In re: UNITED STATES PATENT AND TRADEMARK OFFICE

YAMAHA CORPORATION OF AMERICA

v.

BLACK HILLS MEDIA, LLC

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

May 29, 2014

MERRILL LAD
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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

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

Case IPR2013-00598, Patent 8,214,873 B2.

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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I N D E X

WITNESS:

E X H I B I T S

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P R O C E E D I N G S

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

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

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

Will counsel please state their appearances.

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

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

MR. ENGELLENNER: Tom Engellenner, also Pepper Hamilton, on behalf of Black Hills Media.

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

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

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

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

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

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

MR. YAP: Sure.

MS. GLADSTEIN: All right.
And we will use exhibits consecutively, and to the extent that they're applicable to either proceeding, they will so apply.
MR. YAP: Sure.
MS. GLADSTEIN: All right.
(Exhibit 1 marked for identification.)
EXAMINATION
BY MS. GLADSTEIN:
Q Dr. Bove, I am handing you what has been marked as Bove Exhibit 1.
It's a document titled Notice of Deposition of V. Michael Bove in IPR2013-00598.
Have you seen this document before?
A I believe I was emailed a copy of this document by Yamaha's counsel.
Q Thank you.
(Exhibit 2 marked for identification.)
THE DEPONENT: Thank you.
BY MS. GLADSTEIN:

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

Have you seen this document before?

A I have.

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

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

Q Thank you.

(Exhibit 3 marked for identification.)

BY MS. GLADSTEIN:

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

Are you familiar with this document?

A I am.

Q And what is this document?

A This document is a declaration in which I give my opinion on certain points that Yamaha's counsel has asked me to address with respect to the IPR of the '873 patent.
Q And that's a document you prepared?
A It is.
Q And it bears your signature?
A It does.
Q On page 15?
A Well, it's -- there are two sets of page numbers on here, just for clarity.
Q Oh.
Let's refer to this document is also marked as Yamaha Corporation of America, Exhibit 1002, page 16.
A Yes.
Q Does that page bear your signature?
A It does.
Q Thank you.
(Exhibit 4 marked for identification.)
BY MS. GLADSTEIN:
Q Dr. Bove --
A Thank you.
Q -- I'm handing you what has been

marked as Exhibit 4.
It's a document titled Declaration of Michael V. Bove for Patent No. 8,230,099. I will represent it's an inter partes review proceeding No. IPR2013-00597, and that also there's a Yamaha Corporation of America Exhibit 1002.
Are you familiar with this document?
A I am.
Q And is this a declaration that you prepared?
A It is.
Q And does the Bates stamp page 9 bear your signature?
A It does.
Q Dr. Bove, have you been deposed before?
A I have.
Q On how many occasions?
A Quite a few going back to the 1990s, so I don't have an exact number.
Q Approximately?
A Maybe two.
Q So you are familiar with the

process?
A I think so, yes.
Q Deposition process.
If at any time you need to take a break, so long as there is no question pending, just let me know, and we'll go off the record.
A Thank you.
Q That's really about it.
Is there anything that may impede your ability to answer questions here today?
A Not that I'm aware of.
Q Great, thank you.
Can you please tell me about your education post high school.
A I have a bachelor's degree in electrical engineering from the Department of Electrical Engineering and Computer Science at MIT.
I have a master of science in visual studies from the Department of Architecture at MIT, and I have a Ph.D. in media technology from the program in Media Arts and Sciences at MIT.

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

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

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

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

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

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

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

the system could record news broadcasts and play them back in a non-linear fashion based upon what it felt the user's interests were.
Q So would it be fair to say that the focus of your master's studies was on video recordings?
MR. YAP: Objection.
A No, I wouldn't say it was on video recordings per se. I think it was on what you might think of as personalized television.
Q Then how does personalized television differ from video recordings?
A A video recording is a technical element that might be a part of a personalized television system, but it's not all of it.
Q What are other parts of the system?
A So there would be analysis of the content. There would be a profile of the user. It would be potentially a graphical user interface.
There would be databases. There would be an overall control system for managing the storage and the processing of

the video and audio.
There would be playback mechanisms and probably a lot of what a computer scientist would call "glue" holding it all together.
Q Thank you.
And with respect to your Ph.D. studies, what was the focus of those studies?
A The focus of my doctoral dissertation was what nowadays is called computational photography, although that term wasn't in common use at the time, but it was the idea that if one had a camera that could capture three dimensions instead of just two-dimensional images, so actually the distance to each pixel, which is what a connect camera does now, one could enable a variety of applications ranging from interactivity to artistic or technical modification of the imagery, because it's a computer graphics database of real scenes to very efficient encoding of video based upon a three-dimensional model.
Q Would it be fair to say in general terms that the focus of your Ph.D. studies

was on video?
MR. YAP: Objection to form.
A I would say video was a piece of it, but probably not the main focus.
Q What would you characterize as the main focus?
A I think the main focus would have been acquisition of computer graphics, models of real scenes.
Q So if you had to sum up your education starting with what you did in college and graduate school in pursuing your master's degree and then pursuing your Ph.D., how would you characterize the main focus area of your studies from undergraduate to graduate?
A Well, there were many different aspects to it, but I would say that digital video was a consistent thread that was part of all of my work.
Q What is your current job title?
A Principal research scientist at the Media Laboratory and head of the Object-Based Media Group at the Media Laboratory at MIT.
Q And as part of your job, what are

your duties and responsibilities?
A I head a research group which conducts research in a variety of areas.
As part of that, I supervise a number of graduate students, typically about seven or eight. I also have visiting researchers working in my group as well.
Additionally, I am the chair of the Media Laboratory's intellectual property committee. Additionally, I am undergraduate officer for our academic program.
Additionally, I am head of what's called the MAS Freshman Program, which is a specialized program for first-year undergraduates at MIT, and I have a variety of other duties as well.
Q What is object-based media?
A Well, object-based media is a phrase whose meaning has changed over the years.
In the beginning it was really an outgrowth of my work in building scene models of real scenes, so representing video and later audio in terms of an underlying

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

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

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

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

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

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

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

A Yes.

Q But you would have began work with

respect to the dissertation sometime before
that?
A 1986.
Q 1986.
You also mentioned that the
meaning of object-based media has evolved
over time.
What was the meaning of
object-based media say around 2004?
MR. YAP: Objection, form.
A In about 2004, it was probably
about as broad as it is now.
Q And what was the meaning of it when
you started in that area?
A Well, so when I started, when I was
working on my doctoral dissertation,
object-based media related to the capture of
models of the real world through advanced
cameras and microphones and other sensors and
then enabling efficient compression, enabling
personalization of content and enabling
interactivity and other applications by means
of those models of the world.
Q As a principal research scientist,
would you see your work as academically

focused?
A Well, it has an academic aspect, and we also work fairly closely with a number of industrial sponsors and collaborators as well, and so it has both an academic focus and an applied focus.
Q And who are the industrial sponsors that you're working with currently?
A Well, there are approximately 80 of them, and they are on the Media Laboratory website.
So if you were to go there, you could get the list.
Q Is Yamaha Corporation of America one of the sponsors?
A I don't believe they currently are. They have been in the past, although I didn't work very closely with them at the time.
Q How about Samsung?
A Samsung is, yes.
Q And have you worked with Samsung as -- at MIT as part of your duties and responsibilities?
A Yes.
Q And what was the nature of the work

that you had done with Samsung?
A Samsung is a member of a research consortium, and as part of that work, we tell them about what they're doing. They tell us about what they're interested in.
We -- they've attended workshops that I've run on consumer electronics and on other topics, and we've just had a variety of contacts with people throughout the organizations -- the organization, rather.
Q Do you meet with Samsung representatives on a periodic basis?
MR. YAP: Objection. Objection, relevance.
A I do meet with them, yes.
Q And say this year, how many times have you met with them?
MR. YAP: Same objection.
A That's actually a rather difficult question to answer, because one of my colleagues is going on leave from MIT this year to help Samsung launch a new laboratory on the West Coast, and I met with him almost daily for a good portion of this year.

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

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

MR. YAP: Objection, relevance.

A Possibly about once a month.

Q Once a month.

And how frequently were you meeting with Samsung in 2013?

MR. YAP: Same objection.

A Probably about the same.

Q Okay.

And typically what are your meetings about?

MR. YAP: Objection, relevance.

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

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

three-dimensional television displays.
Q Have you had meetings with Samsung on the subject of networked media?
MR. YAP: Objection, relevance.
A To the degree that networked media might involve smart televisions, yes.
Q How about music players?
MR. YAP: Same objection.
A Not that I can recall.
Q Okay.
Is Pioneer a sponsor?
A They have been in the past.
MR. YAP: Objection, relevance.
A I am not certain if they are currently.
Q What would help you ascertain whether or not Pioneer is currently a sponsor?
A I'd have to look up the dates of their consortium membership and see if it was current or not.
Q And where would you look that up?
A That's actually publicly available.

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

Q And that would list past sponsors as well?

A No.

Q Okay.

So if Pioneer isn't listed --

A If Pi --

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

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

Q And how far back does that list go?

MR. YAP: Objection, relevance.

A At least to the 1990s. Possibly before.

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

A The company has to agree to the

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

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

Q All right.

And what is the annual fee of membership in 2014?

A It's currently $250,000.

Q And what was it last year in 2013?

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

Q And what about 2012?

A The same, $200,000.

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

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

Q And what are some of the major benefits that would typically attract somebody to sponsor --

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

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

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

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

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

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

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

all corporate members of the laboratory, consortium members, have royalty-free rights to all the patents and other IP in that pool.
Q So the patents in the pool are solely the patents that are generated as a result of the Media Lab's work?
A Yes.
Q What about IP generated as a result of the Media Lab's collaboration with any one of the sponsor members?
A In general, we arrange things such that there is no such IP.
On one or two occasions that I'm aware of when such IP was generated, the arrangement is that the IP goes into the pool, but the member who is part of the collaboration also is an assignee of the IP and has the right to license it as well, license it out as well.
Q Are you currently doing any work for Samsung?
MR. YAP: Objection, relevance.
A Could I ask for clarification?
Are you asking expert witness

work or any work at all?
Q Any kind of work.
A I served as a proposal reviewer for a research-funding mechanism that Samsung runs in Korea.
Q Anything else?
A That's the only thing at this point.
Q And have you ever served as an expert witness on behalf of Samsung?
A I don't believe I've been retained directly by Samsung. I may have been involved in cases in which Samsung was involved but not working directly for them.
Q Not on behalf of Samsung?
A Not on behalf of them.
Q And besides serving as an expert witness on behalf of Yamaha, have you done any other work on behalf of Yamaha?
And let me clarify. Besides serving as an expert witness on behalf of Yamaha in the proceedings subject of this deposition, the IPR2013-597 and 598.
A I believe this is the first compensated work I've done for Yamaha.

Q And have you worked with the law firm of Morrison & Foerster before?
A Yes.
Q And when was that?
A Quite a few times going back to the 1990s.
Q When was the last time before the -- before your work on behalf of Yamaha in connection with these inter partes review proceedings?
A I believe I was involved in another matter with Morrison & Foerster in 2012.
I believe prior to that I was involved in a matter before the ITC with Morrison & Foerster in 2009 and 2010.
Q And which matters were those?
A So the first one was the -- was a case involving Funai at the ITC. I believe I also did work in a case involving mobile devices where I was retained on behalf of Kyocera Sanyo Telecom and Palm Incorporated through Morrison & Foerster in 2010.
And I've probably done something else in the intervening period as well, but I don't have my notes in front of

me on that right now.

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

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

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

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

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

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

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

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

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

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

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

A Yes.

Q Prior to your work on this inter partes review?

A I have.

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

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

Q And that's going back to when?

A I don't know precisely the dates.

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

A Less than ten years.

Q Less than ten years, okay.

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

MR. YAP: Objection, form.

A I believe that's correct.

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

A It really varies. It's a function of the case. And so in the past, I have analyzed hardware. I've analyzed software. I've conducted experiments. I've analyzed design of chips.

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

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

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

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

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

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

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

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

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

Q Okay.

Have you provided testimony in court before?

A Yes.

Q On how many occasions?

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

Q Less than five, more than five?

A More than five.

Q More than ten?

A Probably not.

Q Okay.

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

A I think probably 50-50.
Q So would you consider yourself a professional expert witness?
MR. YAP: Objection to form.
A Well, I would not say that it's my primary profession. It's one of the things I do as part of my consulting practice.
Q Okay.
What is your hourly rate in the proceedings at issue here?
A My hourly rate went up toward the end of last year. I believe I signed a contract at my previous rate, which would have been $600 an hour.
Q And what is your rate today?
A 650.
Q Okay.
And when were you first contacted in connection with the IPRs at issue here, the 597 and 598?
And let me just take a step back. I will refer to the proceedings here as IPR597, that's with respect to the Weel '099 patent that we will make of record in a moment, and IPR598 with respect to the '873

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

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

A Yes.

Q Great.

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

MR. YAP: Objection, privileged.

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

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

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

MS. GLADSTEIN: Okay, again --

MR. YAP: Under the rules.

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

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

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

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

MS. GLADSTEIN: Very well.

BY MS. GLADSTEIN:

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

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

Q And how were you first contacted?

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

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

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

which one contacted me first.
Q And when did you sign a retention agreement in connection with these matters?
A I don't recall the precise date.
Q Was it shortly after communication with counsel?
I'm just trying to establish how soon after the initial contact.
A It was within a few weeks, I think.
Q Okay.
Do you have an understanding of how it is that counsel reached out to you, why they reached out to you?
MR. YAP: Objection, form.
A Well, I think in part it was because I had worked with the firm in the past and because they told me they felt I had appropriate knowledge to be able to contribute to this matter.
Q Do you -- do you have an understanding of the tasks with which you were charged?
A What I was initially asked to do, apart from simply reviewing the large number of references, was to give my opinion on

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

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

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

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

A That would be the --

MR. YAP: Objection, form.

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

Q How did you go about preparing your declarations?

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

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

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

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

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

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

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

into those.
Q How many declarations were you preparing?
A Last fall, that would have been four.
Q Okay.
And do you recall what the other two declarations were about?
A Those are the other two patents that we're going to be discussing tomorrow, as I understand it.
Q So if I were to say IPR ending in 593 and 594, would that sound familiar to you?
A Yes.
Q Okay.
So with respect to all four proceedings, how much time have you billed Yamaha up to the point of your filing -- finalizing your declarations?
A I don't have those records in front of me now, so I did not look at the invoices in preparing for this, so I haven't seen those since last fall.
Q Okay.

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

Would that be fair to say?

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

Q Okay, so during the summer 2013.

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

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

A I would have --

MR. YAP: Objection, asked and answered.

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

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

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

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

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

BY MS. GLADSTEIN:

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

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

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

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

of today's deposition and tomorrow's
deposition?
A Well, what I --
Q Approximately. I'm not looking for
a precise number. Just a ballpark.
A Well, since we know what my hourly
rate is, but I've already said I haven't a
precise sense of how many hours, then as a
consequence, I also haven't a precise sense
of how many dollars, since that would just be
the number of hours times the rate.
Q Besides consulting for Yamaha, are
you consulting for any other party
concurrent -- simultaneously, concurrently?
A In this party?
Q No, no, no.
Besides having a consulting
engagement on behalf of Yamaha, are you
engaged in other consulting assignments on
behalf of other parties?
A Legal and other sources of
consulting?
Q Let's start with legal consulting
engagements.
A Yes, I am.

Q How many of those do you have?
A As counsel may be aware, it's sometimes difficult to determine which cases are still active since there are things that have been stayed and things that have temporarily vanished, but there is at least one case that I'm actively involved in at this point.
Q And which case is that?
A This -- well, I believe I provided a list of all of my legal engagements to counsel for Yamaha, and I thought they had provided that to your firm.
Q I'm not aware of that list, but I am aware of your CV that's attached to the declarations.
A Right, right.
So the issue is that this CV is approximately a year old at this point, because this CV was last edited beginning of summer 2013.
Q Right.
I see --
A That was the most up-to-date version that I had as of September.

Q Okay.
If I could ask you to look at Exhibit 3, which is your declaration in the IPR598, and look at the first page of your CV.
It bears a header on the left-hand side in small font that says "last updated June 2013."
A Yes.
Q And if we turn to page 2, under the heading of Consulting Record, which goes on to page 3, there are at least two entries that I see on page 3 that state as of June of 2013, that those are ongoing assignments, and those are Research in Motion and HTC.
A And --
Q Do you see those?
A And just to be precise, there is also one for Motorola, Inc., farther up.
Q Oh, I see that.
There are a couple more, actually.
A And there's also technical advisor to One Laptop Per Child.
Q Okay.

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

A No, as far as I'm aware.

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

A I believe that's correct.

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

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

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

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

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

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

conclusion.
Q But you don't recall when after June of 2013 you would have been notified?
A No.
Q Okay.
How about the next case, technical advisor, One Laptop Per Child?
A One Laptop Per Child closed their Boston office toward the beginning of this year, and I stopped having significant involvement with OLPC at that time.
Q Was that a patent case?
A No.
Q What type of a case was it?
A That wasn't a case. That was -- I was technical advisor to the One Laptop Per Child Foundation.
Q And what about the TDVision Systems, was that a patent case?
A No, that's being a member of their board of advisors.
Q And when did this engagement conclude for you?
A I haven't had any involvement with TDVision in the past year, so I'm assuming

they don't need me to do anything else, but
they did not formally notify me that it had
terminated.
Q Okay.
And what about Research in
Motion, when were you notified that your
services were no longer needed in that case?
A I don't recall.
Q Was it this year?
A It was probably last year, but I
don't know for certain.
Q And what about HTC?
A That would be the same answer.
Q So you believe that your engagement
terminated sometime last year?
A Yes.
Q Late last year?
A I don't know.
Q Do you recall working on behalf of
HTC while you were preparing the Yamaha
declarations?
A I was not doing any work on behalf
of HTC during that period.
Q Do you recall doing any work on
behalf of research in motion while you were

preparing Yamaha declarations?
A I don't recall producing any work product during that time. I may have had contact with their counsel during that period.
Q How about with respect to Motorola, do you recall doing any work on behalf of Motorola while you were preparing Yamaha declarations?
A I do not recall doing any work on behalf of Motorola during that period of time.
Q And do you recall doing work on behalf of One Laptop Per Child?
A Yes.
Q At the time that you were preparing Yamaha declarations?
A Yes.
Q And do you recall the amount of time that you were spending on behalf of One Laptop Per Child?
A Only a few hours.
Q Do you recall doing work for TDVision Systems at the time that you were preparing the Yamaha declarations?

A I do not.
Q Would it be fair to say that when you were preparing declarations on behalf of Yamaha, that was the predominant consulting engagement that you had --
A At that time --
Q -- during that period of time?
A At that period of time, yes.
Q And now that we have gone through and attempted to reconstruct the history between June of 2013 and when these declarations were filed, sitting here today, you have no recollection as to the amount of time or the fees that you charged Yamaha in connection with your work on the four declarations?
MR. YAP: Objection, asked and answered.
A Inasmuch as we are talking about an invoice that I submitted to them probably more than six months ago, I do not recall the numbers on the invoice.
Q So the last invoice that you submitted to Yamaha was about six months ago?
A No, I believe I've submitted

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

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

A In total?

Q In total.

A I think my answer would again be the same.

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

Q Have there -- apologize.

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

A I don't recall.

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

MR. YAP: We'll take it advisement.

THE DEPONENT: Would this be a

time for a break, by the way?
MS. GLADSTEIN: Sure.
THE DEPONENT: I'm sorry, did I stop you from saying something on the record?
MR. YAP: No, that's fine.
THE VIDEOGRAPHER: The time is 10:57 a.m. We're going off the record.
(Recess.)
THE VIDEOGRAPHER: We are back on the record. The time is 11:16 a.m.
BY MS. GLADSTEIN:
Q Dr. Bove, welcome back.
A Thank you.
Q During the break did you have any substantive discussions with counsel about this deposition?
A No.
Q So before the break, we talked about your work on behalf of Yamaha with respect to the petitions at issue here, the 597, 598, as well as the other two petitions on which you will be deposed tomorrow, that's the 593 and 594.
Are you doing any additional

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

A Yes.

Q And what is that additional work?

A That is preparing and signing additional declarations.

Q Which patent or patents are those declarations for?

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

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

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

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

A I believe that's correct.

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

A   As of right now, no.
Q   Do you anticipate doing any additional work on behalf of Yamaha in the near future?
A   If I am asked and if I have the time, I may.
Q   But there is nothing specific that you're aware of at the moment besides the work that you're doing?
A   Not at this time.
Q   Okay.
So do you have a sense of how much time you have devoted on the work for Yamaha with respect to all of the petitions that you have been working on?
MR. YAP: Objection, asked and answered.
A   I think my answer would be the same answer that I had given before, that inasmuch as I don't have the records before me, and further inasmuch as I haven't invoiced them recently, so I don't even have a total calculated for work I've done in the past month or two, I'm not in a position to answer that right now.

Q Okay.
MS. GLADSTEIN: We reiterate the request for the time sheets submitted by Dr. Bove in connection with the four proceedings that are at issue here at the moment, so 593, 594, 597, 598.
MR. YAP: To be clear, counsel, after we went off the record -- as long as we can make a representation of the amount of hours or the amount billed, we can do that, too.
MS. GLADSTEIN: We can start there.
MR. YAP: That will be fastest.
MS. GLADSTEIN: That will be faster? Can you represent on the record?
MR. YAP: We are trying to get a number; so if we can, we will represent on the record.
MS. GLADSTEIN: Okay. Great.
BY MS. GLADSTEIN:
Q So let's move on.
Did you discuss the 597, 598, 593 and 594 IPRs with anybody other than

counsel for Morrison & Foerster?
A No.
Q Did you bring any documents with you today?
A I have copies of my -- these two exhibits, 3 and 4, in my briefcase, as well as copies of the related petitions that Yamaha submitted in those two matters and the decisions in those two matters.
Q And by "related" petitions, you're talking about the 593 and 594?
A The '873 and '099 patents, yes.
Q And aside from your declarations and petitions, are there any other documents that you brought with you?
A The decisions in those two matters as well.
Q Apologies.
So the declarations, petitions and decisions in all four IPRs --
A Only on the two --
Q Only on the two?
A -- that we're discussing today.
Q Okay.
Anything else that you have

with you?
A I have my address book, but I think that's it.
Q And what is -- why do you have the declarations, petitions and decisions with respect to the two proceedings subject of this deposition here with you today?
A Because if I arrived early, I thought I might flip through them again in advance of the deposition, but that didn't happen.
Q And do you keep a file of materials in connection with the work that you have done in the two cases subject of the deposition today?
A I have copies of all of the materials that have been provided to me by counsel, as well as final copies of each of my declarations.
Q And where do you store copies of materials provided to you by counsel?
A On a disk drive that's not on a network.
Q Do you have a physical file of documents that you review, mark up or prepare

in connection with work?
A No, everything is electronic.
Q Do you take any notes about the
case that you're working on?
A Generally, no.
Q No notes whatsoever?
A No.
Q So how do you remember what it is
that you were asked to do, to look into?
A So how do I remember, for example,
what claim elements?
Q That's a good example, sure.
A Well, I think in the case of these
declarations, I probably started typing a
skeleton of the declaration while I was on
the phone speaking to counsel.
Q Did you prepare the declaration
yourself?
A Yes.
Q You typed it up yourself?
A Yes.
Counsel did formatting and
counsel provided the front matter.
Q The case caption?
A (Nods.)

Q Did you prepare for today's depositions?

A Yes.

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

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

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

Q Did you review anything else?

A I don't believe so, no.

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

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

A The '873 and the '099.
Q I'm so sorry.
A Yes.
Q The '873 and the '099.
A So just to be clear, in each of these declarations there's a section called "Materials Considered," and so I reviewed everything in there with the possible exception of prior art references that may no longer be relevant.
So there's a list in these two, so those plus the two decisions, plus the two responses, plus the three documents that I just referred to.
I think that covers everything. At least if we say that in noting that I reviewed a petition, I'm also noting that I reviewed the -- the appendices to said petition.
Q The references cited in the petition?
A Yes.
Q Okay.
Did you meet with counsel in preparation for your deposition?

A I did.
Q And who is the counsel that you met with?
A I met with both the gentlemen who are present here today.
Q And how many occasions did you meet with them?
A I met with Mr. Yap on Tuesday, and I met with both gentlemen on Wednesday.
Q And approximately how long were you meeting on Tuesday?
A Probably about five hours, including lunch.
Q And the length of your meeting or meetings on Wednesday?
A That was probably about seven hours, including lunch.
Q And is Tuesday the first day that you started preparing for the -- for the deposition?
A No.
Q When did you personally start preparing for the deposition?
A I think over the past several weeks I've been looking through these materials,

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

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

A Yes.

Q Approximately how much?

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

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

A Not that I recall.

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

reviewed in your declarations?
A Not that I recall.
Q You mentioned earlier this morning that Yamaha may have been a member of a consortium of the Media Lab.
A Yamaha was a research sponsor of the Media Laboratory at one point. I don't recall the precise dates. I don't believe they currently are.
Q Do you remember how long ago were they a member? Approximately five years ago, ten years, less than that?
A I think they've been a member more recently than five years, and their membership probably went back quite a few years before that, but I don't remember the precise dates.
Q Where would you look to -- to find out as to the status of their membership?
A Well, I could give you the present status by looking at the current sponsor list on the web, which is a publicly accessible document. That was the one referred to earlier this morning.
That would simply tell me yes

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

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

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

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

A Okay.

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

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

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

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

BY MS. GLADSTEIN:

Q Looking at -- I'm looking at

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

A Yes.

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

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

A Between 10 and 20 years.

Q And what is American Institute of Physics?

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

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

A Of AIP? No.

Q Does AIP have digital audio interest group?

A I'm not aware that they do.

Q All right.

Next organization on the list

is the Association for Computing Machinery.
What is ACM?
A ACM, you'll note by the fact that it's called "Computing Machinery" is they're a very old and established organization relating to computer science and allied areas.
Q And do you have a particular focus, interest in ACM?
A I was chair of the ACM multimedia conference some years ago. In fact, I think that's cited here somewhere.
(Deponent read document.)
A That may not actually be listed here.
Q Do you recall when that was?
A That was in I think 1996 or so.
Q Does ACM have a digital audio interest group?
A I don't think they have something that's called "digital audio" specifically. I believe they have a multimedia interest group, and network digital audio would fall under that.
Q Were you part of the multimedia

network group?
A I believe -- I'm not sure I'm currently a member, but I believe I was a member some years ago.
Q How -- approximately how long ago?
A I don't recall. I think I was a member at the time I chaired the conference, because that's the special interest group that's associated with the conference that I chaired.
Q Okay.
Next organization on the list, the IEEE, Institute of Electrical and Electronic Engineers.
How long have you been a member of that organization?
A More than 20 years, I believe.
Q Do you belong to any particular focus group or interest group?
A There is a communications organization that's part of the IEEE.
Q And when is that communications organization?
A They're really interested in all aspects of transmission of information,

whether digital or analogue.
Q Do they meet regularly?
A They have conferences -- a number of conferences associated with the communication society.
One of them is the Consumer Communications and Networking Conference, of which I was general chair ten years ago, I believe. More recently than ten years ago. Within the past ten years as chair of that conference.
Q How frequently does the organization meet on an annual basis?
A They have quite a few events that they either run or cosponsor with the another one of the societies, so I'm sure they have an event every month somewhere.
Q Do you attend their events monthly?
A No.
Q How frequently do you attend those events?
A Probably once a year.
Q And that would be at an annual meeting?
A There's a particular conference

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

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

Q And what does the "CCNC" stand for?

A Consumer Communications and Networking Conference.

Q Okay.

And does IEEE have a digital audio interest group?

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

Q Are you part of those groups?

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

Q So CCNC is --
A The conference, the Consumer Communications and Networking Conference.
Q And you attend the CCNC conferences?
A Yes.
Q And they take place annually?
A Yes.
Q Do you attend any meetings dating up to the conferences, to the CCNC conferences?
A We have regular conference calls with the committee throughout the year.
Q And do you participate in those regular conference calls?
A When I'm available.
Q And on an annual basis, how many conference calls are there that proceed the CCNC conference?
A At least six or seven. It really depends on who is chairing that year and how often he or she wants to convene the committee.
Q And so how many times, approximately, would you participate in one

of those teleconferences?
A Maybe every two months.
Q Sorry.
You said there are six or seven teleconferences leading up to the CCNC conference?
A So these --
Q Of the six to seven, how many teleconferences would you participate in?
A Oh, it varies from year to year. It depends on when they're scheduled. I might have some other event that occurs at the time during the week when they've decided to do it, but I try to get on as many as I'm available for.
Q Aside from CCNC, do you belong to a digital audio interest group that is part of the IEEE?
A I was formerly -- formerly, I believe a member of the -- I don't know if it was called the Multimedia Society, but there was another group that dealt with multimedia that was part of the IEEE that I used to be a member of.
Q How long ago?

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

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

A Probably about ten years.

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

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

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

MR. YAP: Objection, asked and answered.

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

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

A Within the IEEE?

Q Within the IEEE.

