CODEC 104.

[0092] Other Features—Downloadable Firmware and CODECs

[0093] An aspect of control firmware 100 on digital audio converter 32 is the ability to receive and install new CODECs 104 via LAN communication link 6. Non-volatile flash memory 18 in digital audio converter 32 is partitioned into two sectors, flash memory sector A and flash memory sector B. A control bit determines the flash memory sector from which operating system 96 and control firmware 100 is loaded. In an initial state, operating system version A and control firmware version A are loaded into DRAM 14 upon boot of digital audio converter 32. Digital audio converter 32 is functional. New versions of the software, operating system B and control firmware B are sent to digital audio converter 32 via wireless LAN communication link. Operating system B and control firmware B are then written into flash memory sector B. A checksum is provided to insure that the exact image of the software has been successfully written into flash. If the checksum at digital audio converter 32 matches the control checksum, the control bit is changed to cause the system to boot from flash sector B. Either a device reboot command is initiated from the server module 88, or a reboot is initiated at digital audio converter 32. Operating system B and control firmware B are then loaded into DRAM. Digital audio converter 32 operates with new versions of the software. The next new version of software is loaded into flash sector A. Each successive revision of software is loaded into the flash sector A or flash sector B that is not the current bootable flash memory sector.

[0094] Other Features—Tagging

[0095] Because LAN technology is a two-way interconnection technology, responses from digital audio converter, in one embodiment, may be sent back through the digital streaming audio system and processed and presented to the user and other interested entities at both PC 34 and on the web. FIG. 6 shows tag button 120 on digital audio converter 32. FIG. 11 is a flow chart of the tagging sequence. During the playing of digital audio files 116, activation of tag button 120 by the user results in a transmission of XML message 94 back through LAN informing system control application 76 server module 88 that tag button 120 was activated. Server module 88 then compiles and transmits tag XML message 94 to tag storage and processing server 124. The information in tag XML message 94 may include but is not

limited to: metadata or meta-tags (ID3 data) included in the file or stream (characters or images); the file name if content is a file; the URL or IP address of the stream if content 10 is a stream; time; date; and user identifier.

[0096] The transmission of tag XML message 94 can have different results. The information in the message may be formatted as a readable text message and presented to a user on a personal tag aggregation web page. In this scenario, the user has signed up with an account and receives a password for entry into protected tag aggregation web page.

[0097] For the tagging function, the server module 88 should have access to accurate time and date information. Server module 88 includes a function that accesses a server on Internet 8 where accurate time and date data is available, and these quantities are stored locally by server module 88 in system control application 76 database module 80.

[0098] Other Features—User-defined Button

[0099] A user programmable user-defined button 124 is provided on remote control 52. The function of user-defined button 124 can be changed based on a menu of items available via GUI module 84. For example, a user-defined menu may be accessible via a left mouse click on digital audio converter icon 224 on console 204. The left mouse click on digital audio converter icon 224 causes a preference menu to appear. Some possible functions for user-defined button 124 are: delete currently playing track from the current playlist; purchase the currently streaming digital audio file 116 (if it is a sample digital audio file); shuffle the tracks in the existing playlist; repeat the current playlist, if the active level is the playlist level; repeat the current channel if the active level is a channel.

[0100] Use of the System

[0101] The PC 34 downloads several digital audio files 116 through the Internet 8 during the night and stores them on hard drive 68. At some time during the day, the user builds a playlist 216 of the digital audio files 116 to be played on his/her stereo system 40. Using digital audio converter 32 and remote control 52, the user requests to listen to the digital audio files 116. This information is relayed to the PC 34. The PC 34 then sends the audio content to the stereo system 40 where it is played. The user continues to manipulate the playlist 216 through the use of remote control 52 and tags certain songs that he/she finds appealing. The user later returns to the PC 34 and builds a new music playlist 216 from the newly downloaded digital audio files 116.

[0102] Alternative Embodiments

[0103] FIG. 12 shows an embodiment of the invention used to perform the functions of an alarm clock for use with a stereo system 40. The system includes an alarm clock controller 132 such as the one illustrated in FIG. 13. The alarm clock controller 132 includes a wireless LAN transceiver 316 and the functional components required to allow the alarm clock remote controller 132 to operate as a node on the wireless LAN. The user can input a wake-up time into a PC 34 using a GUI or on alarm clock controller 132, which is sent, via the LAN communication link 6, to digital audio converter 32. Digital audio converter 32 may include a switched AC power conversion function that is used to switch on the stereo receiver 44 at the specified time in order

to wake up a person sleeping in the room. The audio content that is played on the stereo at the time of wake-up can be pre-selected according to the users preferences. The alarm clock controller includes several buttons used to perform such functions as inputting a wake up time, tagging a web page, or turning the stereo off (snooze button 304). The alarm clock controller 132 includes a display 312 and several control buttons 308 used to perform such functions as inputting a wake up time and tagging digital audio.

[0104] In an alternative embodiment, the alarm clock controller includes an IR transceiver and other necessary components for establishing an IR communication link to digital audio converter 32. The IR communication link to digital audio converter 32 is used here instead of a wireless LAN communication link to the PC 34. The alarm clock controller module retains the same functionality as previously described, but must communicate with the system via digital audio converter 32.

[0105] In a further embodiment, digital audio converter 32 remote control 52 functions as the alarm clock controller. The user can use the remote control 52 to set the wake-up time for the stereo to turn on and/or use the remote control 521 to switch the stereo off (snooze function). The user-defined button can be programmed by the user to function as a snooze button.

[0106] FIG. 14 shows an embodiment of the invention where a PDA docked with a wireless LAN adapter 148 is used as an enhanced controller and/or player used with the system. FIG. 15 shows the PDA removed from the wireless LAN adapter 148. The PDA is used as the system controller and is used to manage the audio content that is delivered to the stereo by manipulating software on the PC 34 through a wireless LAN communication link to the PC 34. For example, the user can create or edit a playlist that is stored in the database module 80 on the PC 34, by using a browser GUI on the PDA. The PDA can be similarly used to perform functions such as volume control, song skip, and pause. Furthermore, earphones can be connected to the wireless LAN adapter through the audio out jack on the module and the PDA can be used to play audio content stored on the PC 34. An audio data stream from the PC 34 is sent to the wireless LAN adapter module, where it is decoded and converted into an analog audio signal that is sent to earphones. In this effect, the wireless LAN adapter module is functioning as digital audio converter 32, but has the added advantage of being portable. A custom user interface application on the PDA is used as the user interface.