A No.
Q Okay.
Optical Society of America.
What is that organization?
A That is a society of people involved in research, education and commercial applications of optics.
Q Do you have a particular focus of interest there?
A Mostly cameras and displays.
Q Is there a digital audio interest group that's part of OSA?
A No.
Q Next organization, Society of Photo Instrumentation Engineers, or SPIE.
How long have you been a member of that society?
A Since about 1986 or 1987, since I was a graduate student.
Q So what is SPIE?
A Most generally, it's like the OSA, an organization that is interested in optics, in light, things like optical networks and microscopy and use of light in medical applications.

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

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

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

A Yes.

Q -- that you have chaired?

A Yes.

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

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

Q Could you give an example?

A So there was a great deal of discussion in the 1990s about multimedia where multimedia means you have some combination of video, audio and possibly other kinds of media, like text and graphics, and especially on user interactions with that transmission of it and realtime with high quality of service over a network and the processing for it.

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

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

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

There isn't a firm dividing line.

Q With respect to the conference on media processors, can you describe what were some of the themes addressed at the conference, or trends?

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

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

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

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

And more specifically focusing on the 2004 timeframe.

A Well, without having the conference proceedings in front of me, I can't recall precisely what would have been presented in 2004 versus 2003 or 2002; but in general, that was a period of time during which it was clear that it was practical to deal with digital video and digital audio on general purpose computing devices as well as on inexpensive special purpose devices.

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

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

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

A I was associate editor from 2004 to 2011.

Q Okay.

And is that a journal?

A Yes.

Q And what types of subject matter does the journal publish on?
A Generally things relating to optics, to light, to interaction of light with matter, to -- which could include anything from optical networking to cameras to displays to interesting optical materials to use of optics or light in medicine.
So again, it's a very broad journal, but it's all applied rather than theoretical.
Q Would digital audio be a subject matter that you typically encounter in the publications of the journal?
A Not generally.
Q With respect to the Society of Motion Picture and Television Engineers, you have been, it looks like, a member since 1993?
A No, actually, I've been a member since 1983. I joined when I was a student.
Q And you're still a member today?
A Yes.
Q And what is the Society of Motion Picture and Television Engineers?

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

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

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

Q All of them being --

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

I just haven't published papers outside of video.

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

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

Q Are you part of the standards

group?

A No.

Q And what does the standards group do?

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

So a very broad range of standards.

Q Are you aware of any digital audio standards specifically?

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

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

A   Well, I believe they have standards that are used in capture and post-production of audio.
They're not responsible for, say, mp3, although SMPTE and mpeg work together, so there is overlap between the organizations.
Q   Okay.
So would you say that SMPTE's focuses with respect to audio would be, you know, its interplay with video?
A   Well, SMPTE, being focused on motion pictures and television, they would be generally working with video and audio together rather than in isolation from one another.
Q   Okay.
Now, looking at your CV, there is an extensive list of patents there.
Do any of your patents deal with digital audio?
(Deponent read document.)
A   Let's see. Several of the hyperlinked television patents have an audio component inasmuch as the interactive

television program involves packets of --
video packets of audio, packets of controlled
information and packets of interactive
information.
Additionally, I believe the
7,636,365 patent on smart digital modules
involved both -- involved capture, processing
and playback of digital audio as part of
those modules.
Although as I sit here right
now, I don't recall how much that spec talks
about that piece of functionality.
Q Now, in the '365 patent that you
just referenced, is digital audio part of the
video stream or is -- well, let's just start
there.
Is digital audio part of the
video stream?
A It can be or it can be separate.
Q Do you have research experience
with digital audio?
A Yes.
Q Can you give examples of that
research experience?
A Certainly. I'll refer to the

publication list that starts on page 11.

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

Q Simultaneous streaming?

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

I additionally -- let's see.

(Deponent read document.)

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

And then, let's see, page 15, Item 34, this was about a paper that we presented at the Audio Engineering Society Convention in 1999 on capturing audio with multiple microphones and being able to do processing on the outputs of multiple microphones together in order to enhance the digital audio quality.

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

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

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

And we also have the ability in a system like that to process the audio in realtime so as to create a steerable microphone so we can concentrate on the person who's speaking and reject the sound coming from the fan on the PC on the other side of the room or the air conditioning system or something.

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

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

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

(Deponent read document.)

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

And again, this is -- this may not be complete because I'm doing this on the fly, but if we go to page 24, you notice that there is a third item from the top of the page, it's a master's thesis in EECS, Electrical Engineering Computer Science, by Chad Nicholson, where the subject of the thesis was implementing the mpeg-2 audio decoding specification on a DSP chip, and I supervised that project.

Q And by supervising, what did that entail?

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

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

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

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

responsive media.
Then the same page about -- a little past halfway down, the Dalton thesis on audio-based localization. That's a master's thesis that's related to the second of the two Audio Engineering Society papers that we've discussed.
Actually, the item above that the master's thesis by Pilpre, P-I-L-P-R-E, I believe digital audio was one of the kinds of information that he was processing in the sensor networks that he built as part of that work.
And again, there are other -- other pieces of this work that had an audio component, but I think those are the primary ones.
Q Have you done any work on media databases or audio databases specifically?
A Yes.
Q Could you give examples?
A So one particular example -- excuse me, adjusting my chair here -- we created in about the 2000 to 2005 timeframe what we called the Demo Box, and what it really was

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

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

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

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

Or we could also get a profile

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

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

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

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

Q And how would the player play the object?

A The player is simply what you might

think of as a renderer.

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

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

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

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

It would then take that media item and evaluate the reference, which would say where do you go, actually get the file or stream or whatever corresponding to that media item, and then it would either fetch it from local storage or fetch it across the network.

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

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

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

A Well, playlist --

Q Generally.

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

I did a little bit of DJ'ing back in the time there was top-40 radio that anybody listened to. My understanding was that the playlist was the list of records that generally the station management had decided were the records that the DJs were allowed to play, except in very special circumstances, and the DJs could then select items from that playlist and play them.

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

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

THE VIDEOGRAPHER: Excuse me.

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

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

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

(Recess.)

THE VIDEOGRAPHER: This is

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

We are back on the record. The time is 12:14 p.m.

BY MS. GLADSTEIN:

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

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

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

And I have been informed by counsel that I -- that indeed the agreement that was signed in this case was at $650 an hour, so I just want to make the record reflect that.

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

A Okay.

Q -- later on during this deposition.

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

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

MR. YAP: Objection, mischaracterizing witness testimony.

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

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

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

circumstance.
Q Okay.
So typically one would be able to select an item from a playlist?
A Yes.
Q For playback?
A The playlist was the universe of records that the station management had decided the DJ could select among.
Q But it would be inherently a list of items in an order.
A Certainly, but it could be alphabetical order. It could be any sort of order.
Q Okay. All right.
Have you done any work on wireless remote controls?
A Yes.
Q Could you describe that work?
A Certainly.
I think probably the first relevant work goes back to when I was doing my master's thesis, because lacking the ability to store the video on disk drives at the time, we made our intelligent personal

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

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

Q And approximately when was that?

A That would have been in 1983 through 1985.

Q And that is when you were a graduate student?

A When I was doing my master's.

Q Any other experience with wireless remote controls?

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

Q Have you worked on portable devices?

A Yes.

Q Portable mobile devices?

A Yes.

Q What were those devices?
A Well, the one that I had the most involvement with was the OLPC XO laptop. I was one of the designers of that.
Q And what kind of laptop was that?
A So it was a compact, inexpensive laptop specifically for children and even more so specifically for children in developing countries, so there were particular environmental considerations.
For example, the fact that in equatorial Africa, school is outdoors, so the laptop display has to be able to deal with the ultraviolet radiation in equatorial Africa, which a typical netbook can't survive very long.
It had to deal with unusual sources of power. It had to deal with the ability to do what we called "mesh" networking, so that if there was no Wi-Fi access point, a laptop could talk directly to another laptop without going through a Wi-Fi access point, although using the Wi-Fi radio, but it could also go multiple hops.
So if, for example, if there

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

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

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

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

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

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

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

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

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

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

A So there were -- the numbering scheme is a little bit strange, but -- so the first laptop was the XO1, and then we redesigned it to use a better microprocessor and to make a couple of improvements, and that was called the XO1.5.

And then we further improved that to use an ARM system-on-a-chip instead of an 86 processor to make it even more power-efficient and cheaper, and that was the XO1.75.

We were sort of using the Zeno's paradox approach there where you never actually got to XO2. You just kept getting halfway through the remaining distance because XO2 was this mythical thing that was going to be completely different and not evolutionary.

So we felt if you were doing something evolutionary, you couldn't call it XO2.

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

There is another tablet made by a third party which is being shipped that I had no involvement with. And then there is an interesting machine called the XO4, for reasons I still don't understand, which is like the 1.75 but with a special touchscreen, and I had a small amount of involvement with that one before the Boston office -- Cambridge office of OLPC closed.

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

Q And when was the XO1.5 developed?

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

Q And when was the XO1.75 developed?

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

Q The XO1. -- 1.5, did that device have the capability to select a player device?

A You mean to cause media to play someplace else?

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

A Well, one could play audio on the internal speakers. One could plug in a speaker to a jack. If one had the appropriate drivers, one could plug in a USB audio device and play back through that.

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

Q But there was no feature in the XO1.5 model to select a separate device in which the XO 1.5 would direct that separate device to play a song, for example?

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

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

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

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

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

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

the mesh network.
My recollection is that that was never actually shipped as a product but that there was work done on using that same sharing mechanism to allow any child in the classroom to share something with the whole classroom.
Q Okay.
Have you done any work on media databases in commercial settings?
A Yes.
Q Could you tell us about that work?
A Certainly.
I think it's probably fairer to say that I supervised work in that area than implemented it myself, and as part of WatchPoint --
So I should probably step back and say that in about 2000, right around the beginning of 2000, end of 1999, beginning of 2000, I cofounded with my student, John Dax, and another student, Josh Walkman, a company called WatchPoint Media, which was an interactive television products and services company that was looking to offer interactive

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

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

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

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

Q Okay.

And with respect to that code

review, did you have any input into the code itself?
A Well, certainly at an architectural level, at a level of specifying the features that needed to be supported, I believe I had input.
Q Okay.
A Not necessarily on the very, very low-level strategies of each individual function in the system, but we knew -- we knew -- we defined what was the thing that had to be built, what kinds of formats it had to operate under, what features it had to support, how much capacity it had to have, what the user interface looked like for whoever was managing it, and then programmers went off and implemented something.
Q And so would it be fair to say that you had input with respect to the media databases that -- or media database that was part of the system that you were building, your company was building?
A I think that would be correct, yes.
Q Okay.
Why don't we take a lunch

break.

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

(Luncheon recess.)

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

BY MS. GLADSTEIN:

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

A No.

Q Thank you.

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

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

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

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

Q Okay.

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

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

Q I apologize. I misspoke.

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

A Yes.

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

A I don't believe so.

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

A Oh, I reviewed the draft petitions.

Q Okay.

And did you provide any input

into the substance of the draft petitions?
A I recall having discussions about the substance of them. I don't recall specific instances in which I suggested changes.
Q To your best recollection, is this the entire amount of time that you spent drafting -- working on your declarations in each of these four IPR proceedings leading up to the declarations that were filed?
A Just to clarify, we're talking about the 29.25 hours?
Q Yes.
A Then the answer is yes.
Q Okay.
MS. GLADSTEIN: Let me mark a couple of exhibits.
THE DEPONENT: Thank you.
(Exhibit 5 marked for identification.)
(Exhibit 6 marked for identification.)
BY MS. GLADSTEIN:
Q Dr. Bove, I marked as Exhibit 5 US Patent No. 8,214,873 to inventor Martin Weel.

Have you seen this document before?

A Yes.

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

A During breakfast this morning, I think.

Q Great.

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

Have you seen this document before?

A Yes.

Q And when did you see it?

A Either this morning or late last night.

Q Great.

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

A Yes.

Q And what is your understanding?

A It's a system and a method by which one can use a handheld remote control for identifying a media player or a destination for playout of audio.

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

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

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

Q No.

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

MR. YAP: Objection, form.

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

Q Sure, please.

A There is a server which is called

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

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

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

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

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

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

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

MR. YAP: Objection, form.

A I would have to ask which particular art.

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

A Yes, I believe I do.

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

A That's an extremely broad question.

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

Q Sure.

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

A Well, besides my recollections, what I also did was I reviewed a variety of references, some of which are cited in here and others of which may have been cited in other declarations associated with related matters which were descriptive of what was generally understood about network music playing, serving of playlists across the Internet and things of that sort.

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

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

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

Q Do you recall what those other references were?

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

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

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

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

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

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

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

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

Q And what were those dates?
A I don't have those numbers in my head right now. I think they may have -- I might have referred to mp3.com in one of these declarations.
I'm not certain. Just in passing, not as a reference that I specifically relied on. Or I might not have. I'm not sure. Perhaps I didn't provide a reference to that in any of these.
Q So were the dates by which digital audio could be surfed on the web relevant to May 2004?
A First of all, I'd just like to note for the record that I don't see a reference to the actual website mp3.com in either of the two declarations before me right now.
Q You're referring to Exhibits 3 and 4?
A Exhibits 3 and 4, yes.
Q Thank you.
Just so that the record is clear, if you could mention which exhibit you're looking at.
A Certainly, I'm sorry.

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

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

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

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

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

Q Okay.

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

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

dates around which that happened.
Q And when were those dates?
A That was in the late 1990s.
Q And why was that information relevant to you?
A It was really just curiosity, just wanted to see when they've done it, and I found some emails that referred to it.
Q So aside from the art that is -- the references that are listed in paragraph 5 of your declaration and Exhibit 3 and the mp3.com website, as well as work that your students have done with music servers in the late '90s, was there any additional sources of information that you looked to to form an understanding as to the state of the prior art?
A Well, again, with my previous note that I was -- it was not -- since I was reviewing material for four declarations at about the same time, I would probably say the Materials Considered section of all four declarations taken together.
I can't at this point say that a particular reference that may appear in one

of these and not in the other only affected
my opinion about the relevant issues in that
declaration, because I did review multiple
references for each of these, which may not
overlap 100 percent.
Q So besides the references that are
cited in the Materials Considered sections of
your declarations -- and at the moment we're
talking about your declarations in the 597
proceeding and the 598 proceeding -- were --
I'm just trying to learn
whether there was any other information or
materials that you considered in addition to
what is listed in your declarations and the
mp3.com website and your own students' work
on music servers.
A Well, of course, there is also my
general knowledge from having been in the
field at the time.
And again, just to clarify,
some of the references that I may have looked
at in preparation of the two declarations
that do not yet have exhibit numbers --
because they will be discussed at tomorrow's
deposition -- may have impacted my

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

Q Okay, thank you.

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

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

Q Music or video in 2004, audio or video.

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

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

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

Q So with respect to the digital

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

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

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

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

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

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

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

storage?
Because there are many pieces of the puzzle.
Q We're talking about the use of mp3 technology, the storage of mp3 files and transmission of mp3 files.
A I believe I'm familiar with it.
Q So if you wanted to copy music from a CD onto a computer, how would you do it around 2004?
A Well, I know how we did do it, which was that we put the CD into the computer drive and either we imaged the CD directly onto the computer's storage or we imaged the CD directly onto a remote storage device over the network.
Or while reading the data off the CD, we re-encoded it, because the CD format is not compressed. And so for more efficient storage or transmission, we'd want to compress it, and we might do that either by doing it as the data are read directly from the disk or we might do it from the image that was stored on the computer. And then at that point, we would have one or more

compressed audio files.

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

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

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

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

So there is -- there are two

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

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

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

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

But in any event, there are a

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

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

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

Q Okay.

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

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

Are we talking about wirelessly or by any means?

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

A Let's see. At the time there certainly were pocket PCs that were able to connect to the Internet, and whether they did it wirelessly or whether they did it while docked, they were able directly to access files across the Internet without being attached to another computing device. So I'm aware of at least those.

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

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

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

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

Q Now, would a PDA be able to

directly download content from the Internet?
A I believe some of them could, yes.
Q Now, in 2004, were mobile devices able to control networked player devices to play a media item from a content server?
MR. YAP: Objection to form.
A That's a fairly compound statement, and we might need to define a number of the terms in it before I can give a definitive answer to that.
I know, for example, that people had programmed PDAs to act as remote controls for various consumer electronic products by that point in time.
Q Are you -- do you know in 2004 timeframe of any mobile device that was able to communicate with and direct a player device to play a media item --
MR. YAP: Objection, form.
Q -- that was available on a content server, that wasn't locally available?
MR. YAP: Objection to form.
A I believe there were, yes.
Q Can you explain what you mean?
A Certainly.

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

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

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

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

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

Q So you're referring to a situation

where the mobile device is a pocket PC?
A Or an equivalent type of device. I mean, there were tablets at the time. There were a variety of things at the time.
So it could be a PDA that had a similar functionality.
Q So you are aware that in 2004, a PDA would be able to control a player device, another device, to play a media item obtained from a content server in 2004.
A Well, I suppose the process would consist of -- I mean, it would not be something that a typical consumer would necessarily find comfortable to use.
But the ability to use one computing device to issue commands -- one computing device being a mobile device to issue commands to another computing device, whose functionality might include playing digital media from whatever source, certainly existed in 2004.
Q It existed theoretically, conceptually, or did it exist for consumer consumption?
A I'm not aware of anyone selling it

as a product at the time.
Q But theoretically?
A As a practical matter, it could be done using existing software --
Q Could be done?
A -- and existing hardware.
Q Are you aware of any infrared remote controls in 2004 that had bidirectional communication with player devices?
A I don't recall such a remote control in 2004.
Q How about Wi-Fi remote controls, are you aware of any Wi-Fi remote controls in 2004 that had bidirectional communication with player devices?
A If the player device were, for instance, a desktop or laptop PC and if the thing we're calling a Wi-Fi remote control was something akin to a pocket PC or a radio-equipped PDA, then yes.
Q Can you think of any other situations?
A Well, certainly using a tablet as a remote control. There was

wirelessly-equipped tablets at the time.
Not sure whether or not there were phones that would have used Wi-Fi in that way at the time, but a phone would have been able to communicate wirelessly ultimately to a computer.
Q Do you know when phones were able to communicate via Wi-Fi?
A Wi-Fi and phones started in that general timeframe, but I can't give a precise date.
Q Are you aware of any Bluetooth controls in 2004 that had bidirectional communication with player devices?
A I need to clarify. Are we talking about commercial products? Are we talking about patents that had been applied for?
What precisely are we talking about when you ask am I aware of?
Q Commercial products?
A Again, I think my statement about things like pocket PCs or tablets would apply there, that if that were programmed and used as a remote control, it certainly had the bidirectional communication capability.

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

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

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

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

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

A Basically with any other Wi-Fi device.

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

Q Okay.

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

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

Q Okay.

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

(Deponent read document.)

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

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

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

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

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

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

Q Yes.

(Deponent read document.)

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

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

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

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

Q What type of the wireless remote is

being disclosed in the '873?

(Deponent read document.)

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

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

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

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

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

Q So it's a cellular remote?

A No, cellular would be a different communication technician.

Q Could you elaborate?

A Certainly.

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

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

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

Q Okay.

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

(Deponent read document.)

A Yes, it could be.

Inasmuch as in the same column, column 9, we are -- we're starting at line 8, and it says, "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 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."

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

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

And what's interesting about this is that this is describing that the cellphone shown here is a cellphone that does not have a radio that allows it to communicate directly with the second device, but rather the cellphone talks to the server apparently by means of a wireless data connection, and the player device talks to the same server.

And so the communication is accomplished indirectly, but the same control functionality is provided.

And there's a discussion starting at line 36 of column 14 about the network architecture that would enable a cellphone that was only talking to a tower to control the player device.

Q So the remote control in Weel is able to directly connect to the Internet; is that right?

MR. YAP: Objection, form.

(Deponent read document.)

A It appears that the remote control is able to directly connect or to indirectly connect, but it has some means of connecting to the Internet.

Q And by indirectly, what do you mean by that?

(Deponent read document.)

A Well, in the embodiment illustrated in Figure 1 of the '873 patent, the pathway 16 shows a direct connection between the first device, which is the remote control, and the Internet.

However, the spec talks about the connection to the -- to the Internet being preferably direct, but it also has some other discussion that suggests that the important point is that it somehow or other be able to get to the Internet.

Q So by --

A For example, typically a device that only has Bluetooth can't get directly on to the Internet. It has to talk to something else, which then has Internet conductivity, because the Bluetooth communication in a situation like that would be paired with another device, like a computer or something else, which would in turn have Internet conductivity.

And the functionality called out in the spec in the claims would still be available even if the connection involved more than one hop.

Q Okay.

And is there a reference to this indirect connection to the Internet for the remote control and the '873 patent?

A Well, what I would say is that the

discussion that the network transceiver could be Bluetooth instead of Wi-Fi, which I previously referred to in column 9, would suggest a mode of operation in which the connection was not directly to the Internet but was to some other device that was in turn connected to the Internet.

Q And are you assuming that the Bluetooth transceiver is the only communications chip in the device?

A Well, we're told that at least it has a network transceiver, and the network transceiver is described as Bluetooth and/or Wi-Fi, so that suggests that the inventor was considering the case where it was just Bluetooth, just Wi-Fi, or both.

Q Could I direct your attention to Figure 8 of the '873 patent.

A I have it.

Q Does -- what do you see being represented in Figure 8?

A In Figure 8, I see a discussion of being able to control -- being able to provide the functionality described in the spec by means of both what is called a local device, which is the PDA in this figure, where the PDA is able to talk to the Internet and is also able to talk to the stereo, so it can exchange information with the remote server as well as exchanging information with the stereo, but the cellphone 84 is able to provide the control and other functionality even though it's not directly able to talk to the stereo.

And so those two abbreviations or acronyms, "WAN" and "LAN" -- WAN, W-A-N, is wide area network and LAN, L-A-N, is local area network. And so we can regard what is below that line as being the devices that either would be located in close proximity to one another in the consumer's home, for example, and we would regard the devices above the line as being the devices that don't necessarily have to be in close physical proximity but still have network conductivity.

And there's discussion in at least columns 13 and 14 of the topology that's illustrated in Figure 8.

Q Okay.

Does the remote control described in the '873 request playlists?
MR. YAP: Objection, form.
A We see discussion in column 15, starting at line 32, where it's discussing --
This is in the case of a cable television version of the system, but there is language here that says the remote control --
I'm sorry. It says "Playlists can be requested by the remote control 62 and can downloaded from the playlist server 10 by the via Internet 11," and there are other discussions in the spec that are similar to that.
Now, the claim, using claim 1 as an exemplar, the claim does not actually say "requesting."
The claim 1 says "receiving on the first device a playlist."
Q And how does the receiving on the first device a playlist occur in the Weel '873 patent?
A That would be by whatever means of communication that that first device has to

the server, so the kinds of radios we've been talking about, potentially other means as well.

Q So the device would receive a playlist by the means of communications that we've been discussing, which is cellular means or Wi-Fi means, for example, right?

A Or Bluetooth.

Q Or Bluetooth?

A Or possibly other means as well.

Q Right.

But how would it get the list in the first place? Would not the remote control itself need to request the list in order to receive it?

A The spec speaks of requesting. But if we are just looking at the language in the claim, and this is perhaps a legal question as much as it is an engineering question, but if I am simply given the language of the claim, of claim 1, for instance, what that would suggest is that any means by which the playlist server would provide that playlist to the device, which could be, request, it could be streamed, it could be simply a

remote file system where the file appears --
If it's a pocket PC, they can talk to a remote file server where there's no real request. The file just appears as if it's a local file.
All of these would work across those kinds of radios if we configure the system correctly.
Q But the file or the playlist wouldn't magically appear on its own.
There has to have been an initiating step, a requesting step that I want that file or that playlist or that song, right?
A Well, if --
Q The --
A The song -- I'm sorry.
Let's make a distinction between how we get a song and how we get a playlist, because playing a song is presumably in response to the user ultimately doing something, indicating that the user would like to hear that song. So there is some agency with respect to that.
With respect to receiving a

playlist, which is the language of the claim as opposed to requesting a playlist, which certainly is one way of receiving, we could, if we are engineers or computer scientists, imagine a variety of communication protocols which would result in a playlist arriving at the remote control that might or might not require something that we would identify as a request going to the server.

I mean, the server could simply broadcast it on a particular network port.

There could be a variety of communication protocols that would result in the receipt of the playlist.

You know, if it's a phone, we could use SMS to send the playlist to that particular phone, and it would indeed receive the playlist by that means, and there is no request associated with that.

Q In the context of the '873, is there a request for a playlist by the remote?

A The specification describes a -- one or more instantiations of the claimed invention which do make a request.

The claim -- and again, I'm referring to claim 1. The word "request" does not appear in the context of receipt of the playlist in the claim.

MR. YAP: Sorry to interrupt. It's been about an hour, so if you think there's a good natural point to take a break.

Q Do you need to take a break now or can we --

A I wouldn't mind stretching if we could take five minutes.

MR. YAP: That would be good.

MS. GLADSTEIN: Why don't we take a break.

THE VIDEOGRAPHER: The time is 2:27 p.m. We're going off the record. This will be the end of Disk 2 in the deposition of V. Michael Bove, Jr.

(Recess.)

THE VIDEOGRAPHER: This is Disk No. 3 in the deposition of V. Michael pro, Jr.

We are back on the record. The time is 2:46 p.m.

Q Dr. Bove, during the break did you

have any substantive discussions about the subject matter of this deposition with counsel?

A No.

Q Before the break, you said that in 2004 there was no commercially available mobile device that was directing a network player device to play a media item from Quantum server.

Do you recall that?

A I think what I said is there were commercial devices that could be used in that way.

Q And are you aware of there being such usage of those devices?

A Well, I am aware that things like PDAs and pocket PCs were used as remote controls.

Q But specifically as remote controls to direct a networked other device to play, say, music downloaded from a server, were you aware of any such usage?

A I'm not aware of a commercial product that was marketed specifically with that usage as part of the marketing.

Q Are you aware of anyone suggesting that a PDA enabled to communicate with another networked to make that network device play media obtained from the Internet?

MR. YAP: Objection, form.

A Well, I am aware of a project that wasn't mine at MIT called the Media Bank which was a centralized --

Actually, it was a distributed set of centralized servers for media, including video and mp3 files and things of that sort, digital music files, that other devices could talk to the media bank and cause the playout of the media.

And that project was not mine. It was run by Henry Holtzman and Andrew Lippman, L-I-P-P-M-A-N, who are my colleagues at the Media Lab. And there definitely were applications of that in which one would access the Media Bank through one device but cause content to play elsewhere.

That was not a commercial product.

Q And what was the timeframe of that Media Bank project?

A   I believe that was the late 1990s.
Q   But that project wasn't with respect to a portable device, remote device?
A   My recollection was that that product was really agnostic as to -- that system was agnostic as to the form of the product that was being used to access it.
Q   So it was just a bunch of code?
A   It was a bunch of code.
Q   And do you know why the project was terminated?
A   I think all of the grad students working on it got their doctorates and got jobs.
Q   Thank you.
Going back -- strike that. So the record is clear, you said that the Media Bank project was agnostic as to the types of devices that would be able to direct one another to obtain media from a server and direct another device to play the media.
A   Right.
It was simply a matter of being able to make a network connection by whatever means, wired or wireless, to the

system running the Media Bank software.
Q So would it be fair to say that the Media Bank project did not involve the use of a portable device directing a player device to obtain media from a server?
MR. YAP: Objection, asked and answered.
A I don't think it would be fair to say that.
Q It would not be?
A No.
Q Could you correct that statement?
A Well, I would say that the Media Bank was capable of being controlled with portable devices as well as hardwired devices on a wired network, and it was capable causing media to play out in one or another destination.
But the form of the device was really irrelevant as long as the device was capable of making an Internet connection to the Media Bank servers.
Q So to your knowledge, did the Media Bank project involve the use of a portable device directing a player device to obtain a

media item from a server?
MR. YAP: Objection, asked and answered.
A I'm fairly certain people connected to it all the time with laptops. I don't know if we're going to call that a mobile device or not.
Q With respect to the researchers who participated in the Media Bank project, what was the level of their experience and education?
A They ranged from MIT undergraduates who were maybe sophomores or juniors who were writing code to Ph.D. students to the associate director of the Media Lab, who had been there since before the founding of the lab.
So a very broad range of expertise.
Q Who is the associate of the Media Bank at the time?
A Of the --
Q The associate dean of the media --
A It would actually be the associate director of the Media Lab.

Q Director.
A Was Andrew Lippman, L-I-P-P-M-A-N, and it was primarily his project, although another researcher, Henry Holtzman, ended up both doing and directing a significant portion of the technical work behind it.
And there were several bachelor's, master's and doctoral students who did pieces of the system as well, resulted in a number of theses and a number of publications.
Q Is Andrew Lippman still at MIT?
A Yes.
Q And Henry Holtzman, is he still at MIT?
A Yes, although he's the gentleman I referred to earlier as being on leave at Samsung this semester.
Q Okay.
What, in your opinion, is the -- strike that.
What are the qualifications of a person of ordinary skill in the art with respect to the '873 patent?
A I'd say -- and this is identical to

what I discussed in section Roman IV of my declaration, how one would have at least a bachelor's degree in computer science or electrical engineering and at least a year of practical experience with networked multimedia.

Q And why do you say at least a year? Do you need more than a year?

A Well, I think that's probably the minimal experience. We can argue about a month or weeks, but generally about a year of practical experience would enable both -- would enable one to understand the technology and also to understand the general technical landscape of the field.

And further experience probably wouldn't change one's opinion about the relevant issues.

Q So would a person of ordinary skill in the art need more than one year of practical experience or would one year suffice?

A I think one year would suffice, but I would not say that one year plus one day would suddenly make someone not a person of ordinary skill in the art anymore.

Q In order for a person to be considered of having ordinary skill in the art of the '873 patent, would it be fair to say that that person would need to have at least a bachelor's degree in computer science and one year of practical experience?

A At least a bachelor's degree in computer science or electrical engineering.

Q In computer science or electrical engineering, sorry.

A And if we think of it as a threshold, one would cross that threshold at about one year. One would have enough practical experience that I would consider such a person of ordinary skill in the art.

Q Let's take this in two parts.

Would you agree that the minimum educational level that a person of ordinary skill in the art would be required to have is a bachelor's degree in computer science?

A The minimum --

Q Or electrical engineering.

A To be of ordinary skill in the art,

yes.

Q And that person should have one year of practical experience with networked multimedia?

A At minimum, yes.

Q So a person who has a Ph.D. in computer science or electrical engineering and say ten years of practical experience of network multimedia, would that person be of ordinary skill in the art?

A With respect to the skill in the art pertaining to the '873 patent, my belief is that there is a certain level of education and experience beyond which one would continue to have the same general understanding.

So I'm looking at this as a threshold, that it would not be the case that if one received a master's degree, one suddenly would understand the world completely differently and would disagree with one who had only a bachelor's and one year of experience.

So that's why I used the words "at least."

Q So it's your opinion that a -- the hypothetical person of ordinary skill in the art, whether that person has a bachelor's degree and one year of practical experience or that person has a Ph.D. and ten years of practical experience, that person would have the same level of understanding that was disclosed in the '873?

A My --

MR. YAP: Objection, mischaracterizing. Go ahead.

A What I would say is that beyond a year of experience or at least a bachelor's degree beyond that point, one would have sufficient understanding and be considered a person of ordinary skill in the art.

Q Would you consider yourself to be a person of ordinary skill in the art?

A I would.

Q Would you consider yourself to be a person of extraordinary skill in the art?

A I'm not quite sure what the implications of being of extraordinary skill in the art --

I mean, the measure is really

just does one have sufficient understanding of the technology and the language and the landscape to achieve a level of understanding that other people of this much education and experience would agree with.

And I feel that I have the same understanding of this at that level of relevance.

Q Do you think that you and a student of yours would have the same understanding of the '873 patent, a student of yours was -- an undergraduate student -- take it back.

A student of yours who is starting a master's program, so a student who has completed his bachelor's studies.

A If that student had also had practical experience in the relevant area.

Q How much practical experience?

A At least a year, then I would say yes.

Q So somebody with a bachelor's and at least one year of practical experience would have the same understanding of the '873 patent as yourself, who has a Ph.D. and 20-plus years of experience?

A I think with respect to the relevant issues in this case, yes.

Q What is your understanding of the concept of determining whether the patent is obvious over the prior art or not?

A Well, would this be with respect to a single item of art or combinations of elements?

Q In general, how do you go about determining whether the prior art renders obvious that which is claimed in a patent?

A Well, my understanding is one has to think about multiple factors, one of them being the similarities and differences between the piece of prior art and the claimed subject matter of the invention we're considering.

I think one has to understand really the scope and the content of the piece of prior art being considered.

I think one has to have a sense of what it means to be one of ordinary -- of ordinary skill in the art, because that's the hypothetical person who is making these sort of considerations.

And if there is some evidence of nonobviousness that's apparent, I think one would have to consider that as well.

So if, for example, one -- I believe one of ordinary skill in the art would look at a claim element in this patent and look at something disclosed in some other prior art reference and say that what was disclosed in the prior art reference was the same as that claim element, then that would be -- that would make that element obvious to one of ordinary in the art.

I think also one could combine multiple elements if they were known elements, they were combined in known waves and the results are predictable, and that would be a test as well.

And presumably one has a mental model of what one of ordinary skill in the art would understand this intention to be, what one of ordinary skill in the art would understand the pieces of prior art to be, and one of ordinary skill in the art would have a general understanding in the field.

Q When you're looking at a number of different prior art publications, is it your understanding that there has to be motivation to combine these various prior art publications in order for the collective of these prior art publications to render obvious what is claimed in a patent?
A Well, it's -- again, I'm not an attorney, and so I'm --
Q I'm just looking for your understanding.
A I'm doing this based upon what I have been instructed by counsel and what I've been instructed in past matters.
And so it is certainly possible to argue that there is no motivation to combine two pieces of art perhaps because they're from vastly different fields, and one of ordinary skill in the art with respect to '873 might not have any understanding of the field from which another piece of art derived.
It may be that -- that they simply are so different in terms of the scope of the two pieces of prior art that it

wouldn't be apparent to one of ordinary skill in the art to take those two pieces and combine them.

It might be the case that there is something in the reference that specifically teaches away from combining this element with that element.

But absent those, the question is would one of ordinary skill in the art looking at those two references say if I --

First of all, it makes sense to take these two pieces and put them together; and second, that I know in advance what the outcome would be. It's predictable.

Q Okay.

So back to the '873 patent, Exhibit 5, before the break we were talking about whether the portable device has direct communications with the Internet or with a server.

I wanted to direct your attention to Figure 1. Please tell me whether you agree that the first device in Figure 1 has direct communications or is able to directly connect to the Internet.

(Deponent read document.)

A I'm going to refer to the language in column 8, starting at line 51, which is the text that discusses Figure 1.

(Deponent read document.)

Q So --

A So what we are told is that device -- first device 13 is in communications with the Internet, and that conductivity is indicated by the line labeled 16. And indeed we're told it's bidirectional communication.

Now, two comments about that. One of them is this is described as a preferred embodiment. This is not described as the only possible embodiment.

The second thing I'll note is that there is nothing here indicating that 16 is a single wire. And indeed it typically wouldn't be. There would be routers, there would be other things as part of arc 16.

So an Internet connection, there is not -- you know, there isn't a wire going from first device to the Internet, and there might not even be a direct radio link

from it to the Internet, but it is able
bidirectionally to exchange information
across the Internet, so it has a means of
talking to the Internet.
Q And the connection need not be
wired connection?
A Right. Wired or wireless.
Q Wired or wireless.
So in fact --
A Or optical. It could be anything.
Q So going back to Figure 1, would
you agree that the first device is able to
directly communicate with the Internet and
the Internet is able to communicate with the
first device?
A The specific language in column 8
is "also in communication with the network of
a first device."
So I agree that it is in
communication with the network. I don't see
language that says the communication is of
necessity direct, but it has the ability to
exchange information with the network.
Q Do you see any intermediaries in
between the line that connects the box of the

first device with the oval of the Internet?
A I don't see anything illustrated in Figure 1 that's an intermediary.
Q Looking at Figure 1, do you agree that the first device can communicate with the Internet without going through the second device?
A Well, there is -- there are two separate communication paths. There's the dotted one in 18 going between the first device and the second device, and there's the solid one, 16, going between the first device and the Internet.
So that suggests that there is the possibility of the first device talking to the Internet without going through the second device.
Q Okay.
Does the remote control of the '873 patent download playlists?
A It receives playlists.
Q It doesn't download them?
A It can download them, but what we are told in the claim there is -- claim 1, for example, is that it receives them.

In other claims, like 17, we're told that it obtains them.

Q Now, if you could -- if you could look to column 15 of the '873 at around line 32 where it says that "Thus, playlists can be requested by the remote control and downloaded from the playlist server via the Internet thereto.

"Similarly, songs may be downloaded to the remote controls -- to the remote control 62."

A Right.

This is language that I, myself, cited before the break. And so I used this as an example of where the specification does say "request." And so that means at least the remote control can request playlists.

This particular instantiation is a somewhat unusual one, because this one is a set-top box for a television or stereo. So this is one of several embodiments discussed here.

Q In other words, the remote control that's described in the '873 is capable of

downloading playlists or songs?
MR. YAP: Objection,
mischaracterizes.
A At least in some embodiments.
Q Does the remote control of the '873
display playlists?
(Deponent read document.)
A Well, we're told and shown in, for
example, Figure 2 that the remote control has
a display.
We are told in the claims
that -- I'll use the precise word. The media
item -- media item identifier is selected on
the remote control.
And so although the claim --
claim 1, for example, does not explicitly
call out that it is displayed, it's
reasonable to understand that in order to be
selectable, items on the display list must
have to be displayed on the remote.
Q Thank you.
MS. GLADSTEIN: The court
reporter asks that we go off the record for
just one minute. If we could just hold on
that, would be great.

THE VIDEOGRAPHER: The time is 3:15 p.m. We are going off the record.
(Recess.)
(Exhibit 7 marked for identification.)
THE VIDEOGRAPHER: We are back on the record. The time is 3:24 p.m.
BY MS. GLADSTEIN:
Q Dr. Bove, before we had to go on a short break due to technical issues, we were talking about the '873 patent, and I believe I asked you whether the remote control downloads songs according to the '873.
A I think you asked me if it downloads playlists.
Q Okay.
How about whether the remote control downloads songs?
(Deponent read document.)
A Well, one of the modes in operation and the one illustrated in Figure 3 contains an element 37, which is the first device receiving the songs.
Q And the first device would be --
A Would be the remote control.

Q -- the remote control.
And there is a parallel mode of operation in Figure 4 which has a block 49, which is the second device receiving the songs.
Now, again, just to be clear on the record here, I'm speaking to the specification and not to any specific claim.
Q Is the remote control capable of playing songs on -- itself on the remote control in the '873?
A Yes.
In column 11, the relevant language appears starting at line 41. And again, this is an embodiment. This is not of necessity a property of the remote control in every embodiment.
But the embodiment being discussed here says the selected songs are played by the first device 13, and then in the next paragraph, it says the songs may be played via one or more speakers that are part of the first device 13.
Q And that's not the only section of the '873 where the remote's ability to play

songs on itself is described, correct?
And I direct your attention to column 15 at about line 4 -- 39.
(Deponent read document.)
A Yes. This language also talks about his listening to songs on the remote control.
Q Now, is the remote control in communication with media player?
MR. YAP: Objection, form.
A Not necessarily at all times. And in the cellphone example we discussed earlier today, it's never in direct connection with the media player. It talks to the server, and the server communicates with the media player.
Q Let me just make sure that the record is clear.
My question was whether the remote control is in communication with the media player. I didn't ask for whether it's direct or indirect, just it communicates with a media player.
A Yes.
MR. YAP: Objection, form.

Q How does it communicate with the media player?
A Wirelessly.
Q Is the communication --
A Actually, I'd like to append to that at least wirelessly. It might be a combination of wired and wirelessly.
Q Okay.
Is the communication unidirectional or bidirectional?
A Bidirectional.
Q Or both?
A It's my understanding that it's generally bidirectional.
Q Can it be unidirectional?
A In column 9, starting at line 4, we learn that the first device may be an either unidirectional or bidirectional communication with the second device.
Q Looking at Figure 4, does the remote control direct a media player device to play a media item selected at the remote control?
MR. YAP: Objection, form.
A Simply looking at this figure, the

relevant boxes are 49 and 50, and they show that the second device receives the songs and they show that the songs are played. This does not show a direction. Just in this diagram.

Now, the text may describe in more detail.

Q What does box 47 tell you?

A It says it sends information representative of the selected songs from the first device to the second device, which means it enables the song to be played on the second device, but it doesn't actually say that the song is played as a result of that step.

Q So when we get to box 50 that says play the selected songs on the second device, that doesn't tell you that the remote control directed a media player to play a selected song.

A Well, it's interesting, because this doesn't ascribe agency. This says that a song is played on the second device, but it doesn't say as directed by the first device.

And indeed if we go to the

discussion in column 12 of this figure, the
language starts on line 33 and it simply says
the selected song is played on the device 14
as shown in block 50 and discussed above.
So just the diagram and this
piece of language don't say in exactly so
many words that the first device plays the
song on the second device.
Q Would a person of ordinary skill in
the art understand that the first device
directs the second device to play a selected
media item?
A Yes, I think one of ordinary skill
in the art would understand that.
My objection was simply that
neither the diagram nor this language in
column 12 expressly makes that statement.
Q Could a player not play as directed
by the remote?
MR. YAP: Objection, form.
A Well, if one were practicing
claim 1, for example, claim 1 would upon
completion of all of the steps result in the
second device receiving a media item but not
necessarily playing it.

Q Why do you say that?
A Because there is not an explicit element in here that says directing from the first device to second device to play said media item.
It simply says directing from the first device the second device to receive a media item.
Q So what would be the reason why a player device would not play as directed by the remote?
A Perhaps because it's saving the song to play at some later time.
Q Any other reason?
A Perhaps because the person building it had been instructed to follow exactly the elements of claim 1 and do no more than that.
(Exhibit 8 marked for identification.)
BY MS. GLADSTEIN:
Q I am handing you what has been marked as Exhibit 8.
MR. YAP: Sorry, counsel, did I miss Exhibit 7 somewhere?
MS. GLADSTEIN: Let me just

put it on the record.
So Exhibit 8 is US Patent No. 6,622,018 to Erekson.
BY MS. GLADSTEIN:
Q And now I'm handing you what has been marked as Exhibit 7, which is a document bearing Publication No. US2002/0087996 to Bi.
Have you seen Exhibit 7 before?
A Yes.
Q And when was the last time you saw it?
A I believe yesterday.
Q Have you seen Exhibit 8?
A Yes.
Q And when was the last time you saw Exhibit 8?
A I believe yesterday.
Q Okay.
Now, with respect to Exhibit 7, which I will also refer to as "Bi" interchangeably, because the first inventor is Dapeng Bi, do you understand that the navigator 260 of Bi is a remote control that communicates with an audio-video player

application 151 running on a computing
platform 100?
A We learn in paragraph 18 of the Bi
reference that the interactive remote control
device 260, also referred to as the navigator
260, communicates with an audio or video
player application 151 running on a computing
platform 100 such as a personal computer
set-top box or Internet appliance.
Q Does the navigator 260 of Bi
communicate with data server 102?
(Deponent read document.)
A Navigator 260 does not appear to
communicate directly with data server 102.
Q How does navigator 260 communicate
with the data server?
A By means of the application running
on element 100.
Q Which is the computing platform?
A The computing platform.
Q So that navigator 260 of Bi does
not directly communicate were the data server
102?
MR. YAP: Objection, form.
A That is correct, does not directly

communicate.
Q Does the navigator 260 of Bi communicate with the Internet 101?
A Not directly.
Q Does the navigator 260 obtain content from the data server?
A Can we clarify what is meant by "content" in that question?
Q A playlist, a song, a video.
(Deponent read document.)
A Navigator 260 receives information from the computing platforms, at least some of which originates with data server 102.
Q But navigator 260 does not itself obtain songs or videos from the data server; is that right?
A It directs computing platform 100 to do so.
Q But it itself has no ability to go directly to the data server to obtain a song or a video item?
A As shown in these figures, it has no ability to communicate directly with data server 102 to do that.
Q Is there any description in the Bi

application itself as to whether or not the
navigator has the ability to directly go to
the data server to obtain content?
(Deponent read document.)
A It has the ability to direct the
software and the computing platform to do so.
Q What would the navigator 260 need
to have in order to obtain content from the
data server or the Internet itself directly?
A It would need to have the ability
to connect wirelessly to the Internet.
Q And does Bi provide such capability
to the navigator?
A It illustrates wireless data
communication, but it illustrates only
wireless data communication to computing
platform 100.
Q In 2004, would a person of ordinary
skill in the art reading Bi have been
motivated to redesign the navigator 260 to
communicate directly with the data server or
the Internet?
A Well, the opinion that I was asked
to give with respect to Bi was not
specifically that so much as whether it would

be obvious to one of ordinary skill in the art effectively to employ a different device as navigator 260.

Q Do you have an opinion on whether a person of ordinary skill in the art reading Bi in 2004 would have been motivated to redesign the navigator 260 to communicate directly with data server 102 or the Internet 101?

MR. YAP: Objection, outside the scope.

A I haven't previously been asked to give an opinion on redesigning the navigator as opposed to implementing the navigator on another device.

Q So sitting here today, you have no opinion whether a person of ordinary skill in the art would have been motivated to redesign navigator 260 to get it to communicate with the Internet or the data server directly?

MR. YAP: Objection, outside the scope.

A One of ordinary skill in the art understanding that the navigator itself is essentially a computing platform in its own right and has a wireless communication interface associated with it would understand that it would certainly be possible for that device to communicate with the Internet as opposed to communicating with computing platform 100.

Q My question is a little different.

Would a person of ordinary skill in the art have any motivation to alter the navigator 260 and give it direct communication capability with the Internet or the data server?

MR. YAP: Objection, scope.

A I can imagine application scenarios in which it would potentially make sense to do that.

Q But in 2004, the relevant timeframe, what would have been the motivation to one of skill in the art to change the navigator 260 of Bi?

A Well, one of ordinary skill in the art would, first of all, understand that navigator 260 needn't be a custom-built device.

It could have been implemented

as a PDA. It could have been implemented on the phone. It could have been implemented as a pocket PC, because each of those contains all of the necessary elements to perform the functions of 260.

And in implementing 260 as one of those devices, one would gain the ability to communicate directly with the Internet.

Q Does Bi itself disclose the motivation to connect the navigator directly to the Internet or the data server?

A I believe the Bi reference is silent on that point.

Q Let's look at Exhibit 8. It's the patent to Erekson.

The remote disclosed by Erekson does not receive any media content; is that right?

(Deponent read document.)

A I don't see any reference in the Erekson reference -- the Erekson document, Exhibit 8, to receiving media content on the remote control device.

Q Now, Erekson's remote does not receive any playlists, does it?

BHM Ex. 2002 (previously filed in IPR2013-00598 as Ex. 2012)

(Deponent read document.)

A We're simply told that there's a menu of commands, but it doesn't describe precisely what they are.

Q But there is no description that there are any playlists that would be included on the menu?

A There's no description in the reference, although one of ordinary skill in the art would understand that this remote could be used to select an item from the playlist if it had one on the screen.

Q Erekson's remote also does not receive any songs; isn't that right?

A The Erekson reference does not appear to be describing receiving songs in the remote.

Q Does Erekson disclose sharing of media content between the remote control and devices being controlled?

A It does not appear to describe that.

Q Does Erekson disclose sharing of media content between the controlled devices?

A So just to clarify, is the question

whether two devices that are controlled by this can be commanded to share media content between them?

Q So the question is whether Erekson discloses sharing of media content between the devices that are being controlled by the remote of Erekson.

A Although it doesn't describe specifically doing that, one would understand that if the devices are capable of doing it and being commanded to do it, this could be the remote control for initiating that process?

Q But there is no disclosure in Erekson that media content can be shared between the controlled devices?

A Well, it does describe controlling groups of devices that need to communicate with one another, such as a television and a VCR or a stereo and a CD player, so this command -- the command for the CD player to play through the stereo could be issued as a result of using this remote.

So that's described in column 1.

Q Where in column 1?
A In the background art where it's describing the kinds of problems that then-existing remote controls have to address, it lists examples of groups of devices, such as televisions and VCRs and stereos, tape players, compact disk players.
Q Sorry, could you point me to the line --
A This is the discussion -- the first paragraph of Background Art.
Q So this is where the -- where Erekson describes problems in the art that Erekson is trying to solve?
A Yes.
Q Okay.
And Erekson says, Consider, for example, the number of devices and appliances in the typical living room or family room of a residential dwelling," and it lists those devices: Lamps, light switches, a thermostat and consumer electronic devices such as televisions, videocassette recorders and stereos, some of these devices themselves comprising multiple

devices, such as compact disk players, tape players, et cetera.

So where do you read the sharing of content between multiple devices?

A Well, what I'm saying is that this discussion implies that an application that a user might want performed will require multiple devices to work together, and this remote control is addressed to being able to control all of the devices required in that desired scenario with a single remote.

Q You would agree with me that the paragraph that you're pointing to has no discussion of sharing of media content between these devices?

A Well, except --

MR. YAP: Objection. Asked and answered.

A I was about to say, except to the degree that, for example, the compact disk player or the tape player could be said to be sharing content with the stereo or the VCR can be said to be sharing content with the television.

Q Could you explain to me how a

compact disk player or a tape player would be sharing content with each other or --

A Well --

Q Let's take a step back.

What is it that a compact disk player or a tape player would be sharing content with -- content with?

A The reproducing device. So they're -- these are players -- or in some cases receivers -- which themselves cannot reproduce sounds or pictures for a viewer or listener.

And so in order to provide the functionality that a user would want, it would be necessary to control the destination device to select the input connected to the source device, and then to command the source device to play through the destination device.

Admittedly, that's not the same kind of content-sharing that we've been talking about up till now. I'm merely illustrating that it's clear that the inventor understands applications in which a user -- a desired user scenario will involve

commanding multiple devices to work together.
Q Dr. Bove, the sentence that I read into the record where Erekson says, 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, videocassette recorders and stereos, some of these devices themselves comprising multiple devices such as compact disk players, tape players, et cetera, merely recites a number of devices that are typically -- can be found in a residential living room and notes that some devices comprise multiple devices.
So if we look back to the timeframe of Erekson, which was filed in April of 2000, if I recall correctly, compact disk players and tape players were sometimes integrated devices where you would have both a tape deck and a CD player in the same device.
How -- how do you read anything into this with respect to these devices being able to communicate media

content?

A Well, again --

MR. YAP: Objection, form.

A Again, what we are discussing here is really my original point from several minutes ago, that this is not the sort of media sharing that we have been discussing with respect to, let's say, the '873 patent.

But rather, this is simply saying that it's clear that the inventor understands that multiple devices can be controlled and indeed potentially controlled to work together by means of the remote control in Erekson.

So that was the main point that I was trying to make here.

Q Okay.

A This was not simply controlling a single device, but it was allowing the user to select one or more devices and command them to work together.

And ultimately, this is in response to your question, which really seemed to address the point of could this remote control cause multiple devices to do

something.
The particular example you used was media sharing, and I said, well, it's not quite media sharing, but it is -- it is clear that one could command multiple devices to do something using this remote.
Q But Erekson is not describing communication between the controlled devices themselves, correct?
A That appears to be correct.
Q Okay.
A Except in terms of sending analogue signals back and forth, potentially, say between a VCR and a TV.
Q Does Erekson disclose that the controlled device can control another controlled device?
(Deponent read document.)
MR. YAP: Objection, form.
(Deponent read document.)
A To some degree a function of the way that Bluetooth networking operates implies a master-slave relationship among groups of devices, and this is -- this is an illustration of this in Figure 1, and it also

has a discussion at column 5, starting at line 5.

So it talks about a piconet, and within a piconet, one of the devices in the piconet is the master and the other are the slaves.

That's really just a discussion of how Bluetooth communication works.

With respect to the user controlling multiple devices, the relevant illustration is Figure 6.

And in Figure 6, the portable computer system 100 communicates with the devices individually, but it does not show communication between the devices.

So -- which is not to say that it couldn't happen.

If they're all on a Bluetooth network, they do as shown in Figure 1 have the ability to talk to one another, just as a consequence of being on a Bluetooth network.

But Figure 6 does not show such a dataflow.

Q So you would agree that Erekson

does not disclose that a controlled device can control another controlled device?

MR. YAP: Objection, mischaracterizes.

A I would say that it does not disclose that a controlled device does control another controlled device.

Q Okay.

A But it does not teach that it can't.

Q But it also doesn't teach that it can, by the same token?

A Well, it shows in Figure 1, and also one of ordinary skill in the art familiar with Bluetooth network topology would understand, that all of these devices are in communication with one another, so they could.

The scenario illustrated for using that network here does not make use of that inherent capability of Bluetooth networks.

Q Okay.

So looking at Figure 6, does Erekson describe a remote control that can control another device via an intermediary device?

(Deponent read document.)

A Not in Figure 6.

Q Does Erekson anywhere describe a remote control that can control another device via an intermediary device?

A Well, again, the discussion in column 5 of the architecture of or topology of Bluetooth networks shows that these linkages are multi-hop, can be multi-hop or can be synchronized so that one --

In fact, there's an explicit discussion of what is called point-to-point and point-to-multipoint Bluetooth connections in lines 15 and 16 of column 5, and what that means is that a device can send commands to multiple Bluetooth devices.

Q Dr. Bove, would you agree that Figure 1 only shows pairing information through a network and not a cascade of control from a device to a device?

A Figure 1 is showing a coupling arrangement both between two piconets and the individual devices within each piconet.

Q But it does not show control from one device to another device.
It merely shows a multipoint broadcast of the same command to multiple devices; does it not?
A Well, it shows conductivity among a group, among the uses of which could be sending a command to multiple devices.
Q You agree that there's nothing in Erekson that describes a remote control that controls another device via intermediary device?
MR. YAP: Objection, mischaracterizes. Asked and answered.
A I think we've been over this before; but just to reiterate the example illustrated in, for instance, Figure 6, does not show a multi-hop connection or a connection between, say, remote device A and remote device B.
Q And would you consider Blue -- what is Bluetooth to you? What does it mean to you?
A Bluetooth is a short-range digital wireless communication means.

Q Would you call Bluetooth a device?
A A Bluetooth radio would be a device, which would be part of a bigger device.
But a Bluetooth itself is really a protocol.
Q Okay.
Would you agree that Erekson's remote controls directly the device to which it has connected, consistent with what's shown in Figure 6?
A Yes.
Q Now, in your declaration with respect to the '873 patent marked as Exhibit 3, you in paragraph 26 state that you've been asked -- I'm paraphrasing it a little bit.
You've been asked for your opinion as to whether it would have been obvious to one of ordinary skill in the art to combine the portable (palmtop or handheld computer) of the Erekson reference with the system disclosed in the Bi reference.
That's in paragraph 26 of your declaration.
A Yes.

Q How did you go about selecting the combination of Bi and Erekson?
A The particular element that I am looking for here --
Q Well, I apologize.
Let me take a step back.
A Okay.
Q Did you select the combination of Bi and Erekson in connection with preparing your opinion set out in the declaration?
A Well, the selection of this particular combination arose out of conversations I had with Yamaha's counsel, so multiple possible combinations were discussed.
Q And who came up with the specific Bi and Erekson combination?
MR. YAP: Objection. You're getting close to work product here.
Q Let me ask you this question with a yes or no answer.
Did you come up with the Bi and Erekson combination for purposes of arguing obviousness of the '873 patent?
A I'm not certain at this point who

came up with it.

There were many pieces of art being discussed in many combinations. This one was that I felt was particularly relevant to certain claim elements in the '873 patent.

Q In paragraph 27 of your declaration, you state towards the end of that paragraph that, "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 analogue output, as noted at paragraph 21 of Bi, as well as other devices used with the stereo, such as a CD player."

Do you see that?

A Yes.

Q What do you mean by "employing the Erekson remote control with the Bi system"?

A Specifically what I'm employing is the ability of the Erekson remote control to control multiple devices to select a device and send commands to that device among a group of devices.

And whether that means

literally using the remote control here or using that -- combining that functionality of this remote control with the navigator of Bi, the result is equally predictable.

Q You state that a single remote control -- in that same sentence that I read into the record in its entirety, a single remote control could advantageously be used to control the computing platform as described in Bi and a stereo.

Do you see that?

A As well as other devices.

Q Right.

Now, let me turn your attention to paragraphs 28 and 29 of Bi.

Do you see that -- why don't I give you a minute to read 28 and 29, and you tell me when you're done.

(Deponent read document.)

A Okay.

Q Do you see that in -- at paragraphs 28, 29 of Bi, Bi discloses that the navigator 260 is capable of controlling the computing platform as well as an analogue stereo?

A Well, I see that it has

bidirectional wireless communication with a computing platform. And I see that secondarily, it has an infrared transmitter, which I take to mean not bidirectional but unidirectional, because it doesn't say "transceiver," which allows it to control the stereo.

Q Correct.

So why would you need access remote to control a stereo as well as the computing platform when Bi is already controlling both the computing platform and a stereo via the navigator?

A Well, actually, this further suggests since this remote control is controlling two different devices using two different communication means, this suggests the desirability of using only one communication means, as in Erekson, to control everything so that there would be a single-user interface.

The user would simply select which device was to be controlled, and the commands would go out to a single interface.

So it would be a simpler

design, which has advantages over what's in Bi.

Secondarily, the wireless communication is bidirectional, and for certain application scenarios, it might be necessary to read status information back from the controlled device, which would not be possible over just an IR transmitter, because that's a one-way command connection.

Q Right.

But I point you back to your concluding sentence where you state that, By employing the Erekson remote control with the Bi system, a single remote control could be advantageously used to control the computing platform as described in Bi and a stereo that receives its analogue put as noted at paragraph 21 of Bi.

But in Bi we already have a single remote control. You're not distinguishing in this paragraph between the different components that make up the remote control of Bi.