[0107] The PDAs that are included in this system are PDAs that are currently sold as standalone PDA devices such as the Palm III, made by Palm Inc. FIG. 13 shows a generic PDA. By docking a PDA with the wireless LAN adapter, the PDA essentially becomes a node in the LAN established by the wireless LAN access point 28 connected to the PC 24. Through the use of the wireless LAN adapter, in conjunction with software on the PDA and software on the PC 24, the PDA can send data to and receive data from the PC 24. FIG. 14 shows a PDA docked with a wireless LAN adapter 148. Electrical contacts on the rear end of the PDA make contact with electrical contacts 608 on the wireless LAN adapter 148 in order to establish a data communication link. There is a printed circuit board that contains the electronic components that constitute the functional data-

manipulating aspect of wireless LAN adapter. Batteries are included to supply power to the wireless LAN adapter 148. The wireless LAN adapter further includes an audio output jack. In the preferred embodiment, the antenna is located internal to the PDA, mounted to the printed circuit board.

[0108] The PDA can also be incorporated into the system by using onboard IR capabilities. In this scenario, the PDA would communicate with the system via an IR communication link to the Wireless LAN-to-audio converter and would be used to perform similar functions to those of the remote control 521 described in one embodiment.

[0109] In another embodiment, a PDA is used that contains the processing power to decode and convert digital audio files. An example of such a PDA is the Compaq iPaq, manufactured by Compaq Computer. In this case, a wireless LAN Compact Flash transceiver card can be added to the CompactFlash card slot on the iPaq. A streaming player software application is also installed on the PDA that allows the PDA to interconnect to the system control application 76 on the PC 34 as if it were digital audio converter 32. A GUI on the PDA allows the user to select playlists and control the streaming of digital audio files to the PDA.

[0110] The Home PC 34 to Stereo Player System has several permutations that have not yet been explicitly mentioned, but are implied: the system can be wholly controlled through the PC 34 and can be used without the use of a remote control 521 and/or a PDA; digital audio converter 32 can be internally incorporated into a new stereo device; the buttons on digital audio converter 32 can be regarded as optional; the switched power line on digital audio converter 32 can be regarded as optional; the wireless LAN adapter

can be internally incorporated into a new PDA device; the audio in/out jack on the HRF Adapter Sled Module and its associated functions can be regarded as optional; HRF antennas can be located internal or external to digital audio converter 32s they serve.

[0111] In another embodiment the LAN connection between the PC 34 and device is Ethernet. In a different embodiment, the LAN connection between the PC 34 and digital audio converter 32 is a networking technology that uses the existing phone lines in the home as the physical layer. In yet another embodiment, the LAN connection between the PC 34 and digital audio converter 32 is a networking technology that uses the existing AC powerlines in the home as the physical layer.

[0112] In another embodiment, a residential storage gateway or a storage gateway system is used in place of or in addition to the PC 34 to run the system control application 76, connect to the Internet 8, and store file based content. In another embodiment, the system control application 76 including server module 88, database module 80, and GUI module 84 can be run on a set-top box that includes a cable modem and a hard disk drive and can perform the same functions.

[0113] An audio converter device and a method for using the same have been described. Although the present invention is described herein with reference to specific embodiments, many modifications and variations therein will readily occur to those with ordinary skill in the art. Accordingly, all such variations and modifications are included within the intended scope of the present invention as defined by the following claims.

APPENDIX A

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APPENDIX BTitle 37, Code of Federal Regulations, Section 1.56  
Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
  - (i) Opposing an argument of unpatentability relied on by the Office, or
  - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
- (2) Each attorney or agent who prepares or prosecutes the application; and
- (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

(e) In any continuation-in-part application, the duty under this section includes the duty to disclose to the Office all information known to the person to be material to patentability, as defined in paragraph (b) of this section, which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

What is claimed is:

1. A method of using an audio converter device to obtain and convert digital audio data to be played on an audio playback device comprising:

receiving the digital audio data from a first device via a local area network;

decompressing the digital audio data;

converting the digital audio data into analog electrical data; and

transferring the analog electrical data to an audio playback device.

2. The method of claim 1 further comprising manipulating the transfer of both the digital audio data and the analog electrical data using a user interface on the audio converter device.

3. The method of claim 1 wherein the first device is a computer system.

4. The method of claim 3 further comprising manipulating the transfer of both the digital audio data and the analog electrical data using a user interface on the computer system.

5. The method of claim 3 further comprising manipulating the transfer of both the digital audio data and the analog electrical data using a portable electronic device.

6. The method of claim 5 wherein the portable electronic device is a personal digital assistant.

7. The method of claim 3 further comprising storing the digital audio data on a database on the computer system.

8. The method of claim 3 further comprising the computer system obtaining the digital audio data from a wide area network.

9. The method of claim 8 wherein the wide area network is Internet.

10. The method of claim 3 further comprising the computer system obtaining the digital audio data from a compact disc (CD).

11. The method of claim 1 wherein receiving the digital audio data from a first device via a local area network includes receiving the digital audio data using a wireless transceiver via wireless transfer protocol.

12. The method of claim 11 wherein the wireless transfer protocol is IEEE 802.11b.

13. The method of claim 11 wherein the audio converter device is a portable electronic device including a wireless local area network adapter to receive the digital audio data.

14. The method of claim 13 wherein the portable electronic device is a personal digital assistant.

15. A machine-readable storage medium tangibly embodying a sequence of instructions executable by the machine to perform a method, the method comprising:

receiving the digital audio data from a first device via a local area network;

decompressing the digital audio data;

converting the digital audio data into analog electrical data; and

transferring the analog electrical data to an audio playback device.

16. A method comprising:

an audio converter device receiving digital audio data from a computer system;

the audio converter device decompressing the digital audio data;

the audio converter device converting the digital audio data into analog electrical data; and

the audio converter device transferring the analog electrical data to an audio playback device so that the audio playback device can play the analog electrical data.

17. The method of claim 16 further comprising manipulating the transfer of both the digital audio data and the analog electrical data using a system control application on the computer system.