You're not pointing out, you know, any drawbacks or deficiencies that one of skill in the art would be motivated to replace by a system of Erekson, for example.

MR. YAP: Objection, form.

A Well, the Bi -- the Bi system actually has two remote controls in one package.

It has a wireless remote control if you're talking about the computer platform, and it has a secondary infrared remote control for talking to things like a stereo.

And it clearly would be advantageous to replace those two remote controls that happen to be in one box with one remote control.

Q Where do you see in Bi two remote controls? There is only one navigator.

It has many components in it, but I don't see a second remote control within Bi.

A For that we have to refer to the schematic diagrams at the end of the figures, and so my apologies to everybody in the room that isn't an electrical engineer.

MR. YAP: Counsel, we've been

going for over an hour --
MS. GLADSTEIN: A question is still pending --
MR. YAP: No, I understand. After you get to a good natural break, perhaps we can take a break?
MS. GLADSTEIN: Absolutely.
(Deponent read document.)
A So the -- in referring, first of all, to Figure 9, there's one set of circuitry of which really consists of elements 615 -- 615, 265 and 617, which are the IR, remote control, electronics.
And then there is another set of electronics, which are the wireless remote control. So there are two separate pieces of circuitry in this system.
And Erekson, for example, points out the shortcoming of an arrangement like this, because in column 1 of Erekson, we find that -- and this is starting line 45 of column 1.
We find that the problem with using an infrared remote control is that its range is shorter and restricted to line of

sight when compared with a wireless remote control.

So the -- one of the issues with the design in Bi is that if one is not standing directly in front of the music player system, one could control the computing platform, the application, but one would be unable to control the amplifier because the wireless range would be farther and more indirect than the IR range.

And so Erekson offers us a solution to that problem of both having redundant componentry, two different remote control mechanisms in the navigator of Bi, but it also offers us a solution to the problem that one is restricted to using the system by the range of the IR remote control, which really gets rid of most of the advantage of the wireless remote control, as described in Erekson.

Q Going back to my original question, which I did not hear an answer for, Bi does not disclose two separate remote controls, one to control the computing platform and the other to control a stereo; isn't that right?

A It discloses two remote control mechanisms, which are disadvantageous, as described in Erekson.
Q But it discloses a single remote control; isn't that right?
A A single physical remote control device containing two remote control means for two different sets of devices.
Q Now, Erekson only discloses Bluetooth, is that right, Bluetooth communications?
I specifically direct --
A No. I would suggest that in column 4, starting at line 49, it says, "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 802.11 standard, which nowadays we know as Wi-Fi.
Q Well, we're talking about communication with devices that are Bluetooth- or Wi-Fi-enabled?
A Bluetooth or Wi-Fi or other wireless technologies.
Q Can you think of any other wireless

technologies besides Wi-Fi and Bluetooth?

A Lots of them. Zigbee, for example, Z-I-G-B-E-E.

Q But the devices would need to be enabled to communicate --

A With one or another of these, yes.

Q Okay.

So in 2004, stereos were not Bluetooth-enabled, were they?

A I believe some of them were, yes.

Q And what's the basis for your belief?

A There certainly were amplified speaker systems using Bluetooth technology by 2004.

Q Can you give an example of those?

A I don't have a particular model number to suggest now, but there is --

Q Manufacturer?

A About the same time as Bluetooth headsets and Bluetooth printers and Bluetooth everything else became available, which was the early 2000s, Bluetooth-amplified speakers became available at roughly the same point in time.

Q How about a stereo player, not just a speaker but a device that plays a CD or a tape?

A Not certain.

Q You would agree with me that the remote control of Bi could play music via the computer platform?

A It could cause the computing platform to play music, yes.

Q Why don't we take a break.

THE VIDEOGRAPHER: The time is 4:40 p.m. We are going off the record.

This will be the end of Disk 3 in the deposition of V. Michael Bove, Jr.

(Recess.)

THE VIDEOGRAPHER: This is disk No. 4 in the deposition of V. Michael Bove, Jr.

We are back on the record. The time is 4:58 p.m.

BY MS. GLADSTEIN:

Q Dr. Bove, did you have any substantive discussions about the subject matter of this deposition with counsel during the break?

A No.
Q Let's turn to Exhibit 6, which is the '099 patent.
What is your understanding of the field of the invention to which the '099 patent pertains?
A The '099 patent is in many ways related to the patent we've just been discussing.
The claims of the '099 are a system and a method, such the wireless remote control device can receive a playlist of songs from the remote source.
A user can select songs from the playlist, and then a media player that's separate from the remote control device plays those songs.
Q What is the relevant timeframe for assessing validity of the '099 patent?
A My understanding is this is also May 2004.
Q And you mentioned that the '099 is related to the '873 patent.
Do you have an understanding whether they, in fact, are related patents?

A My understanding is that this is a division of an application which is sequentially numbered one after the application from which '873 is a continuation.

And there are many elements present in common between these two patent documents as issued.

Q Okay.

So would it be fair to say that they come from the same family or they're related?

A They're related.

Q They're related, okay.

And would you -- let me -- strike that.

We -- in the first -- earlier in this deposition, we talked a lot about the state of the relevant art, especially as it existed around May of 2004.

Would you say that the state of the art that we have already discussed with respect to the '873 patent would be same for the '099 patent as well?

(Deponent read document.)

A Essentially, yes.
Q Is there any additional prior art that you would consider to be relevant with respect to the '099 patent that was not also relevant with respect to the '873?
A Well, in my analysis of prior art, I -- in my declaration, that is to say, and to be more precise, my declaration is Exhibit 4 -- I consider items of prior art in here that are different from the items that I consider in -- at least some of them, that are different from the ones I consider in the other declaration we just finished discussing.
Q Is there a particular prior art that stands out for purposes of showing the state of the art in 2004 that you haven't discussed with respect to the '873 patent?
A Not with respect to the overall state of the art. Perhaps with respect to particular claim elements.
Q Okay. All right.
So turning our attention to the '099 patent itself, and particularly Figure 2, does Figure 2 show the remote

control 18 directly receiving a playlist from a server 11?

A Well, the figure itself simply discloses a bidirectional data path from the server to the Internet and from the Internet to the remote control.

It doesn't disclose in the figure precisely what information flows up and down through those paths.

Q But the remote control in Figure 2 would -- is directly receiving some data from the server and from the Internet?

A In Figure 2, as opposed to Figure 1, information passes from the server through the Internet to the remote control and potentially back as well.

Q Okay.

If I could direct your attention to column 6 at the bottom at around line 60, there is a description of Figure 2, and it says, "Figure 2 is a block diagram of another exemplary system for sharing playlists according to the present invention, wherein a server provides a playlist to a remote control of a dedicated media player,

wherein the playlists have been obtained from
client computers or other devices."
Does the description in
column 6 that I just read in, in conjunction
with Figure 2, show the remote control
directly receiving a playlist from the server
via the Internet?
A Well, it shows it and it describes
it receiving a playlist from the server
across the Internet.
Whether there are proxies or
anything else in there is just a function of
how the Internet works.
Q Okay.
Does Figure 2 in conjunction
with its description in column 6 show sending
the playlist to the media player device?
(Deponent read document.)
A Figure 2 shows a one-directional
dotted data path between remote control 18, a
dedicated media player 17, but the actual
description of that is I believe at the top
of column 9.
Now, this doesn't specifically
at the top of column 9 describe the situation

we're discussing. I think the relevant language starts at line 15 where it says, "Similarly, playlists that were communicated to the remote control 18 as shown in Figure 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."

So the language here is really dealing with a huge variety of embodiments and a huge variety of dataflows.

Q Now, looking at Figure 1, what is the difference between Figure 1 and Figure 2?

A In Figure 1, the dedicated media player 17 connects to the Internet.

In Figure 2, the dedicated media player 17 is not shown to have an Internet connection.

Q If I could direct your attention to Figure 5, does Figure 5 show the remote control receiving a playlist directly from the Internet with input from one or more of the clients?

(Deponent read document.)
A The discussion of Figure 5 in column 10 says that the playlist may be communicated to a remote control 48 for the dedicated media player, but also says the client's 43 to 46 may communicate their user profiles to the remote -- it says "remove" control, but that's a typo. It should be "remote" control 48.
And then playlists may subsequently be forwarded to another device, such as the dedicated media player 47.
So it's unclear precisely where in this diagram the playlist comes from, but it does land in remote control 48 at the end.
Q If I -- you could look at the brief description of Figure 5 in column 7 at line 5.
A Yes.
This is where a peer provides a playlist to a remote control of a dedicated media player without the use of a server.
But again, it just doesn't tell us whether that's 43 or 44 or 45 or 46

or some combination of them.
Q That's right.
So it's an input from one or more of the clients?
A Yes.
Q Okay.
Does Figure 5 show sending the playlist to the media player device without the use of a server?
(Deponent read document.)
A Well, the discussion in column 10 of Figure 5 starting at line 38 says, "Similarly, playlists that were communicated to the remote control 48 as shown in Figure 5 may be further communicated to the dedicated media player associated therewith.
"This communication may be from the remote control 48 or from any other source, such as from one of the clients 43 to 46, via the Internet 42."
So this implies that although there is no path between the Internet and 47 illustrated here, the inventor understands that an embodiment according to Figure 5 could have an implicit path between the

clients and element 47.
Q Just for clarification, you stated the inventor understands.
Did you mean to say a person of ordinary skill in the art understands?
A Well, no.
The inventor in describing Figure 5 is saying that despite the fact that Figure 5 doesn't show a path from the clients directly to element 47, this says that it can be communicated from the clients to 47.
So it implies there could be a path there even if one isn't illustrated here.
Because this discussion in column 10 is specifically addressing Figure 5.
Q Okay.
But ultimately, the playlist is being sent to the dedicated media player from the Internet, not from the server?
A Well, it's coming from one of the clients on the Internet. It's landing in the dedicated media player either through the remote control or through an Internet

connection to the dedicated media player, which is not illustrated in Figure 5 but is discussed in column 10 in conjunction with Figure 5.

Q Okay.

But you agree with the fact that there is no use of a server that is depicted in Figure 5?

MR. YAP: Objection.

Q There is no server that is depicted in Figure 5.

A There is no server depicted in Figure 5.

Q Are you familiar with the meaning of the term "playlist" as it was used in 2004?

A My belief of the meaning of the term "playlist" in 2004 and the meaning of the term "playlist" now are essentially the same.

Q And what is the meaning of the term "playlist"?

A My understanding is that a playlist is just a list of media items that may be selected.

Q And is -- is a playlist a list of items in some sort of an order?
A By virtue of being a list, the items appear in an order.
Q And what kind of order are the items typically in a playlist?
A They could be in an order in which a user would want to hear them in sequence. They could be in an order by artist, by album, by genre.
There are a variety of ways one could organize a playlist.
Q Can a playlist be out of order?
A Well, that -- such a statement implies that there is a canonical order for a given playlist, and that some other order is not that canonical order.
If we're asking can a playlist be played in an arbitrary order, certainly.
Q No, that's not the question.
If a list is not in an order, would it still be a playlist?
If a list of items --
A Well, I think the plain meaning of "list" implies that there is an order in

which items appear.
That makes it a list.
Q So is there a difference between a list of media items and a playlist of media items?
A If one wanted to split hairs, one could say I could have a list of media items written on a piece of paper, but I couldn't necessarily play that unless it had been converted to a machinery to perform.
Playlist implies that a piece of software would be able to do something with it.
Q So would you agree that the term "playlist" with respect to media items, such as songs, is a list of items arranged in a particular order?
A First of all, I'm not sure what a particular order is. It could be an arbitrary order, but the -- it is a list of items in an order.
Q Okay.
Would you agree that a playlist is a list of items designed to be played?

A The items on the list are intended to be played or at least potentially to be played.

So one could select one or some other subset thereof and play those individual items rather than playing the entire list.

Q Would you agree that the term "playlist" is a list of items arranged to be played in a sequence?

A Not necessarily.

Q Could you explain?

A As I said before, the -- the fact that there is a list implies that the items appear in an order, but that may or may not be an order in which anybody would want to play the items.

They could be in alphabetical order, for example, and that might make no sense to play them in that order.

Q But the default would be to play a playlist in a sequence in which the items appear on a list?

A I would say that commonly a user interface would provide the ability to play the items in the sequence in which they appear, as well as playing them potentially in some other order or selecting some subset and playing the subset.

(Counsel conferred.)

MR. YAP: This happens to all of us.

(Exhibit 10 marked for identification.)

(Exhibit 11 marked for identification.)

BY MS. GLADSTEIN:

Q Dr. Bove, I'm handing you Exhibits 10 and 11.

A Thank you.

MS. GLADSTEIN: Counsel.

MR. YAP: Thank you.

BY MS. GLADSTEIN:

Q So Exhibit 10 is what I will represent that I emailed to counsel for Yamaha, noting that we may be asking you questions at your deposition.

Exhibit 11 is a hard copy of the same chapter that appears in Exhibit 10 from the Microsoft Windows Media

Player 7 handbook.

We are able to obtain a hard copy, so that's what it is in actual print.

And the version that was emailed to you was what was available online from the Internet.

I will represent that they are one and the same in terms of the content of Chapter 2 that is copied in this Exhibit 11.

And so I would like to direct your attention to page 40 of Exhibit 11.

A Will we be using Exhibit 10 at all?

Q No, I just marked it up so that --

A Okay, thank you.

Q -- we have it on the record as something that was communicated to you.

And direct your attention to the definition of the term "shuffle" that appears in this chapter.

A Okay.

Q And if you would read the def -- I'll read the definition into the record.

"Shuffle: Thus place 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."

Do you -- does -- does this definition imply to you that the items in a playlist are arranged in an order?

A Yes.

Q And if you turn to page 39, with respect to the definitions of "skip back" and "skip forward," if you could read them to yourself and then answer the question of whether these definitions are consistent with your understanding that items in a playlist are arranged in an order.

(Deponent read document.)

A This implies that each item in the playlist, except possibly the beginning and the end, has an item before it and an item after it.

And pressing "skip back" or "skip forward" will move through the items in that way.

Q And --

A The word "order" doesn't appear here, but it does show that items in the

playlist are preceded by other items and
followed by other items.
Q Right.
On the last sentence, for
example, of the skip back paragraph states
"If you're at this first item in a playlist
and you select skip back, the last item in
the playlist will be played."
A Right, which implies that they're
actually treating the playlist as what a
computer scientist would call a circular
queue or a circular buffer. The end is
attached to the beginning.
Q But you would agree that skip back
and skip forward functions imply in their
descriptions that the items are set up in a
certain order?
That way, you would be able to
go, say, from Track 2 to Track 1 or from
Track 2 to Track 3?
A Yes.
Q All right.
Now, referring to paragraph 12
in your declaration, which is Exhibit 4, your
declaration for the '099 patent where you

discuss the term "playlist," do you agree
that none of the references to the Weel
patent that you rely upon are inconsistent
with the notion that a playlist is a list of
items arranged to be played in a sequence?
(Deponent read document.)
A Paragraph 12 of this declaration is
not so much addressed to the issue of being
played in a sequence as it addresses the
issue of whether or not a playlist must be
generated by a particular user.
So that was the question that
I was asked to address in this point of this
declaration.
So were I addressing the issue
of sequence in this paragraph as the primary
reason for writing this paragraph, I would
probably have cited different language from
the '099 patent.
Q Would you agree that a list of
media items that are arranged to be played in
a sequence can be generated automatically?
A With the potential that the
sequence might be unpleasant in actuality,
yes.

Q Would you agree that a list of media items that are arranged to be played in a sequence can be generated by a user?
A I would agree that a user could generate such a list.
Q Are you aware of any reference in the context of your work with respect to the '099 patent and the '873 patent and the prior art that you've reviewed where such a reference used the term "playlist" inconsistently with the notion that a playlist is a list of items arranged to be played in a sequence?
A So to state it in another way, is what you're asking me that across all of the references that I have considered and the ones that I have cited in my various declarations, would I agree that the use of the term "playlist" where it appears in any of those references would be consistent with the definition you just gave?
Is that effectively what you asked me?
Q Would be consistent with the notion that a playlist is a list of items arranged

to be played on a sequence.

MR. YAP: Objection, outside scope.

A I would say at the very least it would be consistent with a list of items that could be played in a sequence, not that must be played in such a sequence.

Q But it would be -- would it be consistent with the meaning of the term "playlist" as it would be understood by one of ordinary skill in the art?

A Okay. That's a very different question, so maybe what we really want to ask is we seem to have two definitions of "playlist" at play here, if we -- don't want to use that term too many times.

One of them is the one that Yamaha and I adopt, and the other one is the one that Black Hills adopts.

And the main difference seems to be the phrase involving sequence in the two definitions.

And as I've expressed my opinion that one of ordinary skill in the art would understand playlist -- and this is really discussed more in the previous declaration that we just -- we were dealing with, which would have been Exhibit 3, and expressed my opinion that one of ordinary skill in the art would, in my opinion, understand the playlist just to be -- no, I'm sorry, not in the '873 declaration.

I'm actually thinking of one of the declarations we haven't yet dealt with today.

But it is my opinion that one of ordinary skill in the art would understand that a playlist is simply a list of media items from which a user may make selections, and that would be the broadest reasonable interpretation of playlist consistent with the specifications of these patents.

And my understanding is that Black Hills suggests a construction of "playlist" that includes the notion of playing in a particular sequence.

So you asked me do I think the use of "playlist" in these references is consistent with one of -- with what one of ordinary skill in the art would understand "playlist" to be, and I just want to make sure that we're in agreement which of those definitions is the one that I believe one of ordinary skill in the art would understand a playlist to be.

Q Are you finished?

A Yes.

Q Okay.

So let me clarify. So my original question was whether you've encountered out of all the art that you reviewed in connection with the work for Yamaha with respect to the '099, '873 and the other two patents on which you will be deposed tomorrow, whether you have encountered any prior art reference that used the term "playlist" inconsistent with the notion that a playlist is a list of items arranged to be played in a sequence.

MR. YAP: Objection. Outside the scope.

A I would say that it is consistent with the use of the word "playlist" -- and in some references it appears as two words, "play list," rather than one word, "playlist," so we'll equate those for purposes of this discussion.

It is at least consistent with the sense that a playlist is a list of media items; and by virtue of being a list, it can be played in a sequence.

Q Okay. Let's shift gears a little bit.

Now, we talked about your understanding of the concept of determining whether or not a patent is obvious in view of the prior art a little earlier today.

Do you have an understanding of how to determine whether a patent is anticipated by prior art?

A My understanding is that a patent is anticipated by a piece of prior art if each and every element of a given claim is present in a piece of prior art.

Q Anything else about that piece of prior art that needs to be present?

A Well, we're talking, first of all, about a specific piece of prior art. And presumably, it's a piece of prior art that would be understood to cover the same field

of practice.
Q Okay.
That's -- that's the entirety of your understanding.
A Well --
MR. YAP: Objection, calls for a legal conclusion.
A Right.
I am not representing myself as a legal expert, and I will also note that what I have been asked to do in each of these cases is that I am addressing obviousness rather than anticipation.
Q So in your declaration marked as Exhibit 4, you did not set out any opinion with -- let me take a step back.
First of all, have you reviewed the institution decision in the '099 case?
A Yes, I have.
Q I just would like to correct myself. In the -- let -- let me just strike that.
The question is, did you review the institution decision issued in

IPR2013-00597?
A Which, just to be clear, is the one that relates to the '099 patent?
Q Yes.
A Yes, I have.
Q In its entirety?
A I didn't spend a lot of time dealing with the section of who the parties are. I was really just dealing with the technical portions.
Q Okay.
But you are aware that the trial has been instituted on three grounds.
One ground is on anticipation in view of Bi. The other ground is in anticipation of Gladwin, and then the third ground is obviousness in view of Berman.
A I'd have to see the little chart at the end to make certain, but that's consistent with my recollection.
Q Okay.
And in your declaration, you did not set out any opinion on whether the '099 is anticipated by Gladwin, correct?
A Again, we're talking about the

declaration that's marked Exhibit 4; and in this declaration, I have been asked to do analysis of prior art.

Prior art that I analyzed here is the Berman reference and a combination of two Janik references.

I'll note that I did review the claim charts in Yamaha's petition.

Q Did you have any input into the claim charts in Yamaha's petition?

A I don't believe that I had significant input into what's in them, but I have reviewed them, and I have discussed them with Yamaha's counsel.

And to the degree that an expert opinion has any bearing on that side of the case, there's nothing in there that I disagree with, but that was not what I was asked to address in this declaration.

Q What were you asked to address in this declaration?

A So in this declaration, I was asked to address in the -- with respect to the '099 the term "playlist," but more particularly whether or not a playlist needs to be generated by a particular user.

Second, I was asked to address the claim term "remote source" that appears in the independent claims of the '099 patent.

Third, I was asked to address whether the Berman reference discloses the replication of the graphical user interface of the media player on a remote control device, and also whether one of ordinary skill in the art will understand that the remote control device of Berman could be a wireless remote control.

I was further asked whether one of ordinary skill in the art would combine elements from the Janik 558 reference with the Janik 902 reference, and that was all that I was asked to address with respect to the '099 patent in this declaration, and that's all that I provide here.

Q And so just to confirm, you were not asked to opine on whether Gladwin anticipates the '099 patent?

A I was --

MR. YAP: Objection, asked and answered.

A I was not asked to address that in this declaration.

Q And you were not asked to address whether Bi anticipates the '099?

MR. YAP: Same objection.

A Same answer. I was not asked to address that in this declaration.

Q Do you have an opinion on whether Bi anticipates the '099 patent?

MR. YAP: Objection, outside the scope.

A Well, I was not specifically asked to address that.

As I said, I did review the claim charts that include those references, and I find -- the claim charts from Yamaha's petition, and I find nothing to disagree with the identification of elements in those references that disclose elements in the '099 claims.

Q But you have no opinion on whether or not the '099 patent is anticipated by Bi?

MR. YAP: Objection, asked and answered.

A Well, I haven't been asked to

provide such an opinion.
Q Okay.
(Exhibit 9 marked for identification.)
BY MS. GLADSTEIN:
Q I'm handing you what has been marked as Exhibit 9. It is a document US Patent 6,502,194 to Russell Todd Berman and others.
Have you seen this document before?
A Yes.
Q When was the last time you saw the document?
A Yesterday, I believe.
Q Is the remote control disclosed in Berman an infrared remote control?
(Deponent read document.)
A Well, it is disclosed that -- and this is in column 5 starting at line 46, The playback unit may include -- may also include a sensor such as an infrared sensor 206 for receiving command signals from a remote control unit.
So one possible means of

communication described in the specification is infrared.

Q Take a step back.

What is the remote control in Berman?

(Deponent read document.)

A The remote control in Berman is discussed in a variety of different places; but most notably in column 13 starting at line 60, it talks about how the -- how the audio playing device has a graphical user interface.

And this says that the graphical user interface may be replicated on a remote control device, as indicated in Figure 13.

So whatever the graphical user interface is on playback device, it is replicated or can be replicated on the remote control.

Q Okay.

So my question initially was, is the remote control an IR remote control in Berman?

And correct me if I'm wrong,

but what I heard your answer is that the
playback unit has an IR interface?
A The playback unit has some kind of
sensor for exchanging -- in that case
receiving information. That's what 206 is
from the remote control, and an example given
is IR.
A And IR can be one-directional or
bidirectional. They're well-known
bidirectional IR communication methods.
Q Does Berman disclose any other type
of interface than infrared?
A Well, it discloses other
communication interfaces, but the only one
that it discloses between the remote control
and the playback unit is infrared.
Q And where were you looking to with
respect to other?
A So this is in column 5 starting at
line 11. It says, 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.

And then it lists a number of different communication schemes with which the network interface can communicate with the Internet.

Q Now, this is with respect to the playback unit, but with respect to the remote control, only an infrared sensor is described?

A Well, the infrared sensor is described as being part of the playback unit. It implies that there's an infrared transmitter that's part of the remote control that would talk to that sensor.

And elsewhere, because it describes replicating the graphical user interface of the playback unit on the remote control, that implies that there might be a bidirectional data path, which is also supported by several of the diagrams.

For example, Figure 13, paths 9 and 6.

Q How does an infrared remote control operate?

A It depends on whether it's not a monodirectional or bidirectional.
If it's one-directional, then the transmitter has an infrared LED. The receiver has a photodiode or phototransistor, and there's some agreed-upon sequence of pulses that correspond to each command or correspond to bits in a data packet.
If it's bidirectional, then each element has both a transmitter and a receiver.
Q With respect to the remote, does, does -- strike that.
With respect to the remote, Berman describes only an IR receiver on the playback unit; isn't that right?
A It describes only a sensor receiver on the playback unit, although it describes operations that would necessitate a transmitter on the playback unit and the receiver on the remote, which are not illustrated.
Q Is there a more detailed description of the infrared sensor in Berman other than at column 5, lines 46 through 47?

(Deponent read document.)
A Apart from the element in Figure 2 indicating the sensor, I think that's the only other appearance I see right now.
Q So Berman does not disclose an IR transmitter anywhere?
MR. YAP: Objection, asked and answered.
A Well, it discloses that the remote control unit sends command signals to the sensor, and that's in column 5, lines 48 and 49.
And in order to send signals to the sensor, it must have a transmitter.
Q So the playback unit has a sensor, an infrared sensor for receiving command signals from a remote control unit, so the playback unit would have a receiver and the remote control would have a transmitter?
A At least, but that would not be consistent with the bidirectional data path that's needed to replicate the graphical user interface, and that's why I said "at least," because in an embodiment where the graphical suer interface of a playback unit is

replicated on the remote control, it would be necessary for data to go from the playback unit to the remote control as well.

Q Okay.

So what types of remote control were known in 2004?

A Infrared, RF, ultrasonic. That would be the primary ones used in consumer electronics. And ultrasonic was well on its way out by then.

Q What about RF?

A RF was certainly known at the time.

Q Was it widely used?

A And we're saying as of which year?

Q 2004.

A 2004.

Well, we've already had an example from 2000, which was the Erekson reference we talked about this morning as Exhibit 8, and so that disclosed in 2000 that Bluetooth could be used for remote control.

Q How does a wireless remote control operate?

A A wireless remote control typically will have a transmitter and a receiver at both ends of the communication channel.

If it's one directional, then it will just have a transmitter at one end and a receiver at the other.

There's an agreed-upon transmission protocol by which data are encoded in the RF signal, and then issuing a command at the remote control transmits an RF signal with that agreed-upon protocol to the receiver.

The receiver receives it, interprets it, and takes the appropriate action.

Q So in terms of having a transceiver and a receiver, a wireless remote control is identical to an IR remote control?

A Well, if you ask the physicist, the physicist would say it's exactly the same except for the wavelengths. It's all electromagnetic radiation when you step far enough back.

But for our purposes, you know, the IR has a source of infrared radiation which sends data and an electronic device that's sensitive to that infrared

radiation that receives it.
The wireless has a transmitting antenna and a receiving antenna.
Q In 2004, would a person of ordinary skill in the art understand that an IR remote is not the same as a wireless remote?
A Well, one of ordinary skill in the art would understand they use different electromagnetic wavelengths.
Q So that means they would understand that they are different remotes?
A Well, they can --
Q Different types of remotes.
A They send the same -- potentially send the same information but using different kinds of electromagnetic radiation.
Q In Berman, does the playback unit send any information to the remote control?
(Deponent read document.)
A Well, in order to replicate the graphical user interface of the playback unit on the remote control, that would imply that the information that's displayed on the graphical user interface of the playback unit has to be transmitted to the remote control

unit so it can display it as well.
Q Could you use Berman's remote control to operate the playback unit from another room?
A If it's using infrared, only if you bounce the light off the half-open door between the two rooms. Some of us do that on a regular basis because we're too lazy to get up.
Q Okay.
This goes back to the IR and RF remotes. Does an infrared channel behave the same as a radiofrequency channel with respect to occlusion of the transmitter and receiver?
A Depends on the wavelength. So higher frequencies are line of sight in RF in the same way that they are in -- as they are in infrared?
So once we get up into the gigahertz range, we have pretty much the same problem.
Q Practically speaking, you couldn't use Berman's remote control to operate the playback unit from another room?

A Well, let's say through a wall, through a solid wall.
If we are restricting Berman to using infrared, then you couldn't do it through a wall.
Q Okay.
Could Berman's remote control directly access a server without the playback unit?
A Berman doesn't give an example of operating that way.
Q Would one of skill in the art reading Berman understand Berman's remote control to be able to directly access a server without the playback unit?
A Could you read that question back, whichever of you?
Q Would one of skill in the art reading Berman understand Berman's remote control to be able to directly access a server without the playback unit?
MR. YAP: Objection, outside the scope.
A I think one of ordinary skill in the art would understand that this remote

control would need to communicate through the playback unit.

Q Could Berman's remote control directly access Internet without the playback unit?

MR. YAP: Same objection.

A As disclosed here, I don't think it could.

Q And what would Berman's remote control need to have in order to access a server or the Internet directly?

MR. YAP: Objection, outside the scope.

A It would probably need, for example, the network interface as illustrated in Figure 14.

Q And that network interface is present on the playback unit?

A Correct.

Q Would it need a microprocessor?

Would the remote control need a microprocessor in order to be able to access the Internet?

A To the extent that we're taught that the remote control replicates the graphical user interface on the playback unit, I think one of ordinary skill in the art would understand that it would already have a microprocessor, as disclosed here.

Q What about a memory?

A It would need to have enough memory to store the information associated with the graphical user interface and also to store the program being executed by the microprocessor as part of the function.

Q Does Berman explain how to replicate the graphical user on the remote control?

A Not in detail.

Q What would a person of ordinary skill in the art understand with respect to how to replicate the graphical user interface on the remote control device?

A Well, one of ordinary skill in the art would understand that the playback unit has the necessary hardware and software to replicate -- to create the graphical user interface.

One of ordinary skill in the art would understand that there would have to be communication means by which whatever was displayed on the graphical user interface of the playback unit was duplicated on the display of the remote control and would also understand that whatever user input that was given by the user to the remote control would be sent to the same -- would be transmitted back to the playback unit and go to the same software functions that evaluate the user input if it were given directly on the graphical user interface of the playback system.

So it would be a relatively simple process, because the two things would be synchronized.

Q Where does Berman disclose that the remote control has a microprocessor or memory?

A One of ordinary skill in the art would understand that in order to have a display, it has to have sufficient memory to hold at least the contents of the display.

One of ordinary skill in the art would understand that in order to be able to evaluate the user input and transmit that to the playback unit and then update its display, it would need to have a microprocessor to execute the software or firmware associated with those functions.

Q But Berman nowhere in the specification or the claims or the abstract discloses those components?

A No, Berman does not give hardware architecture for the remote control.

Q Can the -- can the remote replicate the graphical user interface without having its own microprocessor but relying on the playback unit's processor?

A It could be done very inefficiently, but it could be done. That would involve having the remote control basically be a video display that would be -- just wirelessly transmit the video signal associated with the graphical user interface backup to the remote control as if it were a TV signal, display that, and then have some dedicated hardware that evaluated the user inputs and sent it back.

That would probably be significantly more expensive and less

responsive than doing it with a
microprocessor.
Q Would a person of ordinary skill in
the art endeavor to do that?
A I think one of ordinary skill in
the art would understand that given how
inexpensive the microprocessor would be that
one would need for this functionality, it
would be much better just to use a very, very
cheap microprocessor to solve the problem.
Q You mentioned that the remote
control of Berman would need to have a
network interface in order to be able to
communicate with a server or an intranet,
correct?
A Yes.
Q The remote control that is
described in Berman, does it have a Bluetooth
or Wi-Fi transceiver?
MR. YAP: Objection, asked and
answered.
A That specific means of
communication is not described in Berman.
Q Only the IR means as described --
A The IR means is given as an example

of the kind of communication that could
happen.
Q Is the remote control of Berman
able to be discovered by another device or
paired with another device?
A I guess the question is could it
talk to a different playback unit or could it
talk to something else running similar
software to what its original playback unit
was running.
Q Let's start with that question.
A Okay.
We aren't given a lot of
detail about device IDs and things like that,
but my sense is that this remote control
could talk to multiple devices.
Q To multiple devices that run the
same software as the playback unit itself?
A Or if not run the same software, at
least use the communication protocol that
whoever is building the system had
established as the means of communication
between the remote control and the playback
unit.
So the -- it could talk to a

very different kind of device as long as that device spoke the same language.

Q But the only communications means disclosed in Berman is the infrared communications?

MR. YAP: Objection, asked and answered.

A That's correct.

Q So in view of the infrared communications, the range of devices with which the remote control could communicate would be quite limited?

A Not necessarily. And I'd give several examples, one of them being that at the time universal remote controls were well known, which would be a single infrared remote control that can talk to multiple devices.

The other thing that was well known were bidirectional infrared communication standards, like IRDA, which at the time I believe Apple laptops and a number of other commercial products incorporated IRDA as a digital infrared communications link.

Q Now, where does Berman describe connecting to multiple playback units by a remote control?

A It doesn't. You asked me whether in my opinion one of ordinary skill in the art would understand that it could, and you have my response on the record to that.

So the disclosure doesn't explicitly say it could, but if the multiple units were able to speak to the remote control, it could communicate with more than one playback unit or even with other things that weren't playback units.

And additionally, given the architecture that's laid out here, if the remote control spoke to the playback unit, the playback unit then communicated with a server on the Internet, that server on the Internet could then use the Internet connection to a different playback unit.

So we could communicate directly to one playback unit but command another one by means of the Internet.

The architecture laid out here would support that.

Q Are you aware of the use of IRDA in 2004 timeframe in remote controls?

A Certainly used by inexpensive devices to talk to one another.

I'm not sure whether remote controls generally used it, but it was used for exchange of information among a variety of inexpensive devices because it was much cheaper than wireless.

Q In 2004?

A Yes.

Q What types of inexpensive devices were utilizing IRDA?

A There were various computer peripherals, I believe, that were able to communicate using IRDA.

Q Any other types of devices?

A I believe there were just modules that were available for incorporation into various devices so that one could easily design it into a multiplicity of things.

But right at the moment, I haven't looked back into what was available of that sort ten years ago.

Q Were cellphones using IRDA?

A I don't know if cellphones were. I think there were PDAs that did.
Q There were PDAs?
A I believe there were PDAs that were able to talk IRDA or pocket PCs.
Anyway, handheld computing devices of one sort or another.
Q If -- hypothetical situation.
If you take your Berman remote control and you come over to my house where I also have a Berman system, what content would you be able to play on my Berman system with your Berman remote control?
MR. YAP: Objection, incomplete hypothetical.
A Again, this calls for a certain degree of speculation, because this is referring to a situation that Berman doesn't describe.
But to the degree that I understand the architecture and the data interchange of Berman, if I go to your house, your playback unit knows your user ID. And so whatever material you were authorized to receive I would be able to control using the

remote control that I brought over.
Q So with the Berman system, you would only be able to play my content on my system?
With the Berman remote control at my house, you would only be able to play my content on my Berman system?
MR. YAP: Objection, mischaracterizes.
A Well, potentially I could configure your system to have my ID while I was there, in which case I'd be able to access my content on your playback unit.
But if I just walked in the door with my remote control and it synched with your playback unit, what I would see would be your media content.
Q Could you point me where in the specification Berman describes for the ID setup?
(Deponent read document.)
A So we find one example of this in column 13 starting at line 41, where it says, "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.

Q So the user identification information is optional?

A This doesn't say it's optional. Elsewhere it says it's optional because in some situations we can -- the inventor -- inventors understand that there could be a -- an embodiment in which every user was authorized for every piece of content.

And in that case it's unnecessary to check for authorization or to deal with billing.

In cases where it's necessary to check for authorization to deal with billing or to have things like personalized playlists, it would be necessary to have a way of entering the user information and of transmitting that from the playback unit to

the server.
Q Okay.
So how does the user in Berman select a song to be played on the Berman system?
A One example of this is given in the flowchart in Figure 3, which is described in the specification in column 6 starting at line 50 where it says, "Playback unit operating steps."
So the system is powered on, the user can enter some information if the user wants to constrain the kinds of content that are accessible.
The system verifies that its song list is up to date with respect to material available at the server by actually sending the song list back up to the server, and the server compares that with its current song list.
If the song list is not up to date, then the server provides a new song list to the playback unit.
That song list is displayed on the graphical user interface. The user uses

the graphical interface to select an artist and the song title, basically to select a media item, to use the terms you've been talking about.

That user selection is sent back up to the server. The server then provides a URL on the Internet where the actual content can be fetched.

Now, there are a number of variations on that theme, including having the playback unit actually download the first few seconds of each song on the list so that when the user selects a song, it can begin playing immediately with no delay.

And while the first few seconds are playing, the playback unit goes and gets the remainder of the song.

Q   Okay.

Let's -- let's take a closer look at Figure 3.

So after the system powers on, in Step 3 the user selects artist, or title or album or genre, et cetera.

The system sends the current song list version to DUL server. What is the current song list version?

Is that a song list or is that something else?

A No, I'm sorry, I may have -- I may have missed saying "version" when I was reciting the operation of this flowchart previously on the record, and what I meant to say is it sends the song list version back to the server.

So the communication protocol actually has an ID number associated with the song list for a particular user, and that's illustrated in Figure 6.

And so what it does is it sends the user ID and then the song list version. And then the server compares that song list version with the latest song list version number that might be associated with a server -- service or with just that user.

So that's akin to your figuring out if your phone is up to date by looking at the version number of the operating system rather than comparing byte by byte everything that's stored in the operating software.

If the version number that was transmitted does not match the latest version, then the latest version will be provided automatically.

So the user doesn't see any of this happening.

Q Would you agree that in Step 302, the user is doing some sort of browsing?

A The user might be said to be doing browsing or might be said just to be limiting the scope of the song list that's going to come back.

So the user might say I only want to listen to country music right now.

Q Okay.

And so it's -- so once the song list -- an updated song list is sent to the playback unit in Step 308 or Box 308, it's only after that point that the user is able to select an artist and song title?

A Right.

The user can select an artist, for example, immediately upon turning on the device, but the user can't necessarily select a particular song until it's verified that the song list is current.

As a practical matter, this probably occurs essentially instantaneously, because the song list isn't that big for something like this.

So it wouldn't take long to transmit it back down. It would need to be updated. And most of the time, it wouldn't need to be updated.

But yes, the answer is in Step 310, that's where the user can go through the song list and select a song.

Q Now, is the song list in Berman the same as a playlist?

Is what you get in Box 308 a playlist?

MR. YAP: Objection, compound.

A Well, my understanding of a playlist is that it's a list of media items from which items may be selected, and that -- this certainly agrees with my understanding of that term.

Q So when in Step 302 the user selects an artist, for example, and in step 304 -- 304 a current song list version is being sent to the DUL server and afterwards there is very -- a verification step of whether the song list is current, and if it is, only at that point in time can the user select an artist and song title, would you say that what is received from the DUL server is merely an updated song list and not the browse results?

(Deponent read document.)

A Well, I would say that until we reach Box 310, the user can't actually browse through the list and select a song, a specific song or multiple songs as described elsewhere in the spec.

Q To say that the record is clear, what information does the DUL send to the playback unit in Berman?

A The song list ultimately originates with the DUL. And if the song list that resides in the playback unit is current, then it doesn't send another one until there's a change in the song list.

So it's essentially giving a list of the available songs.

And as that gets updated, as

necessary, it supplies a new song list to the playback unit.

MR. YAP: Counsel, do you still have a lot more or -- we've been going on for about an hour and 40 minutes, and you probably only have about 20 minutes left, so --

MS. GLADSTEIN: Let me just ask two follow-up questions, and then we can take a break, and then I can regroup to see if there's anything more that we need to ask.

MR. YAP: Thank you.

BY MS. GLADSTEIN:

Q So a quick one with respect to the IRDA that we talked about earlier.

What is the operational range of the IRDA devices?

A I think that's typically within a room, a few meters.

Q A few meters?

A At most. I mean, it depends on a lot of things, like how powerful an LED one uses and how big the lens is on the receiver and things like that.

Q So in practical terms, the

application of IRDA technology in a remote
control is not attractive?
A Well, I would say it is limited to
using the remote control within a certain
proximity of the things to be controlled.
People have built IR
repeaters. And in fact those have been
around for probably 20 years at this point,
so that one can actually extend the range of
IR remote controls across multiple rooms in
the house, so that's a way to get around that
limitation.
Q Okay.
I just wanted to follow up on
the Berman and the user ID aspect.
So we talked earlier about
there being a user ID associated with the
playback unit.
Do you recall that?
A Well, what I'm really saying is
that a user provides user information to a
playback unit, and that's the information
that the playback unit transmits to the
server.
And apparently one can change

which user is associated with a playback
unit.
     Q   Is the user ID also associated with
the remote in Berman?
               (Deponent read document.)
     A   Well, the user ID could be entered
on the remote control as well as being
entered directly on the playback unit,
because the two share a graphical user
interface.
               And we're told in column 13
that the information can be entered manually
through the user display interface.
               Now, whether -- what the
implications of that are to how long does the
remote control remember it and what does it
do with it, the Berman patent is silent on
that point.
     Q   So you're not able to say one way
or the other whether a user ID is associated
with the remote?
               MR. YAP: Objection,
mischaracterizes.
     A   Well, what I can say is that it can
be entered on the remote, but I don't know

whether the remote's communication with the playback unit or with anything else beyond the playback unit involves the user ID.

Q If I were to carry the Berman remote to a different playback unit, not my playback unit, somebody else's Berman playback unit, I would be required to enter the user ID at the new playback unit?

MR. YAP: Objection, incomplete hypothetical.

A You might or might not. And we had this discussion a few moments ago where I said it might simply replicate whatever was on the graphical user interface of that playback unit, in which case if your ID had previously been entered into that playback unit or somebody else's ID had previously been entered into that playback unit, that playback unit would simply use that ID but would now allow you to use that remote control.

Berman doesn't say whether or not there's a specific pairing of user ID with remote control and with playback unit such that the playback unit and the remote control both have to have the same user ID to work together.

It just doesn't tell us that.

Q What would a person of ordinary skill in the art think about that?

A I think one of --

MR. YAP: Objection, form.

A I'm sorry. I think one of ordinary skill in the art reading the specification would say that the most likely case is just that the remote control is a replication of the graphical user interface on the playback unit.

And so whatever is -- whatever interactions are happening on one are happening on the other.

MS. GLADSTEIN: Okay.

Why don't we take a short break.

THE VIDEOGRAPHER: The time is 6:47 p.m. We are going off the record. This is the end of Disk 4 in the deposition of V. Michael Bove, Jr.

(Recess.)

THE VIDEOGRAPHER: This is

Disk No. 5 in the deposition of V. Michael Bove, Jr.

We are back on the record. The time is 7:05 p.m.

BY MS. GLADSTEIN:

Q Dr. Bove, in connection with Exhibit 9 that's the Berman patent, I'm looking at Figure 3, but you're welcome to look at Figure 3 and anything else.

Is it -- what is your understanding of whether or not the updated song list that is sent from the DUL to the playback unit intended to be played in an order in which the song list is arranged when it is -- when the DUL sends it to the playback unit?

(Deponent read document.)

A So are you asking simply can a user select more than one song or are you asking does the user begin playing at a given point and the song plays in sequence?

Q The latter.

A Given that the remote control and the graphical user interface on the playback unit implement a skip forward button, one would generally understand that the skip forward button is essentially just saying don't wait until the end of this song to play the next one. Go there now.

So we are told that there is a skip track or a skip forward button as part of the user interface, so that suggests, just as with the Windows Media Player reference we discussed earlier today, that the songs are in an order and can be played in that order.

I'll also note that there's discussion in column 9 that talks about playing in a random order as well as the user can record a program of track selections for playback in the programmed order.

This is in column 9 starting at about line 10.

Q Is the updated song list in Berman more than what the user specifically has asked for, seen in Step 302 when the user selects artist, title?

MR. YAP: Objection, outside the scope.

A That's not entirely clear from the description in column 6 and 7.

Q How would a person of ordinary skill in the art reading the section of the playback unit operating step that begins at the bottom of column 6 over to column 7 understand whether the user gets more than what he has asked for in the song list?

A Well, as I said, it's my opinion -- and I think one of ordinary skill in the art would see the same thing, that it's not entirely clear from this description what the scope is of what's on the song list that comes back.

It is a list of available songs, and the user apparently can confine the query to specific categories. And there's a discussion of that at the top of column 7, but it does not give a detailed walk-through of exactly what the user does or what comes back in response to that query.

Q So say if a user asks for a specific artist, would the update be of everything on the user's list or just those entries that correspond to the artist?

(Deponent read document.)

A Well, I suspect that if the user

put in a search saying give me only songs by a specific artist, what would end up being displayed would be only songs by that artist. That's the whole point of having that step.

But if one did something very general, if one entered the musical genre hip hop, then one could potentially get hundreds of thousands of songs in response to that.

Q Is that how a person of ordinary skill in the art would understand the operation of the playback unit?

A Well, what this says is that the user selects music category or type of song desired for playback from a list, which can include categories such as artist, song, title, album and musical genres.

It may through other things, and it might even be the case that it's possible to select none of them, in which case one gets everything available, although this doesn't say that in so many words.

But ultimately, the reason for doing that is so that every time one turns on the device, one doesn't get 50,000 songs that one might not want.

Elsewhere in the specification, there's information about personalization for a particular user, and so presumably, there is a mechanism by which a user can create a specific song list using the graphical user interface.

Q So, Dr. Bove, what is your understanding of what is the updated list that DUL sends to the playback unit?

MR. YAP: Objection, outside the scope.

A Well, it can -- ultimately it contains a list of songs that are available. It includes information which might not be displayed as such about where to access those songs by means of URLs.

It includes information about song name, artist, title, all that sort of -- album title, whatever, and it may be bounded by the user having circumscribed the scope of it.

Now, there also is a description of personalization features, and so it may be a user's personal song list further circumscribed by the fact that this

morning I feel like listening to jazz.
(Exhibit 12 marked for identification.)
BY MS. GLADSTEIN:
Q Okay.
I'm handing you what has been marked as Exhibit 12.
This is a US Patent Application No. 2003/0045955 to Craig Janik.

I also refer you to Exhibit 3, which is your declaration on the '873 patent, and particularly page 13, Section G, titled "Bi in combination with Erekson and Janik 955."
Would it be fair to say that you are relying on the shuffle playback feature disclosed in Janik 955, Exhibit 12.
In paragraph 99 of Exhibit 2, you're relying on the shuffle playback feature as the only feature of Janik that in combination with Bi and Erekson renders -- strike that.
Would it be fair to say that the only aspect of Exhibit 12 that you're

relying on is the shuffling playback feature disclosed at paragraph 99?

A That is the only element of Janik 955 that I'm relying on in this declaration for that particular Item G, yes.

Q And this is in connection with your opinion that it would have been obvious to one of skill in the art to add a shuffle feature to the combination of Bi and Erekson?

A This and also just one of ordinary skill in the art knowing that shuffle was a common feature in other audio-playing systems, yes.

Q And did you conduct prior art search to arrive at the combination of Bi and Erekson and Janik?

MR. YAP: Objection, work product.

MS. GLADSTEIN: No, it's not.

MR. YAP: Under the federal rules --

MS. GLADSTEIN: I am asking whether the expert has conducted a prior art search. I'm entitled to know whether the expert has conducted a prior art search.

It's a yes or no answer.
MR. YAP: That's fine.
BY MS. GLADSTEIN:
Q Did you conduct a prior art search to arrive at the combination of Bi, Erekson and Janik?
A I believe we've already had a discussion of Bi and Erekson, and so in this particular case, let me -- so that would be Item E up above.
So all I'm doing here is I'm saying one element that that is -- that does not explicitly appear in the population of Bi and Erekson is playing back in a random order.
Inasmuch as the Janik 955 reference was already a reference in the general pool of references that were being discussed in this case, I spotted that there was random play in this reference and decided that was as good as any for demonstrating that.
Q Okay.
So you did not conduct your own independent prior art search to arrive at

a combination of Bi, Erekson and Janik 99 -- 955?

MR. YAP: Same objection.

A Well, what I did, we already discussed how I arrived at Bi and Erekson, and for claims that require random playback, I used this reference.

Q Did you conduct any prior art search in connection with your work on the '873 and the '099 patents?

A Yes.

Q And what type of prior art search did you conduct?

A I reviewed a variety of potential references, some of which may have landed in one or another of these declarations, and others of which I am not using.

But looking for combinations of references to deal with obviousness on claim elements that were not present in a single reference.

Q Where did you get the references that you reviewed from?

MR. YAP: Counsel, your time's up.

MS. GLADSTEIN: There's a question pending.

MR. YAP: Object. Work product.

MS. GLADSTEIN: The source of the references is not work product.

I'm entitled to know whether the expert obtained the references via his own efforts or whether the expert obtained the references that were provided to him by counsel.

That's not work product.

MR. YAP: Why don't you just ask it.

MS. GLADSTEIN: I have.

A I'll answer in this way:

There was a prior art search that was instituted by counsel. At about the same time, let's say late last summer, I did my own prior art search, and indeed it turned out that some of the same references that turned up in their search turned up in mine, so it's difficult to say where they came from.

In some cases, I used their

references, and in some cases I may have provided references to them that I had found that I thought were interesting.

At this point in time, I don't think I could ultimately reconstruct why any individual reference or the means by which any individual reference landed in my declaration or in their petition.

Q Okay. Thank you, Dr. Bove.

Would you like to take a break or would you like to continue?

MR. FEHRMAN: I think we can just go on.

THE DEPONENT: It's fine with me if we just wrap this up.

MR. FEHRMAN: Just another couple of hours.

THE DEPONENT: Sure.

EXAMINATION

BY MR. FEHRMAN:

Q Dr. Bove, I have just a couple of questions, we'll start with '099, which is pretty much where we were leaving off here.

So you had a lot of discussion

with counsel regarding the construction of playlist.

And as I recall, you were indicating that you had proposed a construction of a playlist that is a list of media items from which one or more selections may be made by a user and that the patent owner had proposed a construction that a playlist is a list referencing media items arranged to be played in a sequence?

A Yes.

Q And you reviewed the decision by the board to implement the IPR or '099?

A I did.

Q And you understand that they actually adopted yet a different construction?

A Yes.

Q And their construction, which is on page 9 of the decision, is simply a list of media selections --

I'm reading it from that.

A Yes, that is my recollection.

MS. GLADSTEIN: Counsel, hang on a second.

MR. FEHRMAN: Can you make that an exhibit?

MS. GLADSTEIN: Why don't you mark it as an exhibit so that Dr. Bove can follow, Exhibit 13.

MR. FEHRMAN: Thirteen. Thank you.

(Exhibit 13 marked for identification.)

BY MR. FEHRMAN:

Q So if you look at page 9 of Exhibit 13, the first paragraph --

A Yes.

Q -- can you review that quickly?

(Deponent read document.)

A Okay.

Q So you see that the board references column 1, lines 33 to 34 of the '099?

A Yes.

Q You have that in front of you as well now.

A I see that, yes.

Q Okay.

A This is in the background Section

of the '099 patent?
Q Right.
It states there that "A playlist is a list of user's favorite selections."
A Yes.
Q Just the simple statement.
And you're aware, aren't you, that the -- in an IPR proceeding, the construction that is to be employed is the broadest reasonable construction consistent with specification?
A IPRs are somewhat new to me, as perhaps to all of us, but I have been so information.
Q So do you believe that the board's construction is consistent with the broadest reasonable construction consistent with the specification?
A Yes, I believe that's a consistent construction.
Q Okay.
And there may be other reasonable constructions, but that's the broadest construction, reasonable

construction that's consistent with the specification?
A It would be hard to make broader. It has so few words in it.
Q Okay.
If you look at Berman reference --
A Exhibit 9.
Q I'm trying to find.
So you have quite a bit of discussion regarding the disclosure in Berman, column 13, lines 60 to 64.
MS. GLADSTEIN: Objection. Mischaracterization.
Q So you discussed the disclosure at column 13, lines 60 to 64, and specifically the statement that the GUI may be replicated on a remote control device as indicated in Figure 13?
A Yes.
Q And looking at Figure 13, there is a disclosure of a playback dataflow from playback unit to the user display interface at the line 9 in Figure 13?
A Yes.

Q And if you look at column 14, lines 5 to 9, is that basically indicating that?

A Well, actually, I'd say in particular -- I'm sorry, you're talking about the dataflow from the playback unit to the graphical user interface?

Q Right.

A Right.

And that's indicated at lines 8 to 10 in column 14. It says, The dataflow from the playback unit to the user display interface is indicated by the Figure 13 dataflow arrow marked 9."

Q Okay.

So regarding the statement that the GUI may be replicated on a remote control device, do you think it would be -- would have been difficult for a person of ordinary skill in the art to do such implementation?

A Well --

MS. GLADSTEIN: Objection, leading.

A -- what I would -- what I believe one of ordinary skill in the art would understand is that there is a graphical user interface which is implemented as a piece of hardware, as well as some software, on the playback unit, and there is data that has to go from the -- let's say from the operating software of the playback unit to that display, and that is represented by the arrow marked 9.

And the same information has to go outside the box and go to the replicated display on the remote control, and I don't think that would be a particularly difficult thing to do.

The difference is that presumably inside the box, it goes over wires and presumably outside the box it needs to go over some non-wired interface, whether it's infrared or something else.

Q So given the functional statement that the GUI can be replicated, do you believe that one of ordinary skill in the art could implement such a replication without undue experimentation?

A I think it would be essentially off the shelf as of 2004.

Q Okay.
Let's go back to the '873 for a few minutes, the Bi and the Erekson references as well.
A Okay.
Q So if you first look at Bi, paragraph 29?
A Yes.
Q And you had discussed this earlier, the last sentence of that states that there is an IR transmitter in the navigator 260.
A In the IR -- right. There is an IR transmitter 265 in the navigator 260, yes.
Q Correct.
And you have some discussion of previously if you were in a different room or something, is an IR transmitter basically limited to line of sight?
A Unless it reflects off something, yes.
Q Okay.
So normal operations in the same room?
A Yes.
Q And with an open space?

A Yes.
Q So regarding Erekson, Erekson's disclosure is the use of a wireless link, such as Bluetooth, to control various devices; is that correct?
A That is correct.
Q So, for example, at column 4, lines 41 to 52?
A Right.
So this discusses Bluetooth as well as other standards, like 802.11, which we now know as Wi-Fi.
MS. GLADSTEIN: Objection.
Was there a question pending after you stated "so, for example, column 4, lines 41 to 52"?
MR. FEHRMAN: I'm sorry, I didn't phrase it as a question, but I asked him to confirm that it does disclose use of a wireless connection, such as Bluetooth, for its remote control.
A What I said is that it does disclose Bluetooth as well as other wireless standards.
Q And does it say a similar thing at

column 2, lines 22 to 24?

MS. GLADSTEIN: Objection, leading.

Q Will you look at column 2, lines 22 to 24.

A It says here, "In a preferred embodiment the transceiver and the remote devices are Bluetooth-enabled devices. So that's consistent with the language in column 4.

Q Is a Bluetooth device limited to line-of-sight applications?

A No.

Q And is that an advantage over an IR transmitter or IR remote?

A Yes.

Q So a Bluetooth type or 802.11 type of remote control would provide at least that advantage over an IR remote; is that correct?

A Well, in fact, this reference discusses that in column 1, where -- starting at line 45, it says, "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 a 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.
Q If you can look at column 2, line 58 also, 58 to 64.
A Right.
This, again, is discussing the fact that under Bluetooth, we were not limited to line-of-sight communication.
Q All right.
And the last sentence of that starts, "With a radio connection"?
A With a --
MS. GLADSTEIN: Is there a question, counsel?
MR. FEHRMAN: I'm asking him to make sure -- to read that statement.
A So this is another reinforcement of the same point where it just says "With a radio connection, the system of the present invention is not limited to line-of-sight applications."
MS. GLADSTEIN: And is there a

question --

MR. FEHRMAN: I'm following up with a question.

Q So would the use of an all-Bluetooth remote control for plural devices, such as disclosed in Erekson, provide a benefit over using a remote, such as that in Bi, that uses an IR transmitter?

A Particularly in the case where the devices were not all located in close proximity to one another, so that one would not have to point the remote control individually at the devices.

Q So would that benefit provide one reason to one of ordinary skill in the art to use the combination of features of Bi with those of Erekson?

MS. GLADSTEIN: Objection, leading.

A Well, one reading Bi would see the discussion of infrared, and then one reading Erekson would say whatever you can do with infrared you can do better with Bluetooth.

And inasmuch as they're both talking about controlling audio devices, it would make sense to one of ordinary skill in the art to follow the Erekson's suggestion to use Bluetooth.

Q Okay.

That's all the questions that I have.

MS. GLADSTEIN: Give us -- let's go off the record for just ten minutes and --

THE VIDEOGRAPHER: The time is 7:37 p.m. We are going off the record.

(Recess.)

THE VIDEOGRAPHER: We are back on the record. The time is 7:56 p.m.

BY MS. GLADSTEIN:

Q Dr. Bove, with respect to the standard for claim construction in the inter partes review proceedings, isn't it true that the broadest reason of all claim construction has to be consistent with the specification of the patent?

A I have been so informed.

Q Now, you referred to line 33, 34 in column 1 of the '099 that states a playlist is a list of a user's favorite selections.

A Sorry, this -- you're referring to in my declaration or in my testimony?
Q I'm referring -- I'm referring to Exhibit 6, but you have referred to it -- your counsel has referred to it just a few minutes ago as the -- the support and the specification for the claim construction proposed by the petitioner.
And I would like to direct your attention to the next sentence in column 1 at line 34 that states, "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."
Do you see that?
A I do.
But I would also like to note that it was actually the decision that referenced lines 33 and 34 in support of the board's construction.
I didn't reference that language in support of their construction. They cited it.
Q If -- if I may direct your

attention to your declaration, which is Exhibit 4, at paragraph 12 on page 5, you state "A discussion of playlists in the specification describes a playlist as, in quotes, a list of users' favorite selections"?

A Right.

But there I'm not discussing the board's construction, because the board's construction had not yet been made.

Q That is correct. I'm not saying that you are discussing the board's construction.