18. The method of claim 17 wherein manipulating the transfer of both the digital audio data and the analog electrical data using the system control application on the computer system includes inputting instructions on a user interface on the computer system.

19. The method of claim 16 further comprising manipulating the transfer of both the digital audio data and the analog electrical data by inputting instructions on a user interface on the audio converter device.

20. The method of claim 16 further comprising manipulating the transfer of both the digital audio data and the analog electrical data by using a portable electronic device.

21. The method of claim 20 wherein the portable electronic device is a personal digital assistant.

22. The method of claim 16 further comprising storing the digital audio data on a database on the computer system.

23. The method of claim 16 wherein an audio converter device receiving digital audio data from a computer system includes first transferring the digital audio data from a wide area network to the computer system.

24. The method of claim 16 wherein the wide area network is the Internet.

25. The method of claim 16 wherein an audio converter device receiving digital audio data from a computer system includes first transferring the digital audio data from a compact disc (CD) to the computer system.

26. The method of claim 16 wherein the digital audio data is received by the audio converter device via a wireless transceiver using a wireless transfer protocol.

27. The method of claim 26 wherein the wireless transfer protocol is IEEE 802.11b.

28. The method of claim 26 wherein the audio converter device is a portable electronic device including a local area network adapter.

29. The method of claim 28 wherein the portable electronic device is a personal digital assistant.

30. The method of claim 16 wherein the digital audio data is received by the audio converter device via AC power lines coupled to both the audio converter device and the computer system.

31. The method of claim 16 wherein the digital audio data is received by the audio converter device via an Ethernet connection between the audio converter device and the computer system.

32. The method of claim 16 the digital audio data is received by the audio converter device via phone lines coupled to both the audio converter device and the computer system.

33. An audio converter device comprising:

a transceiver to receive digital audio data from a computer system;

a digital to analog converter to convert the digital audio data to analog electrical data;

an output to an audio playback device to transfer the analog electrical data to the audio playback device; and

a processor to receive and execute instructions for the transfer of the analog electrical data to the audio playback device.

34. The audio converter device of claim 33 further comprising a user interface on the computer system to manipulate the transfer of both the digital audio data and the analog electrical data.

35. The audio converter device of claim 33 further comprising a user interface on the audio converter device to manipulate the transfer of both the digital audio data and the analog electrical data.

36. The audio converter device of claim 33 further comprising a portable electronic device to manipulate the transfer of both the digital audio data and the analog electrical data.

37. The audio converter device of claim 36 wherein the portable electronic device is a personal digital assistant.

38. The audio converter device of claim 33 further comprising a display.

39. The audio converter device of claim 33 further comprising an infrared receiver to receive instructions from a remote controller for the transfer of the analog electrical data to the audio playback device.

40. The audio converter device of claim 33 wherein the audio converter device is a portable electronic device including a local area network adapter.

41. A system comprising:

a computer system to obtain digital audio data;

an audio converter device to receive the digital audio data from the computer system, the audio converter device

converting the digital audio data to analog electrical data; and

an audio playback device to receive and play the analog electrical data from the audio converter device.

42. The system of claim 28 further comprising a remote controller to send instructions to manipulate both the transfer of the digital audio data to the audio converter device and the transfer of the analog electrical data to the audio playback device.

43. The system of claim 41 wherein the computer system includes a system control application to manipulate both the transfer of the digital audio data to the audio converter device and the transfer of analog electrical data to the audio playback device.

44. The system of claim 41 further comprising a portable electronic device to send instructions to manipulate both the transfer of the digital audio data to the audio converter device and the transfer of the analog electrical data to the audio playback device.

45. The system of claim 44 wherein the portable electronic device is a personal digital assistant.

46. The system of claim 41 wherein the audio converter device includes a transceiver to receive the digital audio data from the computer via a wireless transfer protocol.

47. The system of claim 46 wherein the wireless transfer protocol is IEEE 802.11b.

48. The system of claim 41 wherein the audio converter device is a portable electronic device including a local area network adapter.

49. The system of claim 48 wherein the portable electronic device is a personal digital assistant.

\* \* \* \* \*

# **EXHIBIT 13**

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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YAMAHA CORPORATION OF AMERICA  
Petitioner

v.

BLACK HILLS MEDIA, LLC  
Patent Owner

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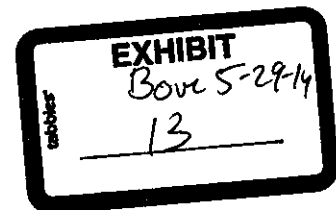
Case IPR2013-00597  
Patent 8,230,099 B2

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Before BRIAN McNAMARA, STACEY G. WHITE, and PETER P. CHEN,  
*Administrative Patent Judges.*

CHEN, *Administrative Patent Judge.*

DECISION  
Institution of *Inter Partes* Review  
37 C.F.R. § 42.108



## I. INTRODUCTION

Yamaha Corporation of America (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1, 2, 6, and 9-12 of U.S. Patent No. 8,230,099 B2 (Ex. 1001, “the ’099 patent”). Paper 1 (“Pet.”). Black Hills Media, LLC (“Patent Owner”) filed a preliminary response on December 26, 2013. Paper 10 (“Prelim. Resp.”). We have jurisdiction under 35 U.S.C. § 314.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides as follows:

THRESHOLD.—The Director may not authorize an *inter partes* review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.

Upon consideration of the Petition and the Preliminary Response, we are persuaded the information presented by Petitioner has shown a reasonable likelihood that Petitioner would prevail in showing the unpatentability of claims 1, 2, 6, and 9-12 of the ’099 patent. Accordingly, we grant the Petition and institute an *inter partes* review of these claims.

### A. Related Proceedings

On May 22, 2012, the Patent Owner filed suit against Petitioner in the U.S. District Court for the District of Delaware, alleging infringement of several patents. *See Black Hills Media, LLC v. Yamaha Corp. of Am.*, No. 1:12-cv-00635-RGA (D. Del.). On September 12, 2012, the Patent Owner filed a First Amended

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Complaint alleging, *inter alia*, infringement of the '099 patent. The First Amended Complaint was served on September 19, 2012. The Patent Owner also has filed lawsuits alleging infringement of the '099 patent against Pioneer (1:12-cv-00634), Logitech (1:12-cv-00636), Sonos (1:12-cv-00637), LG (1:13-cv-00803), Sharp (1:13-cv-00804), Toshiba (1:13-cv-00805), and Panasonic (1:13-cv-00806) in the District of Delaware, and against Samsung (2:13-cv-00379) in the Eastern District of Texas. On August 5, 2013, the Delaware Court transferred four of the cases to the Central District of California, where the Yamaha (2:13-cv-06054), Pioneer (2:13-cv-05980), Logitech (2:13-cv-06055), and Sonos (2:13-cv-06062) cases are now pending. Pet. 2-3.

The Patent Owner also initiated a Section 337 action in the U.S. International Trade Commission against LG, Sharp, Toshiba, Panasonic, and Samsung alleging, *inter alia*, infringement of the '099 patent. *See Certain Digital Media Devices, Including Televisions, Blu-Ray Disc Players, Home Theater Systems, Tablets and Mobile Phones, Components Thereof and Associated Software*, Inv. No. 337-TA-882 (USITC). *Id.* at 3.

#### *B. Real Party-in-Interest*

Patent Owner asserts that Petitioner fails to identify all real parties-in-interest and requests the Petition be dismissed for noncompliance with 35 U.S.C. § 312(a) and 37 C.F.R. § 42.8(b)(1). Prelim. Resp. 8-12. Patent Owner asserts that Pioneer Corporation and Pioneer Electronics (USA) Inc. (collectively "Pioneer") should have been identified in the Petition as real parties in interest. *Id.* at 9.

Patent Owner and Pioneer currently are engaged in a patent infringement lawsuit in parallel with the patent infringement lawsuit between Patent Owner and Petitioner. *Id.* AV receivers, networked Blu-Ray players, and home theater systems from Pioneer and Petitioner are alleged to infringe claim 1 of the '099 patent. *Id.* Thus, according to Patent Owner, Pioneer and Petitioner are aligned on claim construction and invalidity of the claims asserted in the district court litigation. *Id.* Patent Owner also argues that Petitioner's counsel in this proceeding has spoken on behalf of Petitioner and Pioneer at a district court technology tutorial directed to the '099 patent. *Id.* at 10. Finally, Patent Owner states that Pioneer's counsel agreed to be bound by the outcome of this proceeding if the district court would agree to stay the district court litigation. *Id.*

On this record, we are not persuaded Pioneer is a real party in interest in this matter. A determination as to whether a non-party to an *inter partes* review is a real party-in-interest is a "highly fact-dependent question," based on whether the non-party "exercised or could have exercised control over a party's participation in a proceeding" and the degree to which a non-party funds, directs, and controls the proceeding. Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,759-60 (Aug. 14, 2012). In other words, the question before us is whether there is a non-party "at whose behest the petition has been filed" or a relationship "sufficient to justify applying conventional principles of estoppel and preclusion." *Id.*

We are not persuaded Pioneer is in position to exercise control over Petitioner's involvement in this proceeding. It is common for one lawyer to speak on behalf of multiple parties at a technology tutorial in patent infringement



litigation. This can occur for efficiency purposes and does not, by itself, signify control over the decision making of the various entities in the litigation. In addition, while Pioneer and Petitioner both may be interested in the patentability of the '099 patent claims, this does not mean that the parties have the same interests. Litigation alliances may arise for numerous reasons, including, but not limited to, parties having a similar perspective on one or more issues in a case. However, the existence of such alliances, alone, generally does not rise to the level that would require naming the ally/co-defendant as a real party-in-interest. Office Patent Trial Practice Guide, 77 Fed. Reg. 48,760 (Aug. 14, 2012). We, therefore, will not deny the Petition for failure to comply with 35 U.S.C. § 312(a) and 37 C.F.R. § 42.8(b)(1).

*C. The '099 Patent*

The subject matter of the challenged claims of the '099 patent relates generally to methods and devices for sharing playlists, and in particular, to a method for presenting a playlist on a wireless handheld remote control for selection for playback on a media player device associated with, but separate from, the remote control. Ex. 1001, col. 1, ll. 25-29, col. 9, ll. 1-8.

Figure 2 of the '099 patent is reproduced below.

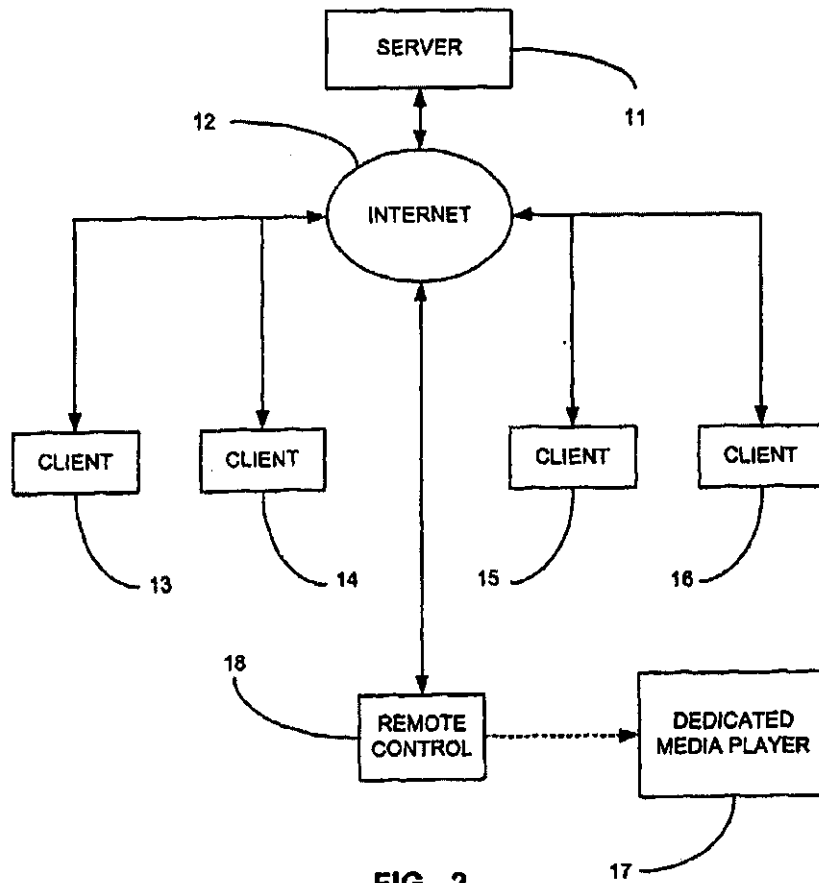


FIG. 2

Figure 2 depicts an embodiment of the invention with a playlist communicated from server 11 to remote control 18 via Internet 12. Ex. 1001, col. 9, ll. 1-23. After the playlist has been communicated to the remote control, the playlist may be displayed on the remote control and used to choose which selection is to be played by dedicated media player 17. *Id.* at col. 9, ll. 5-8. The playlist may be communicated further to media player 17. *Id.* at col. 9, ll. 9-23. Thus, playlists may be stored in, displayed upon, and used to make selections from either