A I'm sorry, I thought when you first posed the question you said I had cited lines 33 and 34 in column 1 in support of the board's construction.

And what I'm saying is no, the board cites lines 33 and 34 in support of their construction.

Q That is correct, but you're referring to that sentence in support of your position on the construction of the term "playlist," and I would like to ask you the following:

Since we've agreed that the rule is that in the IPR proceedings the claims are to be construed -- are to be given their broadest reasonable interpretation in view of the specification, I am pointing your attention to the next sentence in the specification after the one that is quoted in your declaration and is also quoted in the board's decision on institution that says that the Windows Media Player -- and I'm paraphrasing -- offers the capability of a user to compile a playlist.

Now, isn't it true that when you compile a playlist using the Windows Media Player, you compile a list that contains items arranged in an order?

A Well, my recollection, and it's been a while since I used Windows Media Player -- I suppose we could spend some time going through the manual -- is that Windows Media Player essentially allows the user the ability to append items to the end of an existing playlist.

So the "add item to playlist" functionality in Windows Media Player, as I

recall, essentially just appends it to the end of the existing playlist.
I could spend some time going through that exhibit if we'd like to.
Q The Windows Media Player, I'll just represent for the record, also allows a user to create a brand-new playlist.
A Understood.
But what I'm saying is that the mechanism for doing it is to append items to a playlist.
So you could say the creation of a new one is taking what a computer scientist would call the null playlist and appending something to it, and then recoursing on that process.
(Counsel conferred.)
BY MS. GLADSTEIN:
Q Okay.
Dr. Bove, isn't it true that a playlist that the Windows Media Player makes has an order no matter how that list ultimately gets generated?
A Yes.
As we discussed earlier, it

being a list, contains items in an order.
Q If you look down in column 1 at lines 47 through 53, the paragraph that states, "Playlists also facilitate the playing of a plurality of selections in a particular order. That is, the playlist can 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."
A Is that a question?
Q Did you see that paragraph?
A Yes.
Q So in view of this paragraph, does this reinforce the notion that a playlist necessarily is a list of items arranged in an order?
A It is a list of items, and as we've been saying since 10:00 this morning, being a list, items on a list are in an order.
And I don't need to refer to this language to have that reinforced. That's a property of lists.

Q And you don't see anything in the specification of the '099 that would contradict the concept that items on a list are arranged in an order?

MR. YAP: Objection, mischaracterizes.

MS. GLADSTEIN: It's a question.

A I don't see anything in here that says one could have an un-ordered list.

Q Can I ask you a few questions with respect to Exhibit 7, which is the Bi reference?

I believe you testified on redirect that a person of ordinary skill in the art would replace the IR transmitter in Bi with a wireless transmitter; is that right?

A If one wanted to --

MR. YAP: Objection, mischaracterizes.

A I was going to say, if one wanted to overcome the limitations that we discussed --

Q Which --

A -- of IR, which include line of sight.

Q So to overcome a line-of-sight limitation, a person of ordinary skill in the art would replace the IR transmitter with a wireless transmitter?

A That would be one way to do it, yes.

But I'm not completely sure. Are we really talking about the Bi reference here or are we talking about some other reference? Because the navigator in the Bi reference is not restricted to IR.

Are we talking about the Berman reference, perhaps?

MR. YAP: Exhibit 9.

Q The declaration. Okay.

It's been a long day, and I think what we're -- what your counsel has asked you on redirect -- and correct me if I'm wrong, because it has been a very long day -- is that it would be obvious to a person of ordinary skill in the art to replace the remote of Bi with the remote of the Erekson because the remote of Erekson enhances the capability of a remote of Bi by virtue of it being a wireless remote as opposed to an IR remote.

Do you recall that?

MR. FEHRMAN: It's not a completely accurate characterization, but if you want to ask him that, that's fine.

MS. GLADSTEIN: But the question was posed with a disclaimer.

Q Correct me if I'm off on this characterization of the gist of the question and answer that was given on redirect.

(Deponent read document.)

A My understanding is that the reason for combining the remote control of Erekson with the system of Bi was not because of the communication method but because of the ability to control multiple devices using a single communication channel.

Q Is it your position that Bi is not capable of controlling multiple devices?

A As I say -- and again, we're talking about my declaration, Exhibit 3 of the '873, in paragraph 27, I say that -- I note "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."

So I was just saying that one could take the known technique from Erekson and use it in combination with the remainder of the system disclosed in Bi.

So Bi has a wireless control of one device. Erekson has wireless -- and I will say actually RF, to be more precise, it has an RF control of one device. Erekson has an RF control of multiple devices.

Both of them are in the same general domain in terms of the kinds of devices they're controlling.

And so that's why it's my opinion that it would be obvious for one of ordinary skill in the art to use the Erekson remote control in conjunction with the Bi system.

Q So how would you go about changing the navigator of Bi to a wireless system of Erekson?

A Well, the navigator of Bi is already wireless in terms of how it communicates with the computing platform.

And indeed we even learn from a reading of the specification -- let me just use the language in paragraph 20 of Bi. We learned that the wireless communication can be over Bluetooth. So the navigator already has a Bluetooth radio in it.

The only thing that we're doing to use Erekson with Bi is we are adding functionality to the display of Bi akin to the functionality of Erekson that allows it to select from multiple devices and direct the commands to the device of choice.

In so doing, we wouldn't need the infrared aspect of the navigator of Bi anymore, provided the controllable devices were equipped with Bluetooth or other RF controllability.

Q Let me -- let me ask you this:

Bi certainly discloses controlling of multiple devices, such as, you know, interaction with the platform -- of the computing platform as well as a stereo,

right?
So in 2004, what motivation would you have to employ the system of Erekson with the system of Bi except for hindsight?
A No.
What I'm actually saying is that the Bi reference does not explicitly disclose functionality on the display that allows the selection of multiple devices.
So there is no illustration in Bi that corresponds to Figure 7 of Erekson.
Q But why would you want to have that functional in Bi where Bi's navigator is capable of talking primarily to the computing platform and then also tell a stereo player to play a song as opposed to a system where the navigator can talk to the Internet or to a data server?
MR. YAP: Objection, asked and answered.
A Yes, I've already answered this question earlier.
One of the reasons is, as we've been discussing, the fact that the

infrared connection would be limited to line
of sight and the wireless wouldn't.
So that if we have the
computing platform of Bi sitting in a room
next to some other audio component that I
want to control, I can't control both things
unless I'm standing in front of them both.
Even though I could
communicate with the computing platform from
another room, I couldn't turn on the audio
amplifier from another room because that
interface would be infrared.
It would certainly be
advantageous to have the ability to have the
same conductivity range for all the devices
I'm controlling instead of having some of
them controllable only line of sight and
others controllable at a distance.
And indeed that's discussed in
Erekson as a reason for wanting to use
Bluetooth for everything.
Q Okay.
My question is, aside from the
benefit of a wireless transmitter being able
to transmit the signal farther than a few

feet or the line of sight, what other
motivation in 2004 a person of ordinary skill
in the art would have reading Bi to
incorporate Erekson into Bi?
MR. YAP: Objection, asked and
answered.
A One of our -- I think I've answered
it three times now, but I'll do it a fourth
time.
Q Aside --
A One reading --
Q -- from the elimination of the
line-of-sight limitation with respect to
controlling a stereo device.
MR. YAP: Asked and answered.
A Okay.
I think the other -- another
advantage would be simply unifying the
control, because Bi does not describe in the
specification or in the illustrations the
figures something like Figure 7 of Erekson,
which says you pick the device, you send a
command to it.
Now, that's not to say that Bi
doesn't potentially have that functionality,

but it's not called out explicitly in Bi. It is called out in Erekson.

Q So what would you need to change in the navigator 260 of Bi to incorporate the functionality of Erekson?

MR. YAP: Objection, asked and answered.

A I think one would have to potentially change the user interface to allow selection of multiple devices from some universe of visible devices.

And again, recall that with infrared remote control that's one way, the user can't see what devices are available for control, whereas with a system like Erekson, Erekson ascertains what devices may be controlled, because those are the devices that have responded to Bluetooth.

So it's able to adapt to whatever devices happen to be available at the time as opposed to saying we're going to hard-wire this to control the stereo using infrared and if you bring in a CD player, the remote control won't know about it.

With a Bluetooth control, the

remote control can discover that CD player as well.

Q In the system of Bi where the computing platform is communicating with the navigator and the navigator has the capability to send -- to request a stereo device to play a song, why would a person of ordinary skill in the art want to have the capability of selecting multiple other devices from a list of devices to play a song?

MR. YAP: Objection, asked and answered.

A I might, for example, want to direct the sound to come out of a different set of speakers.

Q So besides changes to the user interface, what else would need to be changed in Bi to incorporate the system of Erekson?

A Well, that would depend upon which of the several potential wireless communication protocols were used.

I think in the case of a Bluetooth, it would not be a matter of just having to establish conductivity between the navigator and the computing platform, so there might be some additional device discovery software.

Q Anything else?

A I think that would be the majority of what would need to be done.

The computing platform wouldn't have to change at all. It would all be changes to the navigator.

(Counsel conferred.)

Q Dr. Bove, thank you very much. I have nothing further.

A Thank you. Might I request given --

THE VIDEOGRAPHER: The time is 8:20 p.m. We're going off the record.

This is the end of Disk 5in the deposition of V. Michael Bove, Jr.

(Proceedings adjourned.)

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.

WITNESS: VICTOR MICHAEL BOVE, JR., Ph.D.

SIGNATURE PAGE/ERRATA SHEET

PAGE	LINE	CHANGE OR CORRECTION AND REASON
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I have read the transcript of my deposition taken on May 29, 2014. Except for any corrections or changes noted above, I hereby subscribe to the transcript as an accurate record of the statements made by me.

Signed under the pains and penalties of perjury.

Deponent: _________________________ ___/___/2014

VICTOR MICHAEL BOVE, JR., Ph.D.

CERTIFICATE OF NOTARY PUBLIC

Sworn and subscribed to before me this

_______ day of _______________, _________

______________________ ______________________

NOTARY PUBLIC MY COMMISSION EXPIRES

BHM Ex. 2002 (previously filed in IPR2013-00598 as Ex. 2012)

BHM Ex. 2002 (previously filed in IPR2013-00598 as Ex. 2012)

S

BHM Ex. 2002 (previously filed in IPR2013-00598 as Ex. 2012)

EXHIBIT 1

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

Case IPR2013-00598
Patent 8,214,873 B2

NOTICE OF DEPOSITION OF
V. MICHAEL BOVE, JR.

Mail Stop "PATENT BOARD"
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

EXHIBIT
tabbies
Bove 5/29/14
1

#25274786 v1

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, 19th 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 Media, LLC

Date: April 25, 2014
PEPPER HAMILTON LLP
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19th Floor – High Street Tower
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(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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Respectfully submitted,

/Lana Gladstein/

Lana Gladstein (Reg. No. 48,502)
Lead Attorney for Patent Owner Black Hills Media, LLC

Date: April 25, 2014

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EXHIBIT 2

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

Case IPR2013-00597
Patent 8,230,099 B2

NOTICE OF DEPOSITION OF
V. MICHAEL BOVE, JR.

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Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

EXHIBIT
Bove 5/29/14
2

#25275842 v1

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, 19th 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,

/Reza Mollaaghababa/

Reza Mollaaghababa (Reg. No. 43,810)
Lead Attorney for Patent Owner Black Hills Media, LLC

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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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Respectfully submitted,

/Reza Mollaaghababa/

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EXHIBIT 3

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.

EXHIBIT
tabbies
Bove 5/29/14
3

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 Erekson And The P800

29. I have additionally been asked to address the further combination of Bi and Erekson 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 Erekson.

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 Erekson 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 Erekson. 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 Erekson 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.

V. Michael Bove, Jr.

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^2 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

Effie 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 Communications, 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.

[0] 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.

[0] 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.

[0] 10. J. A. Watlington and V. M. Bove, Jr., "Stream-Based Computing and Future Television," *SMPTE Journal, 106,* April 1997, pp. 217-224.

[0] 11. J. A. Watlington and V. M. Bove, Jr., "A System for Parallel Media Processing," *Parallel Computing, 23:12* December 1997, pp. 1793-1809.

[0] 12. S. Agamanolis and V. M. Bove, Jr., "Multilevel Scripting for Responsive Multimedia," *IEEE Multimedia, 4:4* October-December 1997, pp. 40-50.

[0] 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

---

[0]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.

[0] 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.

[0] 16. S. Agamanolis and V. M. Bove, Jr., "Viper: a Framework for Responsive Television," *IEEE Multimedia, 10:3*, July-Sept. 2003, pp. 88-98.

[0] 17. V. M. Bove, Jr. and Wilfrido Sierra, "Personal Projection," *SMPTE Motion Imaging Journal, 113*, Jan. 2004, pp. 17-21.

[0] 18. V. M. Bove, Jr. and J. Mallett, "Collaborative Knowledge Building by Smart Sensors," *BT Technology Journal, 22:4*, Oct. 2004, pp. 45-51.

[0] 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.

[0] 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.

[0] 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

[0] 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 Refereed Conference 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, "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.

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.

[0] 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.

[0] Outgrowths of supervised theses or research projects.

[0] 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.

[0] 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.

[0] 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.

[0] 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.

[0] 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.

[0] 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.

[0] 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..

[0] 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.

[0] 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.

[0] 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.

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.

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.

[0]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.

[0]41. W. Butera, V. M. Bove, Jr. and J. McBride, "Extremely Distributed Media Processing," *Proc. SPIE Media Processors*, v. 4674, 2002, pp. 37-41.

[0]42. V. M. Bove, Jr. and W. Sierra, "Personal Projection," *Proc. SMPTE 144th Technical Conference*, 2002.

[0]43. D. Butler, S. Sridharan, and V. M. Bove, Jr., "Real-Time Adaptive Video Segmentation," *Proc. ICASSP 2003*, 2003.

[0]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.

[0]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.

[0]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.

[0]49. 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.

[0]50. 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.

[0]51. B. C. Dalton and V. M. Bove, Jr., "Audio-Based Self-Localization for Ubiquitous Sensor Networks," *Proc. 118th Audio Engineering Society Convention*, 2005.

[0]52. 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.

[0]53. 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.

[0]54. 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.

[0]55. 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.

[0]56. J. J. Kalanithi and V. M. Bove, Jr., "Connectibles: Tangible Social Networks," *Proc. 2nd Intl. Conf. on Tangible and Embedded Interaction (TEI'08)*, 2008.

[0]56. 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.

[0]57. B. T. Taylor and V. M. Bove, Jr., "Graspables: Grasp-Recognition as a User Interface," *Proc. ACM CHI*, 2009.

[0]58. 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.

[0]59. A. L. Santos and V. M. Bove, Jr., "uCom: Spatial Displays for Visual Awareness of Remote Locations," *Proc. ACM CHI 2010*, 2010.

[0]60. 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.

61. 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.

[0]62. 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.

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.

[0]64. E. Portocarrero, D. Cranor, and V. M. Bove, Jr., "Pillow-Talk: Seamless Interface for Dream Priming Recalling and Playback," *Proc. TEI '11*, 2011.

[0]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.

[0]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.

[0]67. 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.

[0]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.

[0]69. J. Barabas and V. M. Bove, Jr., "Visual Perception and Holographic Displays," *J. Phys.: Conf. Ser. 415*, 012056, 2013.

[0]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.

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*

[0]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 Televsion, 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, Tyeler, *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.

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.

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

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

Inter Partes Review No. ______

DECLARATION OF V. MICHAEL BOVE, JR.

EXHIBIT
Bove 5-29-14
4

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^2 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

Effie 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 Communications, 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.

[0] 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.

[0] 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.

[0] 10. J. A. Watlington and V. M. Bove, Jr., "Stream-Based Computing and Future Television," *SMPTE Journal, 106,* April 1997, pp. 217-224.

[0] 11. J. A. Watlington and V. M. Bove, Jr., "A System for Parallel Media Processing," *Parallel Computing, 23:12* December 1997, pp. 1793-1809.

[0] 12. S. Agamanolis and V. M. Bove, Jr., "Multilevel Scripting for Responsive Multimedia," *IEEE Multimedia, 4:4* October-December 1997, pp. 40-50.

[0] 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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[0]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.

0 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.

0 16. S. Agamanolis and V. M. Bove, Jr., "Viper: a Framework for Responsive Television," *IEEE Multimedia, 10:3*, July-Sept. 2003, pp. 88-98.

0 17. V. M. Bove, Jr. and Wilfrido Sierra, "Personal Projection," *SMPTE Motion Imaging Journal, 113*, Jan. 2004, pp. 17-21.

0 18. V. M. Bove, Jr. and J. Mallett, "Collaborative Knowledge Building by Smart Sensors," *BT Technology Journal, 22:4*, Oct. 2004, pp. 45-51.

0 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.

0 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.

0 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

0 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 Refereed Conference 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, "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.

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.

[0] 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.

[0]Outgrowths of supervised theses or research projects.

[0] 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.

[0] 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.

[0] 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.

[0] 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.

[0] 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.

[0] 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.

[0] 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..

[0] 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.

[0] 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.

[0] 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.

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.

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.

[0]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.

[0]41. W. Butera, V. M. Bove, Jr. and J. McBride, "Extremely Distributed Media Processing," *Proc. SPIE Media Processors*, v. 4674, 2002, pp. 37-41.

[0]42. V. M. Bove, Jr. and W. Sierra, "Personal Projection," *Proc. SMPTE 144th Technical Conference*, 2002.

[0]43. D. Butler, S. Sridharan, and V. M. Bove, Jr., "Real-Time Adaptive Video Segmentation," *Proc. ICASSP 2003*, 2003.

[0]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.

[0]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.

[0]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.

[0]49. 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.

[0]50. 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.

[0]51. B. C. Dalton and V. M. Bove, Jr., "Audio-Based Self-Localization for Ubiquitous Sensor Networks," *Proc. 118th Audio Engineering Society Convention*, 2005.

[0]52. 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.

[0]53. 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.

[0]54. 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.

[0]55. 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.

[0]56. J. J. Kalanithi and V. M. Bove, Jr., "Connectibles: Tangible Social Networks," *Proc. 2nd Intl. Conf. on Tangible and Embedded Interaction (TEI'08)*, 2008.

[0]56. 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.

[0]57. B. T. Taylor and V. M. Bove, Jr., "Graspables: Grasp-Recognition as a User Interface," *Proc. ACM CHI*, 2009.

[0]58. 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.

[0]59. A. L. Santos and V. M. Bove, Jr., "uCom: Spatial Displays for Visual Awareness of Remote Locations," *Proc. ACM CHI 2010*, 2010.

[0]60. 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.

61. 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.

[0]62. 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.

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.

[0]64. E. Portocarrero, D. Cranor, and V. M. Bove, Jr., "Pillow-Talk: Seamless Interface for Dream Priming Recalling and Playback," *Proc. TEI '11*, 2011.

[0]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.

[0]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.

[0]67. 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.

[0]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.

[0]69. J. Barabas and V. M. Bove, Jr., "Visual Perception and Holographic Displays," *J. Phys.: Conf. Ser. 415*, 012056, 2013.

[0]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.

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*

[0]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 Televsion, 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, Tyeler, *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.

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.

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 5

US008214873B2

(12) United States Patent
Weel

(10) Patent No.: US 8,214,873 B2
(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

(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 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/207,113**

(22) Filed: **Aug. 10, 2011**

(65) **Prior Publication Data**

US 2012/0042007 A1 Feb. 16, 2012

Related U.S. Application Data

(63) Continuation of application No. 10/840,109, filed on May 5, 2004, now Pat. No. 8,028,323.

(51) **Int. Cl.**
H04N 7/173 (2011.01)

(52) **U.S. Cl.** **725/141**; 725/133; 725/118; 709/219

(58) **Field of Classification Search** 709/223, 709/203, 231, 206, 204, 219; 725/110, 88, 725/112, 86, 134, 141, 118, 133; 705/27; 348/734; 700/94

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,819,160 A 10/1998 Foladare et al.
5,852,610 A 12/1998 Olaniyan
5,857,149 A 1/1999 Suzuki
5,907,831 A 5/1999 Lotvin et al.
5,949,492 A 9/1999 Mankovitz
6,014,569 A 1/2000 Bottum
6,088,455 A 7/2000 Logan et al.
6,182,128 B1 1/2001 Kelkar et al.
6,199,076 B1 3/2001 Logan et al.
6,226,672 B1 5/2001 DeMartin et al.
6,229,621 B1 5/2001 Kulakowski et al.
6,233,682 B1 5/2001 Fritsch
6,253,069 B1 6/2001 Mankovitz
6,349,329 B1 2/2002 Mackintosh et al.
6,473,792 B1 10/2002 Yavitz et al.
6,502,194 B1 12/2002 Berman et al.
6,628,928 B1 9/2003 Crosby et al.
6,662,231 B1 12/2003 Drosset et al.
6,701,355 B1 3/2004 Brandt et al.
6,711,622 B1 3/2004 Fuller et al.
6,741,869 B1 5/2004 Lehr
6,793,142 B2 9/2004 Yap
6,823,225 B1 11/2004 Sass
6,925,489 B1 8/2005 Curtin
(Continued)

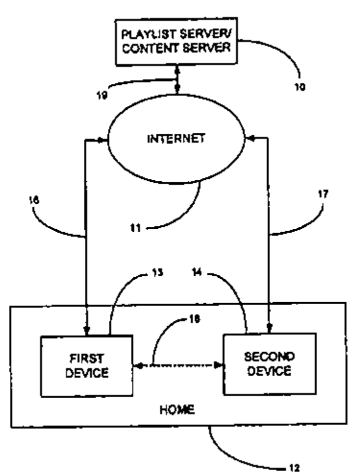
Primary Examiner — Le H Luu

(74) *Attorney, Agent, or Firm* — Withrow & Terranova, PLLC

(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



EXHIBIT
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U.S. PATENT DOCUMENTS

7,010,263	B1	3/2006	Patsiokas	
7,469,283	B2	12/2008	Eyal et al.	
7,472,353	B1	12/2008	Wolff et al.	
7,711,838	B1	5/2010	Boulter et al.	
7,783,722	B1	8/2010	Rosenberg et al.	
7,797,272	B2	9/2010	Picker et al.	
7,840,691	B1	11/2010	De Bonet et al.	
7,856,485	B2	12/2010	Prager et al.	
7,870,088	B1	1/2011	Chen et al.	
7,904,579	B2	3/2011	Janik et al.	
7,917,645	B2	3/2011	Ikezoye et al.	
7,926,085	B2	4/2011	Del Beccaro et al.	
8,028,323	B2	9/2011	Weel	
8,045,952	B2	10/2011	Qureshey et al.	
8,050,652	B2	11/2011	Qureshey et al.	
2002/0002039	A1	1/2002	Qureshey et al.	
2002/0007418	A1 *	1/2002	Hegde et al.	709/231
2002/0072326	A1	6/2002	Qureshey et al.	
2002/0194619	A1 *	12/2002	Chang et al.	725/134
2003/0217102	A1 *	11/2003	Jystad et al.	709/203
2003/0225834	A1 *	12/2003	Lee et al.	709/204
2004/0031058	A1 *	2/2004	Reisman	725/112
2004/0055014	A1 *	3/2004	Edelson	725/110
2004/0119894	A1 *	6/2004	Higgins et al.	348/734
2004/0133914	A1 *	7/2004	Smith et al.	725/86
2004/0205028	A1 *	10/2004	Verosub et al.	705/59
2004/0255340	A1	12/2004	Logan	
2005/0044561	A1	2/2005	McDonald	
2005/0071881	A1 *	3/2005	Deshpande	725/88
2005/0113946	A9 *	5/2005	Janik	700/94
2005/0240494	A1 *	10/2005	Cue et al.	705/27
2005/0251566	A1	11/2005	Weel	
2005/0262204	A1 *	11/2005	Szeto et al.	709/206
2006/0218180	A1	9/2006	Bodlaender et al.	
2006/0294212	A1 *	12/2006	Kikkawa et al.	709/223
2007/0088804	A1	4/2007	Qureshey et al.	
2007/0089132	A1	4/2007	Qureshey et al.	
2007/0089135	A1	4/2007	Qureshey et al.	
2007/0180063	A1	8/2007	Qureshey et al.	