dedicated media player 17, remote control 18, or both. *Id.* at col. 9, ll. 21-23. As summarized by Petitioner, the display of the playlist on the remote control allows the user to select a song to be played on the media player without physically making a selection at the media player. Pet. 5( citing Ex. 1001, col. 9, ll. 9-23).

*D. Illustrative Claim*

Claims 1, 2, 6, and 9-12 are the subject of the Petition. Claims 1 and 10-12 are independent claims. Independent claim 1 is reproduced as follows:

1. A method comprising:  
receiving, at a wireless handheld remote control, a playlist from a remote source; and  
presenting, at the wireless handheld remote control, the playlist to a first user associated with the wireless handheld remote control such that the first user is enabled to select at least one item from the playlist for playback by a media player device which is associated with and separate from the wireless handheld remote control.

*E. Prior Art Relied Upon*

Petitioner relies upon the following five prior art references.

<b>Reference</b>	<b>Title</b>	<b>Ex. No.</b>
Bi	US 2002/0087996 A1	Ex. 1008
Gladwin	WO 01/17142 A2	Ex. 1009
Berman	US 6,502,194 B1	Ex. 1010
Janik '558	US 2002/0068558 A1	Ex. 1011
Janik '902	US 2002/0065902 A1	Ex. 1012

*F. The Asserted Grounds*

Petitioner contends the challenged claims are unpatentable based on four grounds, as follows.

<b>Reference(s)</b>	<b>Basis</b>	<b>Claims Challenged</b>
Bi	§ 102(b)	1, 2, 6, and 9-12
Gladwin	§ 102(b)	1, 2, 6, 9, 11, 12
Berman	§ 103(a)	1, 2, 6, 9, 11, 12
Janik '558 and Janik '902	§ 103(a)	1, 2, 6, and 9-12

II. ANALYSIS

*A. Claim Construction*

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012). Also, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Petitioner submits proposed constructions for two claim terms (“playlist” and “remote source”), and Patent Owner submits proposed constructions for two claim terms (“playlist” and “media player device”).

Petitioner proposes that “playlist” is “a list of media items from which one or more selections may be made by a user.” Pet. 7-8. Patent Owner proposes that “playlist” is “a list referencing media items arranged to be played in a sequence.” Prelim. Resp. 6-7. The Specification states, “[a] playlist is a list of a user’s favorite selections.” Ex. 1001, col. 1, ll. 33-34. We are persuaded that the construction proposed by Patent Owner is too narrow and would exclude the embodiment described in the specification. For purposes of this Decision, we determine that the broadest reasonable interpretation of the term “playlist” consistent with the specification is “a list of media selections.”

Patent Owner has not proposed a construction for “remote source,” which is a term found only in the claims of the ’099 patent, where it is not defined. We determine that the Petitioner’s proposed construction (“a source of a playlist that is separate from a remote control”) is reasonable and adopt that construction as the broadest reasonable interpretation for purposes of this Decision.

Finally, Patent Owner has proposed that “media player device” be construed as “a device capable of playing audio or video or a combination of both, other than a general purpose computer.” The term “media player device” appears only in the claims of the ’099 patent, where it is not defined. The term “media player” is used throughout the Specification, and contrary to Patent Owner’s proposal, is described as a general purpose computer, for example, “the media player 17 may be a general purpose computer,” (*id.* at col. 8, ll. 62-63), and, “a general purpose computer may be used to request playlists that are then communicated from other general purpose computers or other dedicated media players to the user’s player device” (*id.* at col.

3, ll. 29-32). Therefore, for purposes of this Decision, we determine the broadest reasonable construction of “media player device” is “a device capable of playing audio or video or a combination of both.”

*B. Claims 1, 2, 6, 9-12 – Anticipated by Bi*

Petitioner contends claims 1, 2, 6, and 9-12 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Bi. Pet. 10-20.

*Bi (Exhibit 1008)*

Bi is titled, “Interactive Remote Control of Audio or Video Playback and Selections.” Petitioner contends Bi discloses a system for an interactive remote control, which may be wireless, of an audio or playback application running on a personal computer or other computing platform. Pet. 11. Figure 2 of Bi is reproduced below.

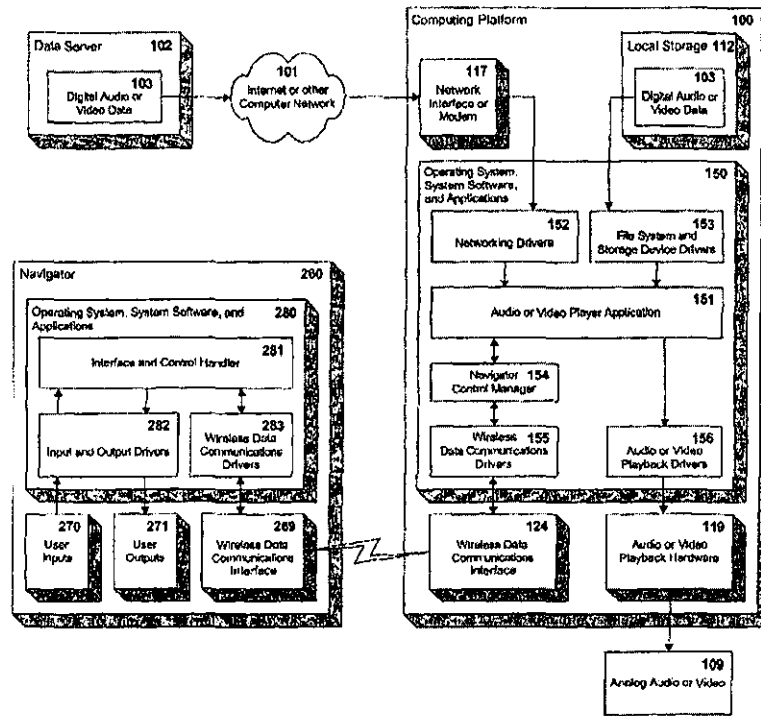


Figure 2

Figure 2 depicts data server 102 that provides digital audio or video data via the Internet or other network 101 to computing platform 110. Navigator 260 is a wireless remote control that communicates with computing platform 100 to control selection of audio or video data. Ex. 1008 ¶ 0020.

Analysis

Petitioner contends claims 1, 2, 6, and 9-12 are unpatentable under 35 U.S.C. § 102(a) as anticipated by Bi. In support of this asserted ground of

unpatentability, Petitioner provides detailed explanations as to how the subject matter of each claim is disclosed by Bi. Pet. 14-20. Patent Owner contends the playlist in Bi does not constitute the claimed playlist recited in independent claims 1, 10, and 11. We have determined for purposes of this Decision that Patent Owner's proposed construction of playlist is not the broadest reasonable construction, and that, for purposes of this Decision, a playlist is a list of media selections. *See* Section II.A above. On the record currently before us, we are persuaded that Bi's "playlist" (Ex. 1008 ¶ 0032) discloses the "playlist" of the '099 patent.

Patent Owner next contends that as to all four independent claims of the '099 patent, Bi fails to disclose receiving a playlist from a remote source. Prelim. Resp. 14-20. According to Petitioner, in Bi, a playlist is received by navigator 260 from computing platform 100, which is a remote source. Ex. 1008 ¶ 0032 (computing platform 100 sends the results of a local music browse, which can be based on playlists, to navigator 260). Patent Owner further contends that as to all four independent claims, Bi fails to disclose the user of the wireless handheld remote being enabled to select at least one item from the playlist for playback by a media player device. Bi, however, discloses "digital content can be controlled from a location away from the computing platform running the digital content playback application." *Id.* at ¶ 0007, Fig. 7. Therefore, we are persuaded on the present record by Petitioner's arguments on the disputed limitations. As to the remaining limitations of the independent claims, we have reviewed Petitioner's



supporting evidence and determine that Petitioner has made an adequate showing under 35 U.S.C. § 314(a).

The Preliminary Response does not respond to Petitioner's contentions on dependent claim 6, and reiterates for dependent claims 2 and 9 the arguments addressed above for the independent claims. For claim 2, we are persuaded by Petitioner's argument that Bi discloses the limitation of claim 2 where the playlist further is communicated from the remote source to the media player device. Pet. 15, citing Ex. 1008 ¶ 0032. For the remaining dependent claims 6 and 9, we have reviewed Petitioner's supporting evidence and determine that Petitioner has made an adequate showing under 35 U.S.C. § 314(a).

Accordingly, on the present record, we are persuaded there is a reasonable likelihood of Petitioner prevailing in establishing the unpatentability of independent claims 1, and 10-12, and dependent claims 2, 6, and 9 of the '099 patent as anticipated by Bi.

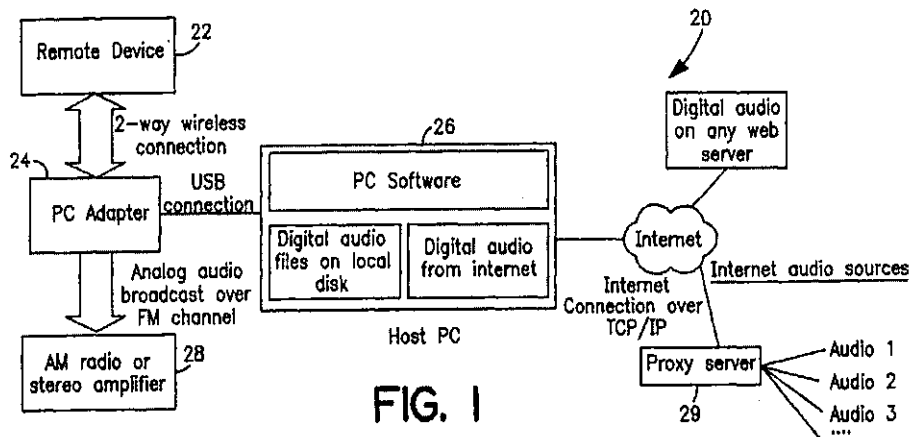
*C. Claims 1, 2, 6, 9, 11, and 12: Anticipated by Gladwin*

Petitioner contends claims 1, 2, 6, 9, 11, and 12 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Gladwin. Pet. 21-26.

*Gladwin (Exhibit 1009)*

Gladwin is titled, "Structure and Method for Selecting, Controlling and Sending Internet-Based or Local Digital Audio to an AM/FM Radio or Analog Amplifier." Petitioner contends Gladwin discloses a remote device interfacing with a personal computer that obtains audio from the Internet or other digital audio

from any web server. Pet. 21-22 (citing Ex. 1009, col. 3, ll. 1-9). Figure 1 of Gladwin is reproduced below.



In Figure 1, digital audio obtained by host PC 26 via the Internet is selected by remote device 22 to be played through a radio or stereo amplifier 28 using PC adapter 24. Ex. 1009, 3-4. The digital audio data is organized as a play list. *Id.* at 4, ll. 13-14. Petitioner contends Gladwin “discloses precisely what was asserted to be missing from the prior art during the prosecution of the ’099 patent” – a wireless handheld remote for selecting an item from a playlist for playback on a separate media player device. Pet. 23-26 (citing Ex. 1009, 3-6, Figs. 1-6).

### Analysis

Patent Owner’s two arguments against Gladwin as to the independent claims 1, 11, and 12 of the ’099 patent both are premised on its proposed claim constructions for “playlist” and “media device player.” Prelim. Resp. 22-24. Patent Owner first contends the “playlist” in Gladwin is not the “playlist” of its

proposed construction. We have determined that Patent Owner's proposed construction is not the broadest reasonable construction, and that, for purposes of this Decision, a "playlist" is a list of media selections. *See* Section II.A above. On the record currently before us, we are persuaded that Gladwin's "play list" (Ex. 1009, 4, ll. 13-14) discloses the "playlist" of the '099 patent.