* cited by examiner

FIG. 1

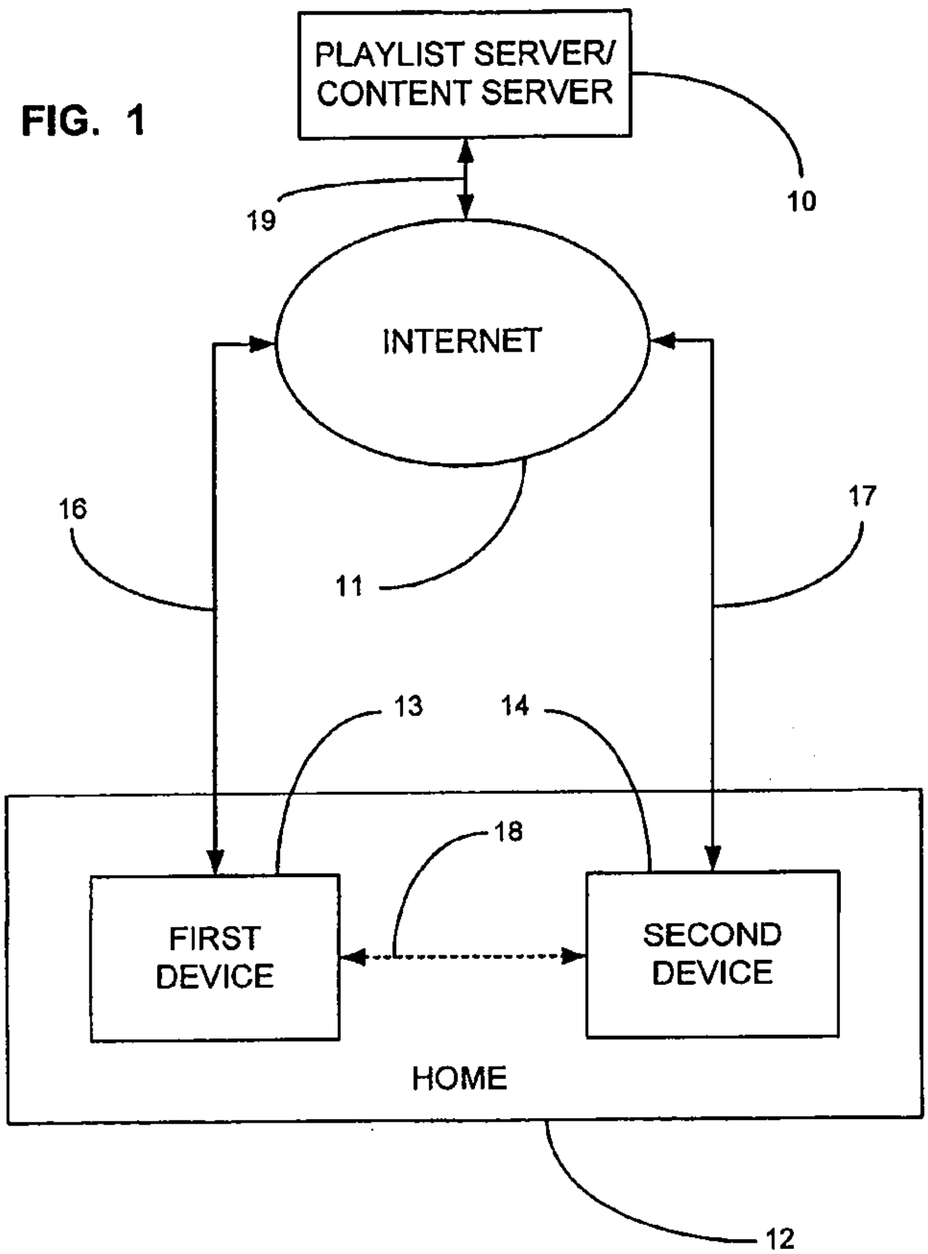

PLAYLIST SERVER/
CONTENT SERVER
10
19
INTERNET
11
16
17
13
14
18
FIRST
DEVICE
SECOND
DEVICE
HOME
12

FIG. 2

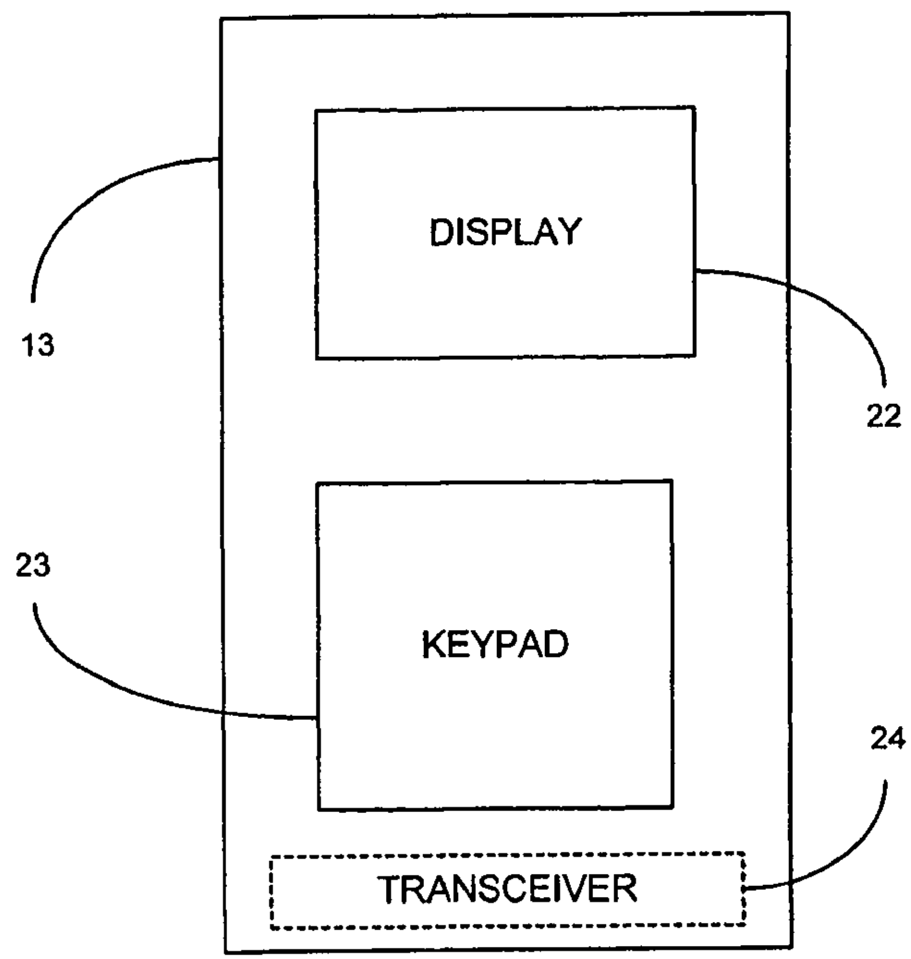


FIG. 3

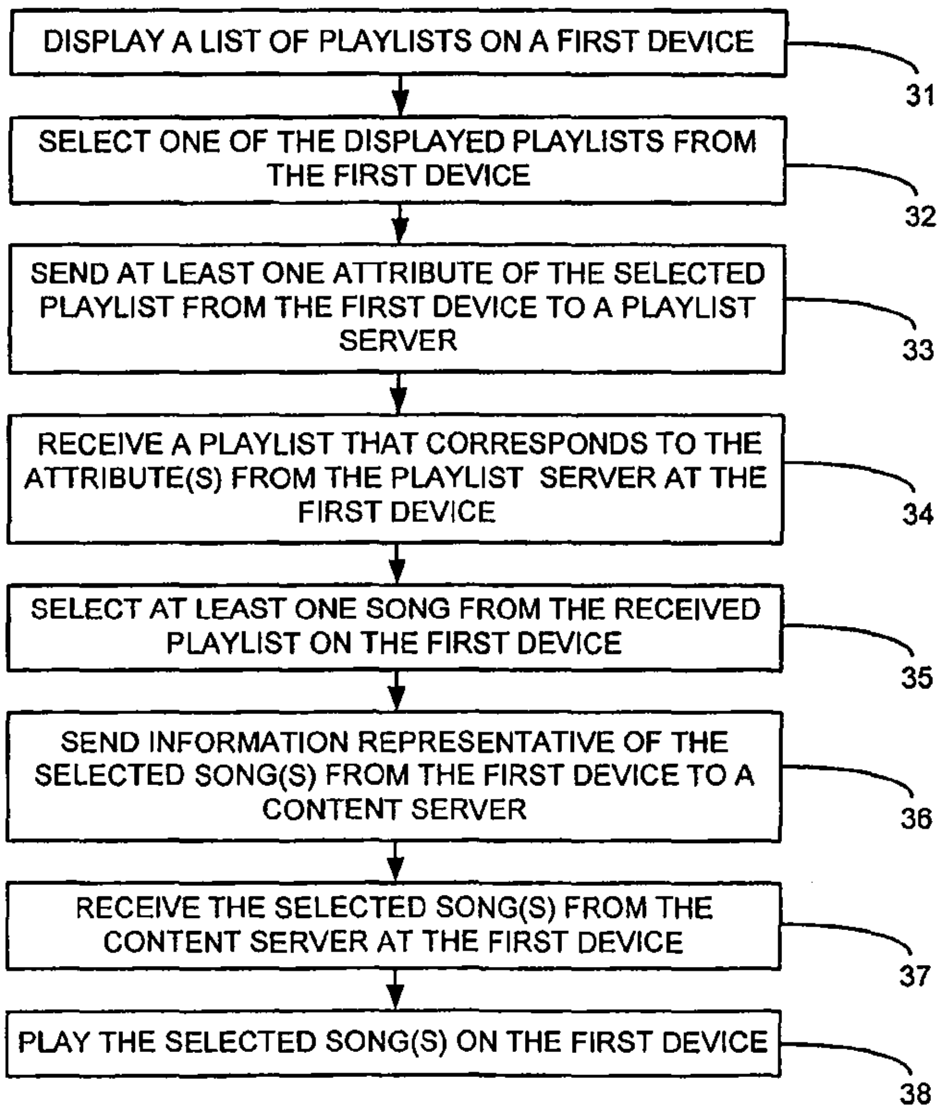

DISPLAY A LIST OF PLAYLISTS ON A FIRST DEVICE
31
SELECT ONE OF THE DISPLAYED PLAYLISTS FROM THE FIRST DEVICE
32
SEND AT LEAST ONE ATTRIBUTE OF THE SELECTED PLAYLIST FROM THE FIRST DEVICE TO A PLAYLIST SERVER
33
RECEIVE A PLAYLIST THAT CORRESPONDS TO THE ATTRIBUTE(S) FROM THE PLAYLIST SERVER AT THE FIRST DEVICE
34
SELECT AT LEAST ONE SONG FROM THE RECEIVED PLAYLIST ON THE FIRST DEVICE
35
SEND INFORMATION REPRESENTATIVE OF THE SELECTED SONG(S) FROM THE FIRST DEVICE TO A CONTENT SERVER
36
RECEIVE THE SELECTED SONG(S) FROM THE CONTENT SERVER AT THE FIRST DEVICE
37
PLAY THE SELECTED SONG(S) ON THE FIRST DEVICE
38

FIG. 4

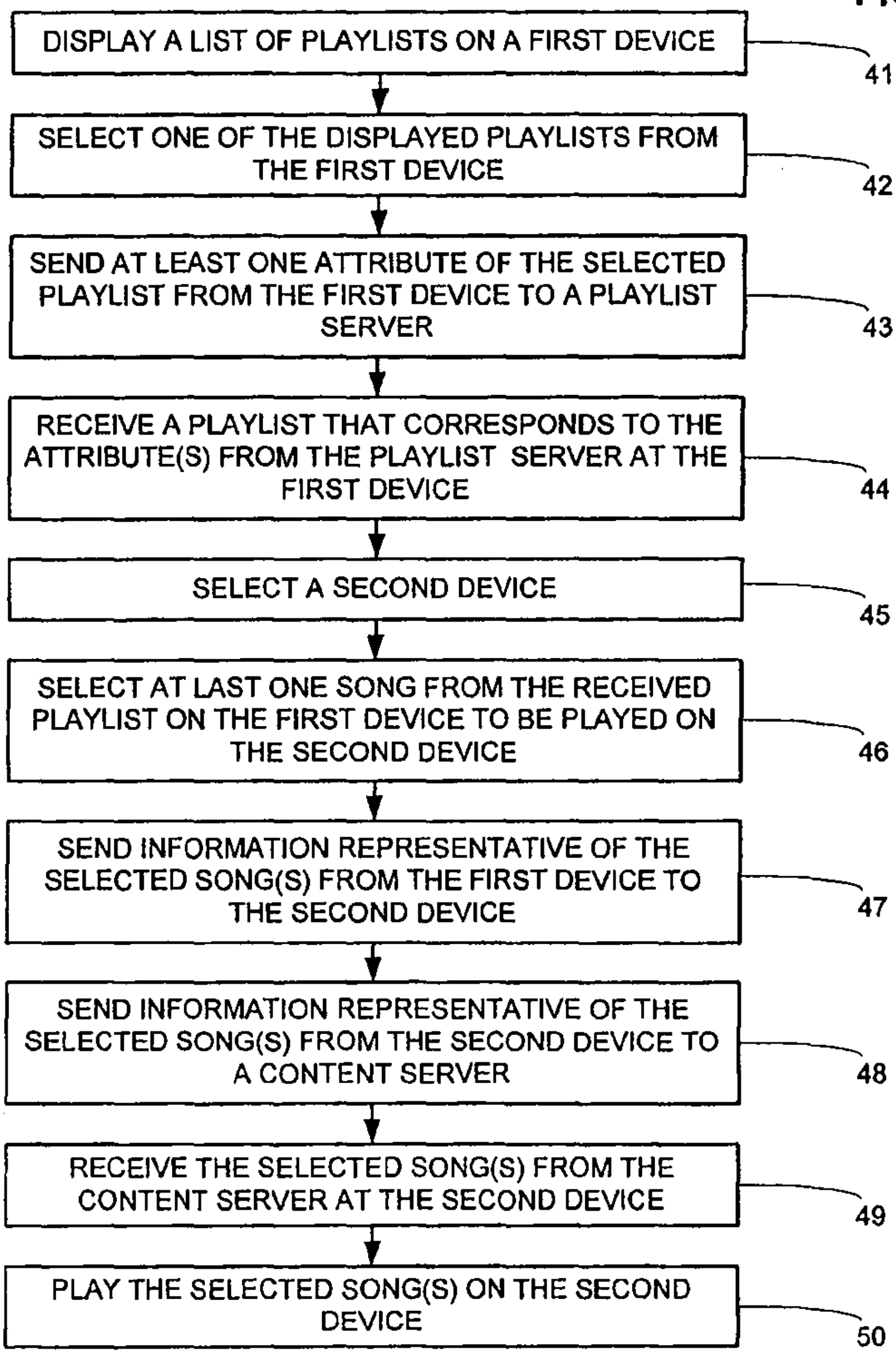

DISPLAY A LIST OF PLAYLISTS ON A FIRST DEVICE
41
SELECT ONE OF THE DISPLAYED PLAYLISTS FROM THE FIRST DEVICE
42
SEND AT LEAST ONE ATTRIBUTE OF THE SELECTED PLAYLIST FROM THE FIRST DEVICE TO A PLAYLIST SERVER
43
RECEIVE A PLAYLIST THAT CORRESPONDS TO THE ATTRIBUTE(S) FROM THE PLAYLIST SERVER AT THE FIRST DEVICE
44
SELECT A SECOND DEVICE
45
SELECT AT LAST ONE SONG FROM THE RECEIVED PLAYLIST ON THE FIRST DEVICE TO BE PLAYED ON THE SECOND DEVICE
46
SEND INFORMATION REPRESENTATIVE OF THE SELECTED SONG(S) FROM THE FIRST DEVICE TO THE SECOND DEVICE
47
SEND INFORMATION REPRESENTATIVE OF THE SELECTED SONG(S) FROM THE SECOND DEVICE TO A CONTENT SERVER
48
RECEIVE THE SELECTED SONG(S) FROM THE CONTENT SERVER AT THE SECOND DEVICE
49
PLAY THE SELECTED SONG(S) ON THE SECOND DEVICE
50

FIG. 5

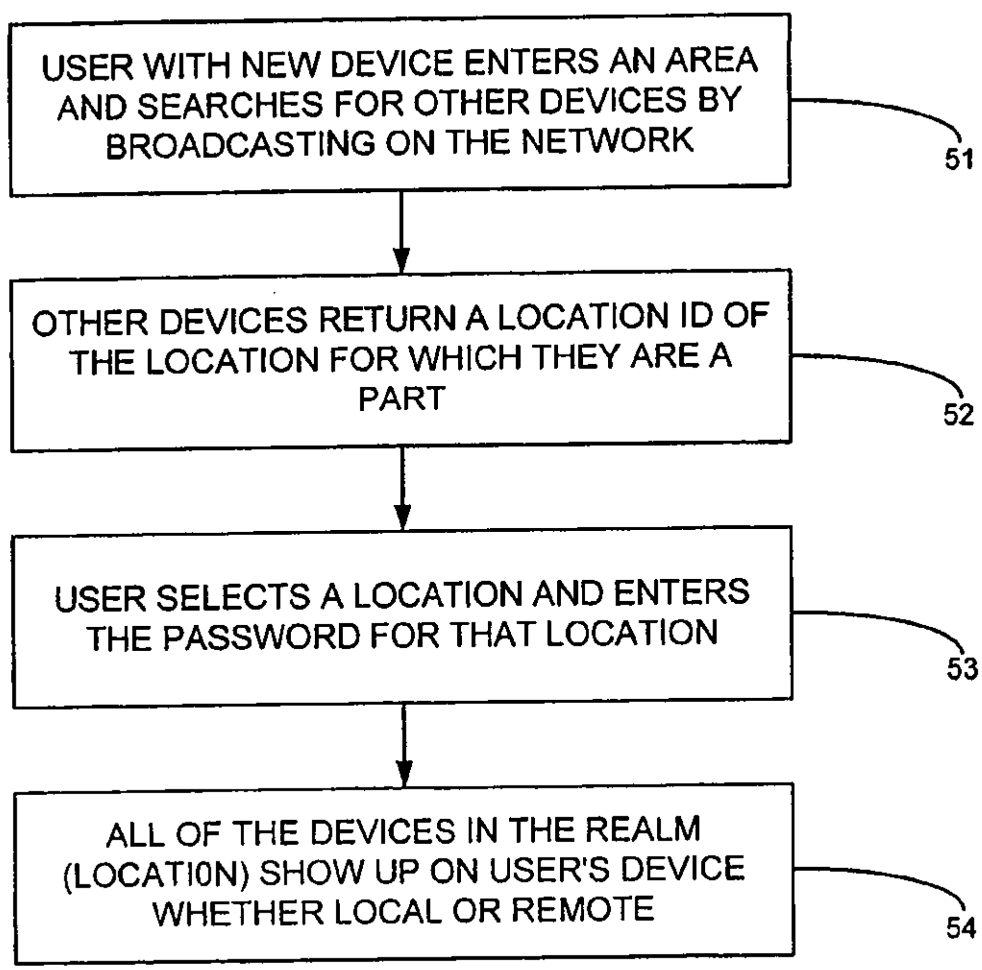

USER WITH NEW DEVICE ENTERS AN AREA AND SEARCHES FOR OTHER DEVICES BY BROADCASTING ON THE NETWORK
51
OTHER DEVICES RETURN A LOCATION ID OF THE LOCATION FOR WHICH THEY ARE A PART
52
USER SELECTS A LOCATION AND ENTERS THE PASSWORD FOR THAT LOCATION
53
ALL OF THE DEVICES IN THE REALM (LOCATION) SHOW UP ON USER'S DEVICE WHETHER LOCAL OR REMOTE
54

FIG. 6

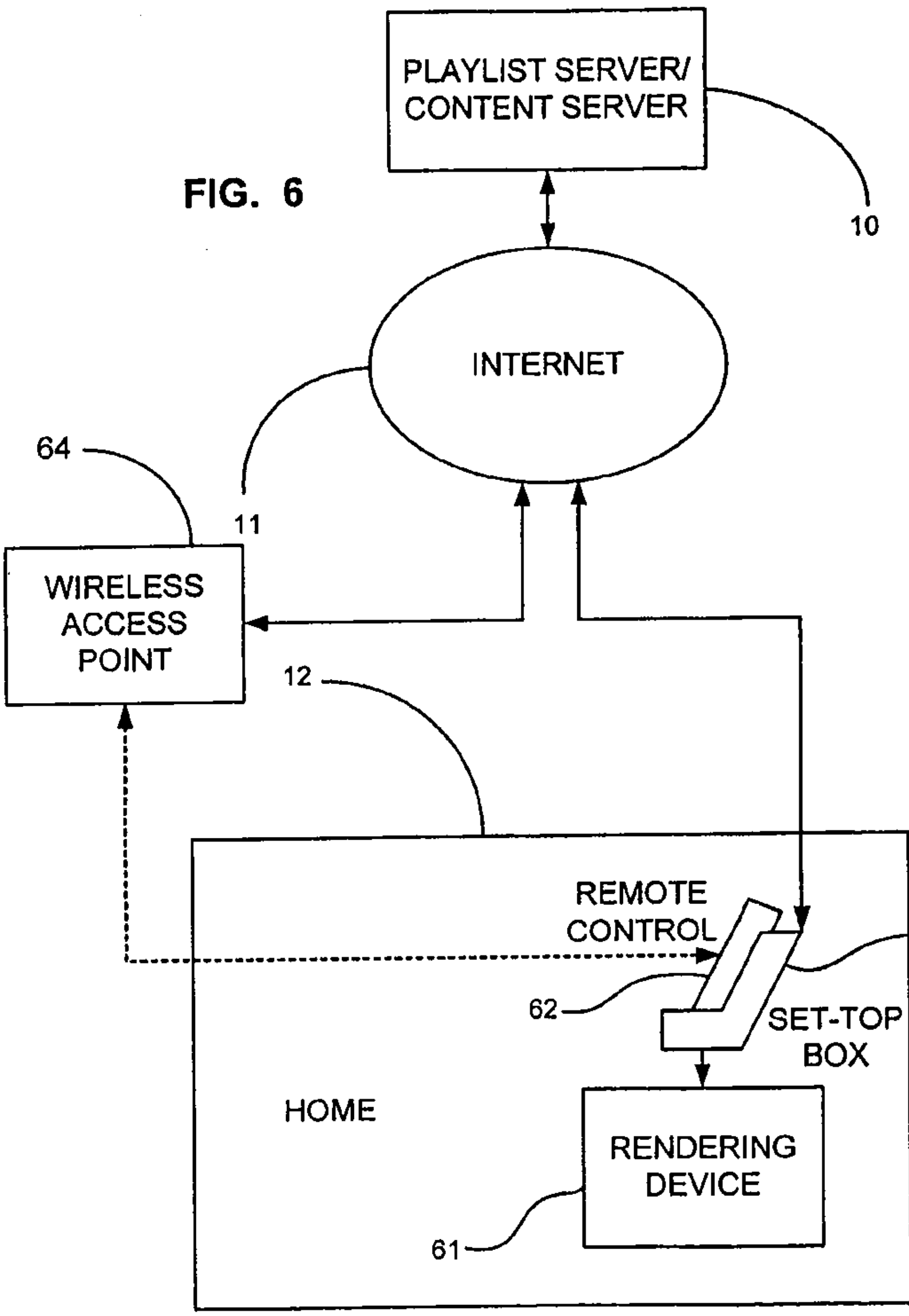

PLAYLIST SERVER/
CONTENT SERVER
10
INTERNET
64
11
WIRELESS
ACCESS
POINT
12
REMOTE
CONTROL
63
62
SET-TOP
BOX
HOME
RENDERING
DEVICE
61

FIG. 7

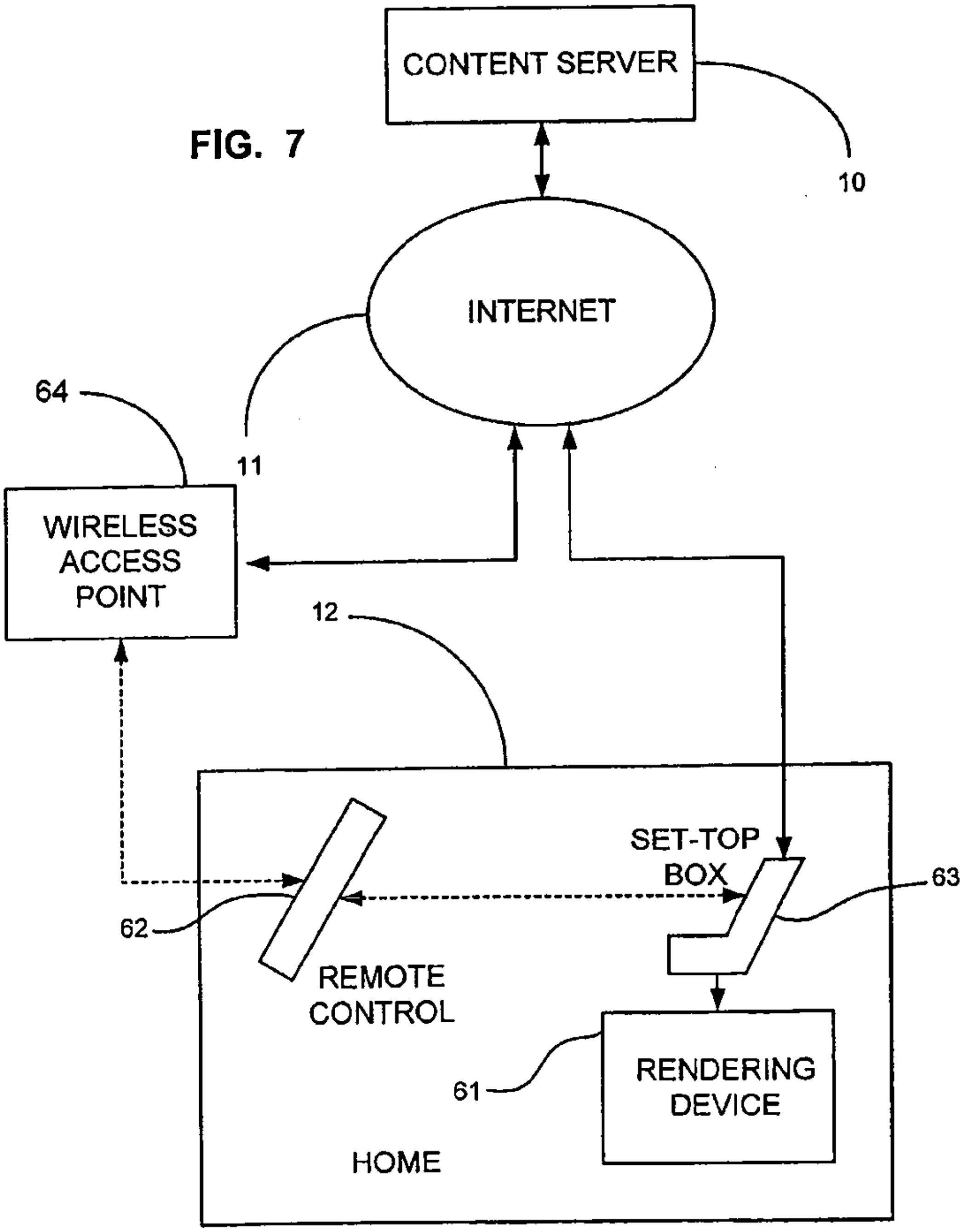
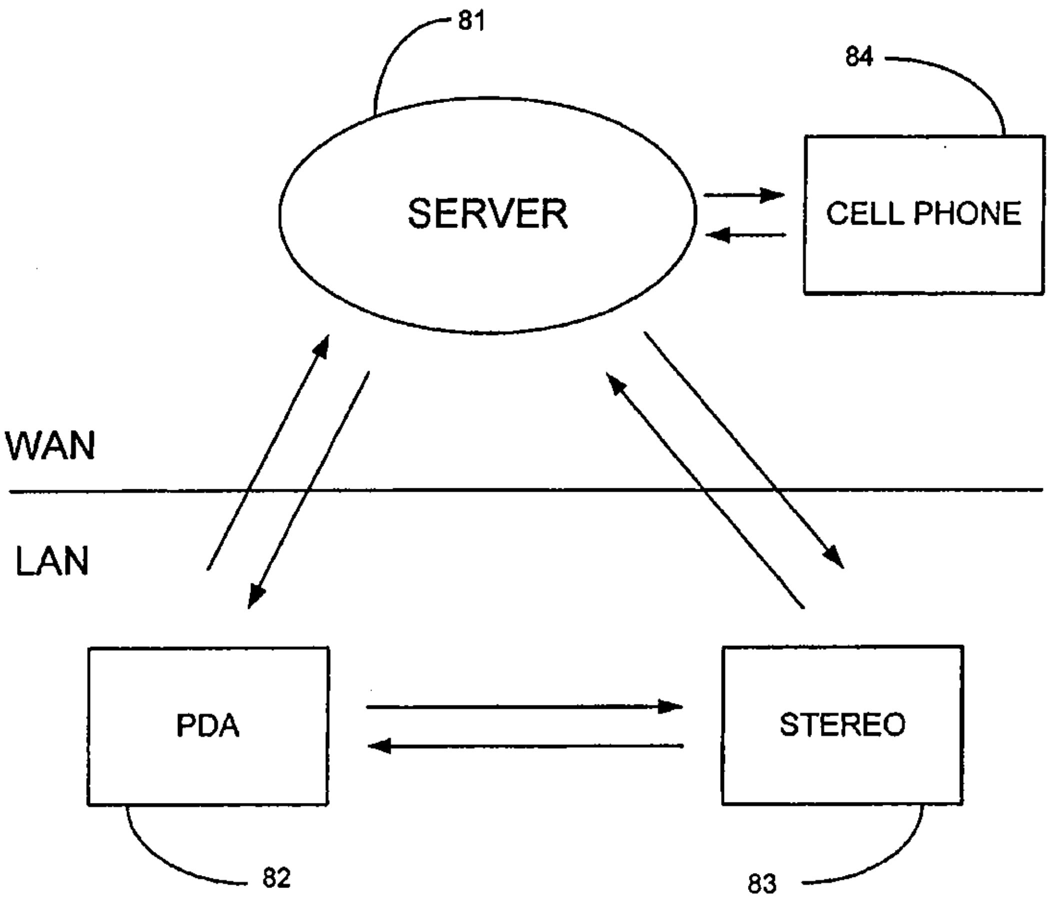

CONTENT SERVER
10
INTERNET
11
64
WIRELESS ACCESS POINT
12
SET-TOP BOX
63
62
REMOTE CONTROL
61
RENDERING DEVICE
HOME

FIG. 8



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 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 comprises a palmtop 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 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;

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 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 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 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 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 WiFi (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 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 touch-screen 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.

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 are 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 instance 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 PCA **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 form 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.

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.

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

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(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**

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G06F 15/16 (2006.01)

(52) **U.S. Cl.** **709/231**; 709/217; 709/218; 709/219

(58) **Field of Classification Search** 709/231, 709/217–219
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,168,481	A	12/1992	Culbertson et al.	
5,262,875	A	11/1993	Mincer et al.	
5,440,334	A	8/1995	Walters et al.	
5,616,876	A	4/1997	Cluts	
5,710,970	A	1/1998	Walters et al.	
5,790,426	A *	8/1998	Robinson	702/179
5,796,727	A	8/1998	Harrison	
5,884,282	A *	3/1999	Robinson	705/7.33
5,903,901	A	5/1999	Kawakura et al.	
5,949,776	A	9/1999	Mahany et al.	
6,041,311	A	3/2000	Chislenko et al.	
6,064,379	A	5/2000	DeMoney	
6,088,722	A	7/2000	Herz et al.	
6,192,340	B1	2/2001	Abecassis	
6,195,657	B1	2/2001	Rucker et al.	
6,248,946	B1	6/2001	Dwek	
6,317,722	B1 *	11/2001	Jacobi et al.	705/14.51
6,456,234	B1	9/2002	Johnson	
6,526,411	B1	2/2003	Ward	
6,587,127	B1	7/2003	Leeke et al.	

(Continued)

FOREIGN PATENT DOCUMENTS

EP 0984584 A1 3/2000

(Continued)

OTHER PUBLICATIONS

"Pandora Internet Radio—Find New Music, Listen to Free Web Radio," http://www.pandora.com/, copyright 2005-2007 Pandora Media, Inc., printed Feb. 7, 2007, 1 page.

(Continued)

Primary Examiner — Mohamed Wasel
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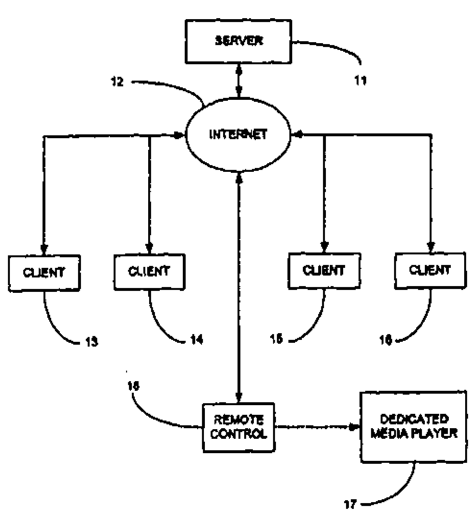
(57) **ABSTRACT**

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.