Patent Owner next contends the "media player device" in Gladwin is a general purpose computer. Patent Owner's proposed construction of "media player device" excludes general purpose computers, but as stated in Section II.A above, we have determined, for purposes of this Decision, that Patent Owner's proposed construction is not the broadest reasonable construction, and we construe "media player device" as a device capable of playing audio or video or a combination of both. For purposes of this Decision, we are persuaded that the PC in Gladwin (Ex. 1009, 3-4) discloses the media player device of the '099 patent. Thus, we are not persuaded by Patent Owner's arguments against Gladwin based on its proposed claim construction. As to the remaining limitations of the independent claims, we have reviewed Petitioner's supporting evidence and determine that Petitioner has made an adequate showing under 35 U.S.C. § 314(a).

The Preliminary Response does not respond to Petitioner's contentions on dependent claims 6 and 9. For claim 2, Patent Owner contends Gladwin fails to disclose the remote source sending a playlist to the PC. We are persuaded by Petitioner's citation to the contrary of Gladwin's disclosure that "[t]he PC software . . . gets digital audio data from audio files on the local disk and/or internet streaming audio data. This data is organized as a play list." Ex. 1009, 4, ll. 12-14.

For the remaining dependent claims 6 and 9, we have reviewed Petitioner's supporting evidence and determine that Petitioner has made an adequate showing under 35 U.S.C. § 314(a).

Accordingly, on the present record, we are persuaded there is a reasonable likelihood of Petitioner prevailing in establishing the unpatentability of independent claims 1, 11, and 12, and dependent claims 2, 6, and 9 of the '099 Patent as anticipated by Gladwin.

*D. Claims 1, 2, 6, 9, 11, and 12: Obvious Over Berman*

Petitioner contends claims 1, 2, 6, 9, 11, and 12 are unpatentable under 35 U.S.C. § 103 as obvious over Berman. Pet. 27-35.

*Berman (Exhibit 1010)*

Berman is titled, "System for Playback of Network Audio Material on Demand." Petitioner contends Berman discloses the use of a remote control that displays a playlist to select music for playback from a separate media playback device. Pet. 27-30 (citing Ex. 1010, Figs 1, 3, 13, and col. 3, ll. 33-39, col. 4, ll. 47-53, col. 5, ll. 42-67, col. 6, l. 64). An embodiment of Berman's system is depicted in Figure 1, which is reproduced below.

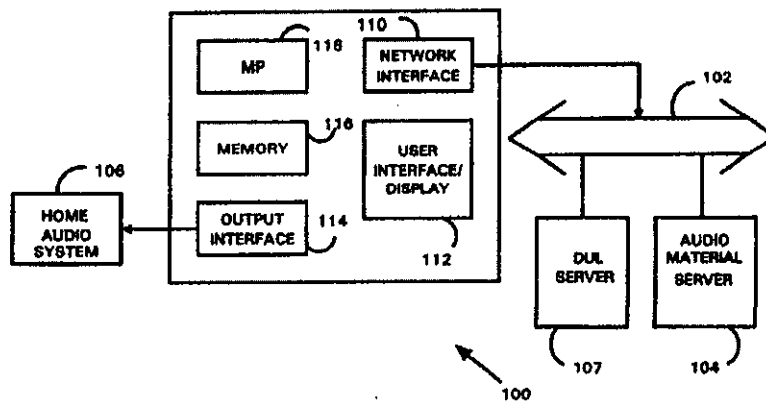


FIG. 1

Figure 1 is a block diagram of Berman's playback unit 100. Ex. 1010, col. 4, ll.17-19. Playback unit 100 receives audio material from audio material server 104, and access rights to this material are controlled by directory and user list ("DUL") server 107. *Id.* at col. 4, ll. 51-53, 63-65. Playback unit 100 includes network interface 110 that facilitates communication with the servers over the internet. *Id.* at col. 5, ll. 11-13. Memory 116 temporarily stores audio for playback and processing. *Id.* at col. 6, ll. 6-8. In certain embodiments, the user may be permitted to record a song to memory. *Id.* at col. 8, ll. 4-6. Berman's playback unit may receive input from a wireless remote control unit. *Id.* at col. 5, ll. 46-49. The remote control unit may be used to move through the song list and search for songs. *Id.* at col. 5, ll. 54-61, col. 13, ll. 51-64, Figs. 2 and 13.

The operation of the playback unit is illustrated in Figure 3, which is reproduced below.

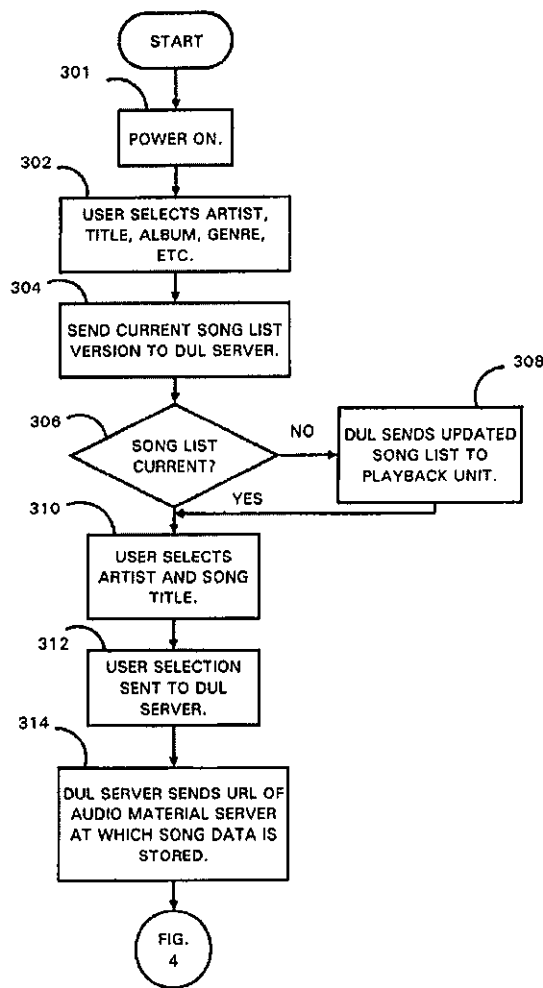


FIG. 3

Figure 3 is a processing flow diagram depicting the steps executed to request and receive audio material. Ex. 1010, col. 4, ll. 22-25. At step 302, the user selects a music category or type of song. *Id.* at col. 6, l. 65 – col. 7, l. 4. The playback unit then contacts the DUL server to confirm that the playback unit's song list is up to date. *Id.* at col. 7, ll. 4-6, Fig. 3 step 304. If the song list is not up

to date, the DUL server will send an updated song list to the device. *Id.* at col. 7, ll. 14-19, Fig. 3 steps 306 and 308. In certain embodiments, the song list may be updated to reflect the user's preferred songs. *Id.* at col. 13, ll. 9-15. The user selects a song from the song list. *Id.* at col. 7, ll. 22-24. The DUL server then sends playback unit 100 the network address or URL for the requested song. *Id.* at col. 7, ll. 30-41. Playback unit 100 then uses that URL to obtain the requested sound file or streaming audio from the appropriate audio material server. *Id.* at col. 7, ll. 41-45, col. 8, ll. 32-34.

Analysis

Petitioner contends that Berman explicitly discloses all of the elements of the '099 patent, with the exception of the remote control being wireless, which Petitioner asserts would have been obvious to one of skill in the art, citing the Declaration of Dr. Bove. Pet. 30 (citing Ex. 1002 ¶ 14). We note that Berman also explicitly discloses the playback unit "may also include a sensor, such as an infrared sensor 206, for receiving command signals from a remote control unit." Ex. 1010, col. 5, ll. 46-48. Berman's disclosure of a sensor suggests that the remote control unit is wireless. Thus, on the record before us, we are persuaded that the remote control of Berman could be implemented as a wireless unit.

Patent Owner contends that for the independent claims of the '099 patent, Berman fails to disclose a remote control that can present a playlist to the user. Petitioner argues that the playlist is presented on the graphical user interface of the remote control and enables the user to select at least one item for playback by the

playback unit. Pet. 31 (citing Ex. 1010, col. 4, ll. 47-53, col. 5, l. 5 – col. 6, l. 49, col. 6, l. 64 – col. 7, l. 38). We determine that Petitioner has made an adequate showing under 35 U.S.C. § 314(a) for this and the other limitations of the independent claims 1, 11, and 12.

The Preliminary Response does not respond to Petitioner's contentions on dependent claims 6 and 9. For claim 2, Patent Owner contends Berman fails to disclose the remote source sending a playlist to the playback unit. We are persuaded by Petitioner's citation to the contrary of Berman's disclosure in Figure 3 of the song list being sent by the DUL server to the playback unit. *Id.* at 32 (citing Ex. 1010, Fig. 3 and col. 6, l. 64 – col. 7, l. 38). For dependent claims 6 and 9, we have reviewed Petitioner's supporting evidence and determine that Petitioner has made an adequate showing under 35 U.S.C. § 314(a). Accordingly, on the present record, we are persuaded there is a reasonable likelihood of Petitioner prevailing as to the unpatentability of independent claims 1, 11, and 12, and dependent claims 2, 6, and 9 of the '099 patent, as obvious over Berman.

*E. Janik '558 and Janik '902*

On its final asserted ground of unpatentability, Petitioner contends claims 1, 2, 6, and 9-12 of the '099 patent would have been obvious over Janik '558 ("System and Method for Providing Content, Management, and Interactivity for Client Devices") and Janik '902 ("Webpad and Method for Using the Same"). On the present record, we are not persuaded there is a reasonable likelihood that Janik '558 and Janik '902 render the challenged claims obvious. We agree with Patent



Owner that neither Janik reference discloses the limitation recited in all of the challenged claims where the user is enabled to select at least one item from the playlist received from a remote source for playback by a media player device. Prelim. Resp. 36-37; *see* Ex. 1001, col. 11, ll. 19-27, col. 12, ll. 11-48. In particular, Janik '558 states that “webpad 92 version of audio device content editor and audio device controller GUI allow the user to access playlists and tracks.” Ex. 1011 ¶ 243. The audio device content editor in turn “provides the user with the ability to group audio files (tracks) into user-defined playlists” (*id.* at ¶ 147), but there is no disclosure of receipt by the audio device content editor of a playlist, or of a user’s ability to select a media item with the webpad version of audio device controller GUI. Prelim Resp. 36.

Janik '902 states that its “webpad 32 can be used to control a digital audio converter, a device that is a node on the LAN and is able to receive digital audio streams from PC, decode and convert the stream into analog signals that are plugged into any existing stereo system.” Ex. 1012 ¶ 0069. The selection of a target device, such as a digital audio converter, however, does not meet the claimed limitation of selecting a media item for playback.

### III. CONCLUSION

For the foregoing reasons, we are persuaded the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail in establishing unpatentability of claims 1, 2, 6, and 9-12 of the '099 patent as

anticipated by Bi, and of claims 1, 2, 6, 9, 11, and 12 as anticipated by Gladwin and as obvious over Berman.

The Board has not made a final determination on the patentability of any challenged claim.

#### IV. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314, an *inter partes* review is hereby instituted as to the following claims and grounds:

1. Claims 1, 2, 6, and 9-12 of the '099 patent are unpatentable under 35 U.S.C. § 102(b) as anticipated by Bi;
2. Claims 1, 2, 6, 9, 11, and 12 of the '099 patent are unpatentable under 35 U.S.C. § 102(b) as anticipated by Gladwin;
3. Claims 1, 2, 6, 9, 11 and 12 of the '099 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Berman; and

FURTHER ORDERED that all other grounds raised in the Petition are *denied* for reasons discussed above.

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(d) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial commences on the entry date of this decision; and

FURTHER ORDERED that an initial conference call with the Board is scheduled for 4:00 PM, Eastern Time on April 9, 2014; the parties are directed to

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the Office Trial Practice Guide<sup>1</sup> for guidance in preparing for the initial conference call, and should be prepared to discuss any proposed changes to the Scheduling Order entered herewith and any motions the parties anticipate filing during the trial.

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<sup>1</sup> Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,765-66 (Aug. 14, 2012).