12 Claims, 6 Drawing Sheets



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6

U.S. PATENT DOCUMENTS

6,657,116	B1	12/2003	Gunnerson	
6,675,015	B1	1/2004	Martini et al.	
6,675,268	B1	1/2004	DeKoning et al.	
6,853,841	B1	2/2005	St. Pierre	
6,865,600	B1	3/2005	Brydon et al.	
6,876,642	B1	4/2005	Adams	
6,882,299	B1	4/2005	Allport	
6,933,433	B1	8/2005	Porteus et al.	
6,937,860	B2	8/2005	Jahn	
6,946,988	B2	9/2005	Edwards et al.	
6,947,571	B1	9/2005	Rhoads et al.	
6,954,443	B2	10/2005	Forstadius	
6,970,703	B2	11/2005	Fuchs et al.	
6,975,266	B2	12/2005	Abraham et al.	
6,982,780	B2	1/2006	Morley et al.	
6,990,497	B2	1/2006	O'Rourke et al.	
6,993,532	B1	1/2006	Platt et al.	
7,000,188	B1	2/2006	Eustace	
7,020,710	B2	3/2006	Weber et al.	
7,028,082	B1	4/2006	Rosenberg et al.	
7,035,912	B2	4/2006	Arteaga	
7,043,477	B2	5/2006	Mercer et al.	
7,047,092	B2	5/2006	Wimsatt	
7,047,315	B1	5/2006	Srivastava	
D524,251	S	7/2006	Lim et al.	
7,075,000	B2 *	7/2006	Gang et al.	84/600
7,081,579	B2	7/2006	Alcalde et al.	
7,134,040	B2	11/2006	Ayres	
7,171,018	B2	1/2007	Rhoads et al.	
7,187,947	B1	3/2007	White et al.	
7,218,611	B2	5/2007	Mimura et al.	
7,240,106	B2	7/2007	Cochran et al.	
7,248,893	B2	7/2007	Christensen et al.	
7,249,367	B2	7/2007	Bove, Jr. et al.	
7,260,638	B2	8/2007	Crosbie	
7,269,854	B2	9/2007	Simmons et al.	
7,277,955	B2	10/2007	Elliott	
7,292,588	B2	11/2007	Milley et al.	
D559,197	S	1/2008	Lim et al.	
7,325,043	B1	1/2008	Rosenberg et al.	
7,340,768	B2	3/2008	Rosenberger	
7,343,160	B2	3/2008	Morton	
7,373,109	B2	5/2008	Pohja et al.	
7,378,903	B2	5/2008	Bates	
D575,800	S	8/2008	Kusano et al.	
D575,801	S	8/2008	Kusano et al.	
D582,429	S	12/2008	Kusano et al.	
7,468,934	B1	12/2008	Janik	
7,472,353	B1	12/2008	Wolff et al.	
7,512,702	B1	3/2009	Srivastava et al.	
7,516,212	B2	4/2009	Nguyen et al.	
7,525,289	B2	4/2009	Janik et al.	
7,571,014	B1	8/2009	Lambourne et al.	
7,613,736	B2 *	11/2009	Hicken	1/1
7,643,894	B2	1/2010	Braithwaite et al.	
7,652,844	B2	1/2010	Edwards et al.	
7,660,601	B2	2/2010	Janik et al.	
7,668,964	B2	2/2010	Millington	
7,696,816	B2	4/2010	Bates	
7,742,606	B2	6/2010	Kreifeldt et al.	
7,768,234	B2	8/2010	Janik et al.	
7,786,705	B2	8/2010	Janik et al.	
7,792,311	B1	9/2010	Holmgren et al.	
7,805,682	B1	9/2010	Lambourne	
7,904,579	B2	3/2011	Janik et al.	
7,920,824	B2	4/2011	Janik et al.	
8,028,038	B2	9/2011	Weel	
2001/0039659	A1	11/2001	Simmons et al.	
2001/0053994	A1	12/2001	Atcheson et al.	
2002/0007418	A1	1/2002	Hegde et al.	
2002/0013852	A1	1/2002	Janik	
2002/0032019	A1	3/2002	Marks et al.	
2002/0049760	A1	4/2002	Scott et al.	
2002/0138630	A1	9/2002	Solomon et al.	
2002/0144259	A1	10/2002	Gutta et al.	
2002/0151327	A1	10/2002	Levitt	
2002/0165793	A1	11/2002	Brand et al.	
2002/0166123	A1	11/2002	Schrader et al.	
2002/0168938	A1	11/2002	Chang	
2002/0173273	A1	11/2002	Spurgat et al.	
2002/0174243	A1	11/2002	Spurgat et al.	
2002/0174426	A1	11/2002	Gutta et al.	
2002/0194260	A1	12/2002	Headley et al.	
2002/0194619	A1	12/2002	Chang et al.	
2003/0014759	A1	1/2003	Van Stam	
2003/0022675	A1	1/2003	Mergler	
2003/0050062	A1	3/2003	Chen et al.	
2003/0093790	A1	5/2003	Logan et al.	
2003/0147624	A1	8/2003	Trajkovic et al.	
2003/0182315	A1	9/2003	Plastina et al.	
2003/0204439	A1	10/2003	Cullen, III	
2003/0217102	A1	11/2003	Jystad et al.	
2003/0225834	A1	12/2003	Lee et al.	
2003/0227478	A1	12/2003	Chatfield	
2003/0229549	A1	12/2003	Wolinsky et al.	
2003/0229900	A1	12/2003	Reisman	
2003/0236843	A1	12/2003	Weber et al.	
2004/0002938	A1 *	1/2004	Deguchi	707/1
2004/0031058	A1	2/2004	Reisman	
2004/0055014	A1	3/2004	Edelson	
2004/0057348	A1 *	3/2004	Shteyn et al.	369/30.38
2004/0078382	A1	4/2004	Mercer et al.	
2004/0086120	A1	5/2004	Akins, III et al.	
2004/0107219	A1	6/2004	Rosenberger	
2004/0119894	A1	6/2004	Higgins et al.	
2004/0133914	A1	7/2004	Smith et al.	
2004/0148393	A1	7/2004	Breiter et al.	
2004/0160307	A1	8/2004	Saikkonen	
2004/0162830	A1	8/2004	Shirwadkar et al.	
2004/0181604	A1	9/2004	Immonen	
2004/0205028	A1	10/2004	Verosub et al.	
2004/0225519	A1	11/2004	Martin	
2004/0246372	A1	12/2004	Megeid	
2004/0249708	A1	12/2004	Jacobs et al.	
2004/0255340	A1	12/2004	Logan	
2004/0260407	A1	12/2004	Wimsatt	
2004/0260786	A1	12/2004	Barile	
2004/0267899	A1	12/2004	Rahman et al.	
2005/0021369	A1	1/2005	Cohen et al.	
2005/0021470	A1	1/2005	Martin et al.	
2005/0033780	A1	2/2005	Simelius et al.	
2005/0059379	A1	3/2005	Sovio et al.	
2005/0060264	A1	3/2005	Schrock et al.	
2005/0071881	A1	3/2005	Deshpande	
2005/0091693	A1	4/2005	Amine et al.	
2005/0113946	A9	5/2005	Janik	
2005/0120373	A1	6/2005	Thomas et al.	
2005/0160270	A1	7/2005	Goldberg et al.	
2005/0165888	A1	7/2005	Elliott	
2005/0187976	A1	8/2005	Goodman et al.	
2005/0192000	A1	9/2005	Lloyd	
2005/0210507	A1 *	9/2005	Hawkins et al.	725/46
2005/0234995	A1	10/2005	Plastina et al.	
2005/0240494	A1 *	10/2005	Cue et al.	705/27
2005/0245233	A1	11/2005	Anderson	
2005/0251453	A1	11/2005	Lu	
2005/0251565	A1	11/2005	Weel	
2005/0251566	A1	11/2005	Weel	
2005/0251576	A1	11/2005	Weel	
2005/0251807	A1	11/2005	Weel	
2005/0262204	A1	11/2005	Szeto et al.	
2005/0267944	A1	12/2005	Little, II	
2006/0020662	A1	1/2006	Robinson	
2006/0059260	A1 *	3/2006	Kelly et al.	709/225
2006/0085821	A9	4/2006	Simmons et al.	
2006/0087926	A1	4/2006	Hwang	
2006/0135059	A1	6/2006	Hill	
2006/0143236	A1 *	6/2006	Wu	707/104.1
2006/0167576	A1	7/2006	Rosenberg	
2006/0168264	A1	7/2006	Baba et al.	
2006/0212442	A1	9/2006	Conrad et al.	
2006/0212444	A1	9/2006	Handman et al.	
2006/0212478	A1	9/2006	Plastina et al.	
2006/0218180	A1	9/2006	Bodlaender et al.	
2006/0256669	A1	11/2006	Sakuma et al.	
2006/0287746	A1	12/2006	Braithwaite et al.	
2006/0294201	A1 *	12/2006	Kito et al.	709/217

2006/0294212	A1	12/2006	Kikkawa et al.	
2007/0025194	A1	2/2007	Morse et al.	
2007/0038999	A1	2/2007	Millington	
2007/0168388	A1	7/2007	Plastina et al.	
2007/0180063	A1	8/2007	Qureshey et al.	
2007/0219996	A1	9/2007	Jarvinen	
2007/0220552	A1	9/2007	Juster et al.	
2007/0247979	A1 *	10/2007	Brillon et al.	369/30.06
2008/0016205	A1	1/2008	Svendsen	
2008/0033821	A1 *	2/2008	Jacobi et al.	705/14
2008/0109095	A1	5/2008	Braithwaite et al.	
2008/0114481	A1	5/2008	Braithwaite et al.	
2008/0133520	A1 *	6/2008	Hempleman et al.	707/6
2008/0176511	A1 *	7/2008	Tan et al.	455/3.06
2008/0288375	A1	11/2008	Uhrig et al.	
2009/0085724	A1	4/2009	Naressi et al.	
2009/0193472	A1	7/2009	Braithwaite et al.	
2009/0292376	A1 *	11/2009	Kazem et al.	700/94
2009/0315670	A1	12/2009	Naressi et al.	
2010/0172512	A1	7/2010	Braithwaite et al.	
2011/0026727	A1	2/2011	Braithwaite et al.	
2011/0044468	A1	2/2011	Braithwaite et al.	
2011/0044469	A1	2/2011	Braithwaite et al.	

FOREIGN PATENT DOCUMENTS

EP 1536352 A1 6/2005

OTHER PUBLICATIONS

"Napster—All the Music You Want," at <http://www.napster.com/using_napster/all_the_music_you_want.html>, copyright 2003-2006, Napster, LLC, printed Feb. 7, 2007, 2 pages.

"Webjay—Playlist Community," at <http://www.webjay.org/>, copyright 2006, Yahoo! Inc., printed Feb. 7, 2007, 5 pages.

"MyStrands Labs: Patent-pending Technologies," http://labs.mystrands.com/patents.html, printed Feb. 7, 2007, 5 pages.

"Music Downloads—Over 2 Million Songs—Try It Free—Yahoo! Music," http://music.yahoo.com/ymu/default.asp, copyright 2006 Yahoo! Inc., printed Feb. 7, 2007, 1 page.

"Billboard Music Charts—Latest Music News—Music Videos," http://www.billboard.com/bbcom/index.jsp, printed Feb. 7, 2007, 2 pages.

"CNN.com—Breaking News, U.S., World, Weather, Entertainment & Video News," http://www.cnn.com, copyright 2007 Cable News Network LP, LLLP, printed Feb. 7, 2007, 3 pages.

"InferNote is an exploration tool for your music collection," http://www.itweaks.com/infdoc/index.html, copyright 2004 otherslikeyou.com Inc., printed Feb. 7, 2007, 13 pages.

"Rhapsody—Full-length music, videos and more—Free," http://www.rhapsody.com/welcome.html, copyright 1948-2007 Muze Inc., copyright 2001-2007 Listen.com, printed Feb. 7, 2007, 1 page.

"National and Local Weather Forecast, Radar, Map and Report," http://www.weather.com/, copyright 1995-2007 The Weather Channel Interactive, Inc., printed Feb. 7, 2007, 3 pages.

Goombah—Preview, http://www.goombah.com/preview.html, printed Jan. 8, 2008, 5 pages.

"Apple—iPod + iTunes," http://www.apple.com/itunes/, copyright 2007 Paramount Pictures, printed Feb. 7, 2007, 2 pages.

"Roxio The Boom Box Music and recording reviews—CNET Reviews," http://reviews.cnet.com/music-and-recording/roxio-the-boom-box/4505-3669_7-3141440..., printed Nov. 15, 2007, 4 pages.

"Napster.co.uk—Napster to Go," http://www.napster.co.uk/ntg.html, copyright 2003-2007 Napster, LLC, printed Nov. 15, 2007, 2 pages.

"Start Listening with Last.fm," http://www.last.fm/, 1 page, Jul. 23, 2008.

"MSN—Music," http://music.msn.com/help/sync, copyright 2007 Microsoft, printed Nov. 16, 2007, 1 page.

Jeff Mascia et al., "Lifetrak: Music in Tune With Your Life," copyright 2006 ACM, 11 pages.

Jun Wang et al., "Music Recommender System for Wi-Fi Walkman," No. ICT-2003-01 in the ICT Group Technical Report Series, 23 pages, 2003.

"Musicstrands.com Because Music is Social," copyright 2006 MusicStrands, Inc., 2 pages.

"MyStrands for Windows," http://www.mystrands.com/overview.vm, copyright 2003-2007 MediaStrands, Inc., printed Feb. 7, 2007, 3 pages.

"UpTo11.net—Music Recommendations and Search," http://www.upto11.net/, copyright 2005-2006 Upto11.net, printed Feb. 7, 2007, 1 page.

"LAUNCHcast Radio—Yahoo! Messenger," http://messenger.yahoo.com/launch.php, copyright 2007 Yahoo! Inc., printed Nov. 8, 2007, 1 page.

"Apple—iPod classic," http://www.apple.com/ipodclassic/, printed Oct. 26, 2007, 1 page.

"Yahoo! Messenger—Chat, Instant message, SMS, PC Calls and More," http://messenger.yahoo.com/webmessengerpromo.php, copyright 2007 Yahoo! Inc., printed Oct. 26, 2007, 1 page.

Kevin C. Almeroth et al., "An Alternative Paradigm for Scalable On-Demand Applications: Evaluating and Deploying the Interactive Multimedia Jukebox," IEEE Transactions on Knowledge and Data Engineering, vol. 11, No. 4, Jul./Aug. 1999, pp. 658-672, copyright 1999 IEEE, 15 pages.

* cited by examiner

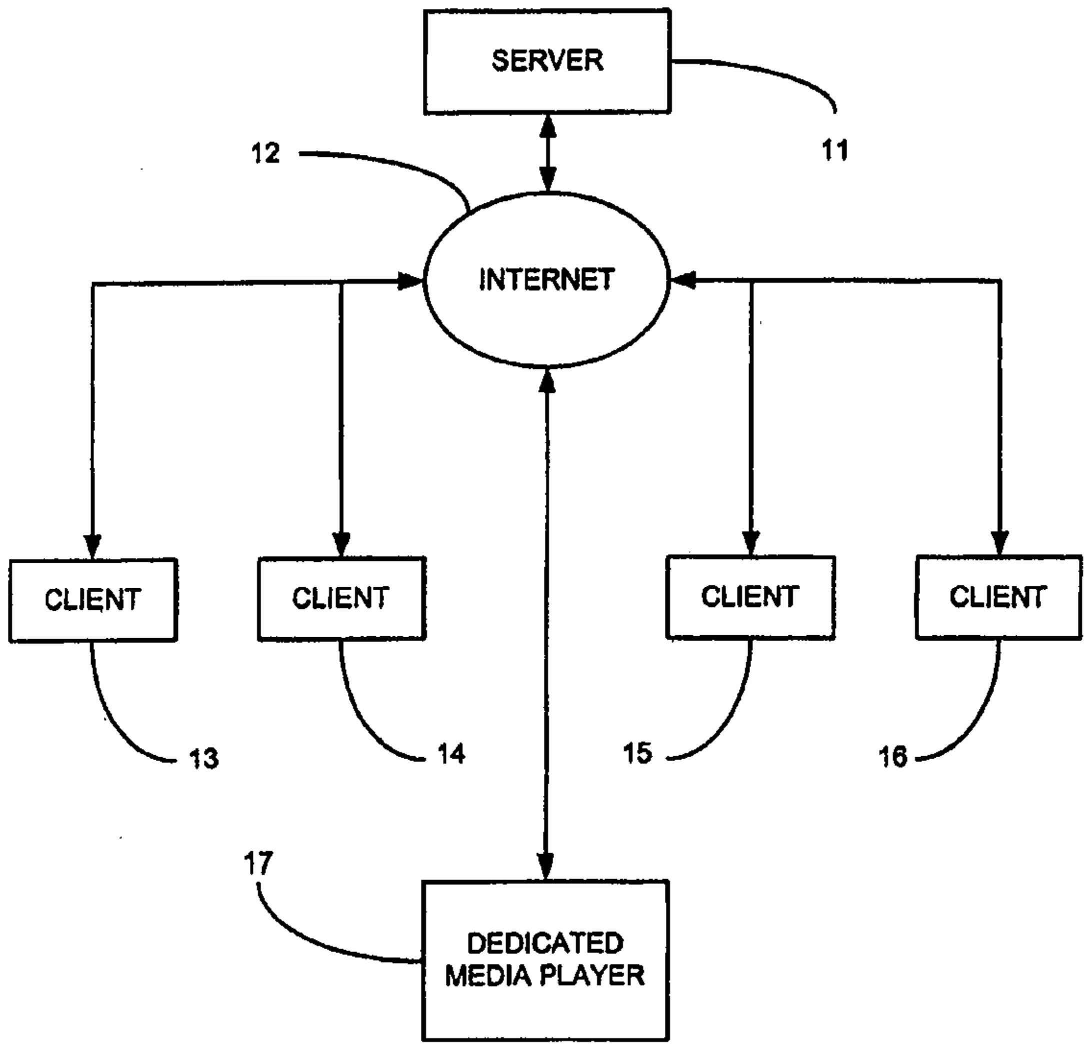

SERVER
11
12
INTERNET
CLIENT
CLIENT
CLIENT
CLIENT
13
14
15
16
17
DEDICATED MEDIA PLAYER

FIG. 1

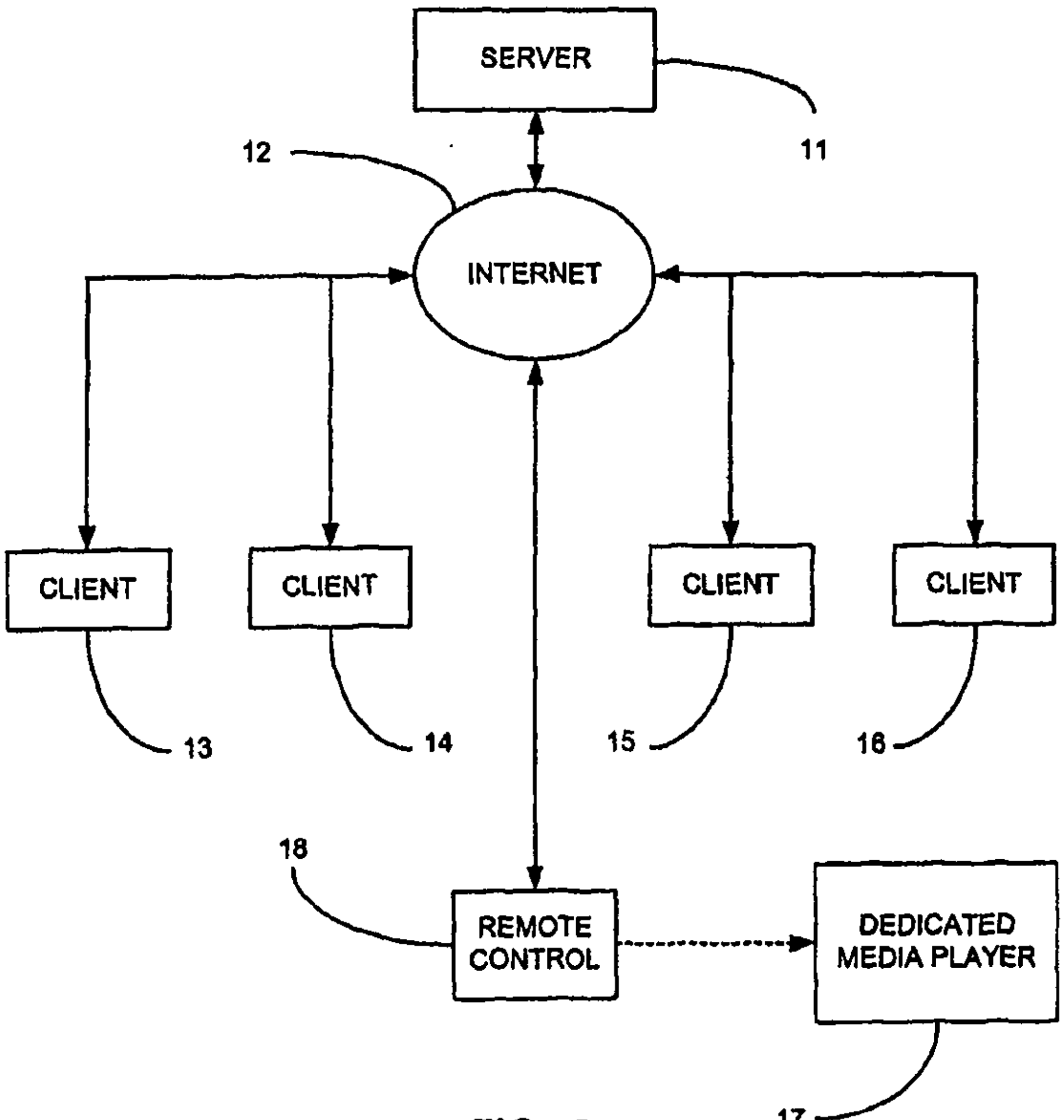

SERVER
11
12
INTERNET
CLIENT
CLIENT
CLIENT
CLIENT
13
14
15
16
18
REMOTE CONTROL
DEDICATED MEDIA PLAYER
17

FIG. 2

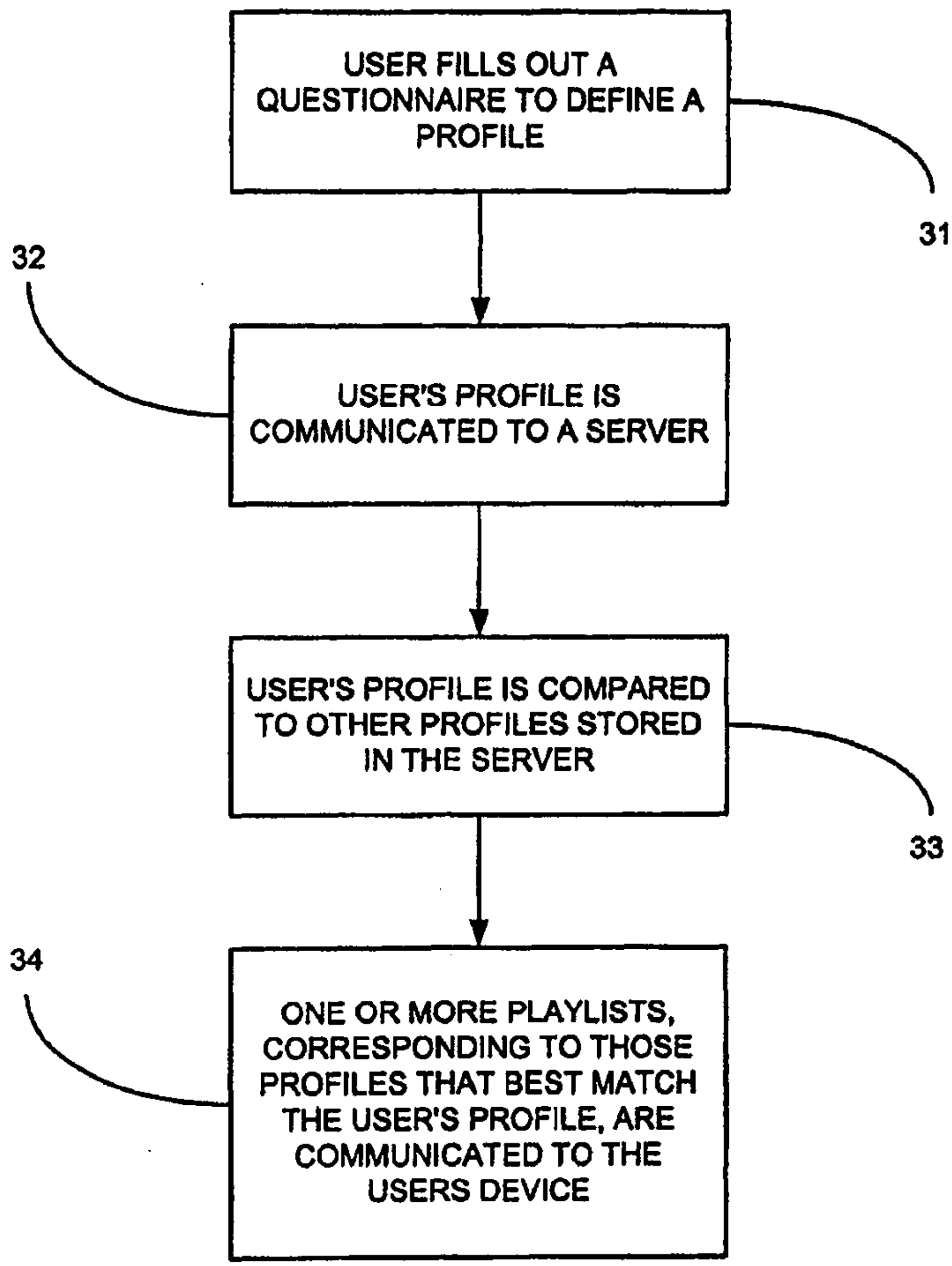

USER FILLS OUT A QUESTIONNAIRE TO DEFINE A PROFILE
31
32
USER'S PROFILE IS COMMUNICATED TO A SERVER
USER'S PROFILE IS COMPARED TO OTHER PROFILES STORED IN THE SERVER
33
34
ONE OR MORE PLAYLISTS, CORRESPONDING TO THOSE PROFILES THAT BEST MATCH THE USER'S PROFILE, ARE COMMUNICATED TO THE USERS DEVICE

FIG. 3

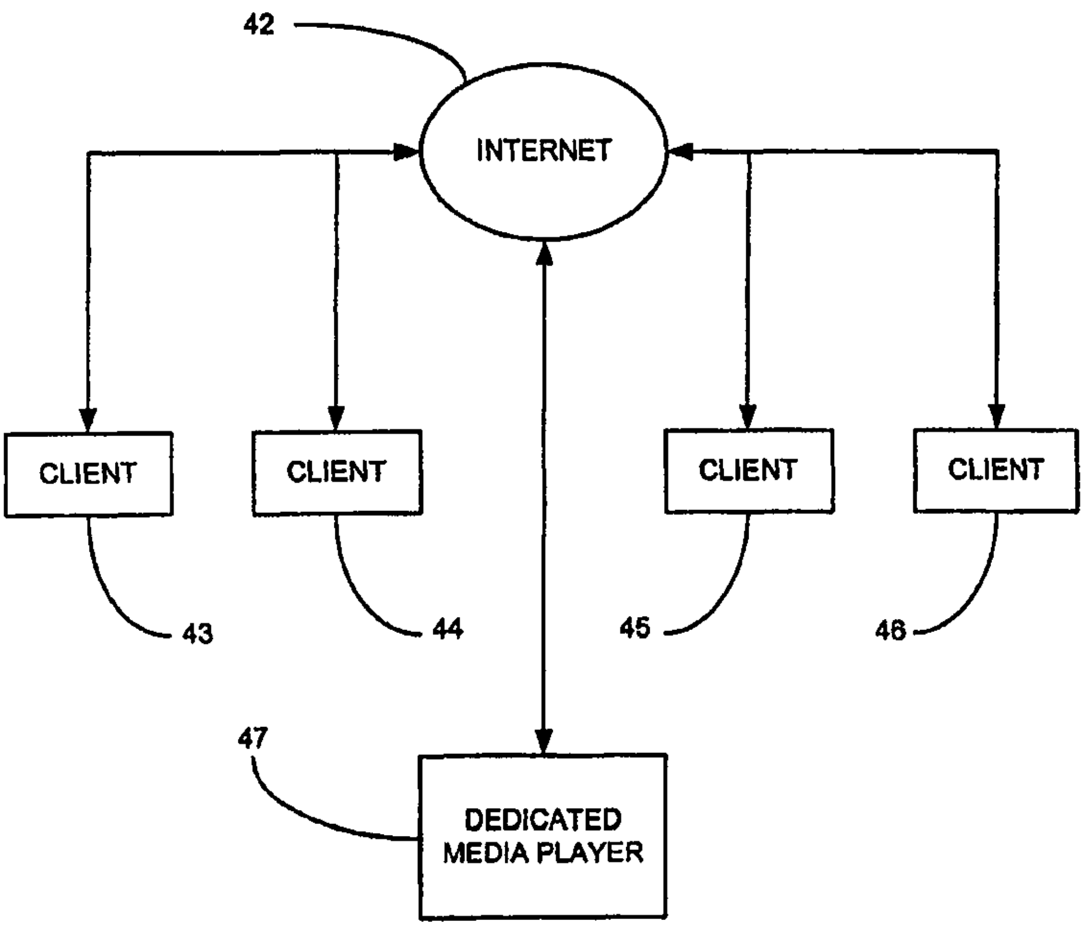

42
INTERNET
CLIENT
CLIENT
CLIENT
CLIENT
43
44
45
46
47
DEDICATED MEDIA PLAYER

FIG. 4

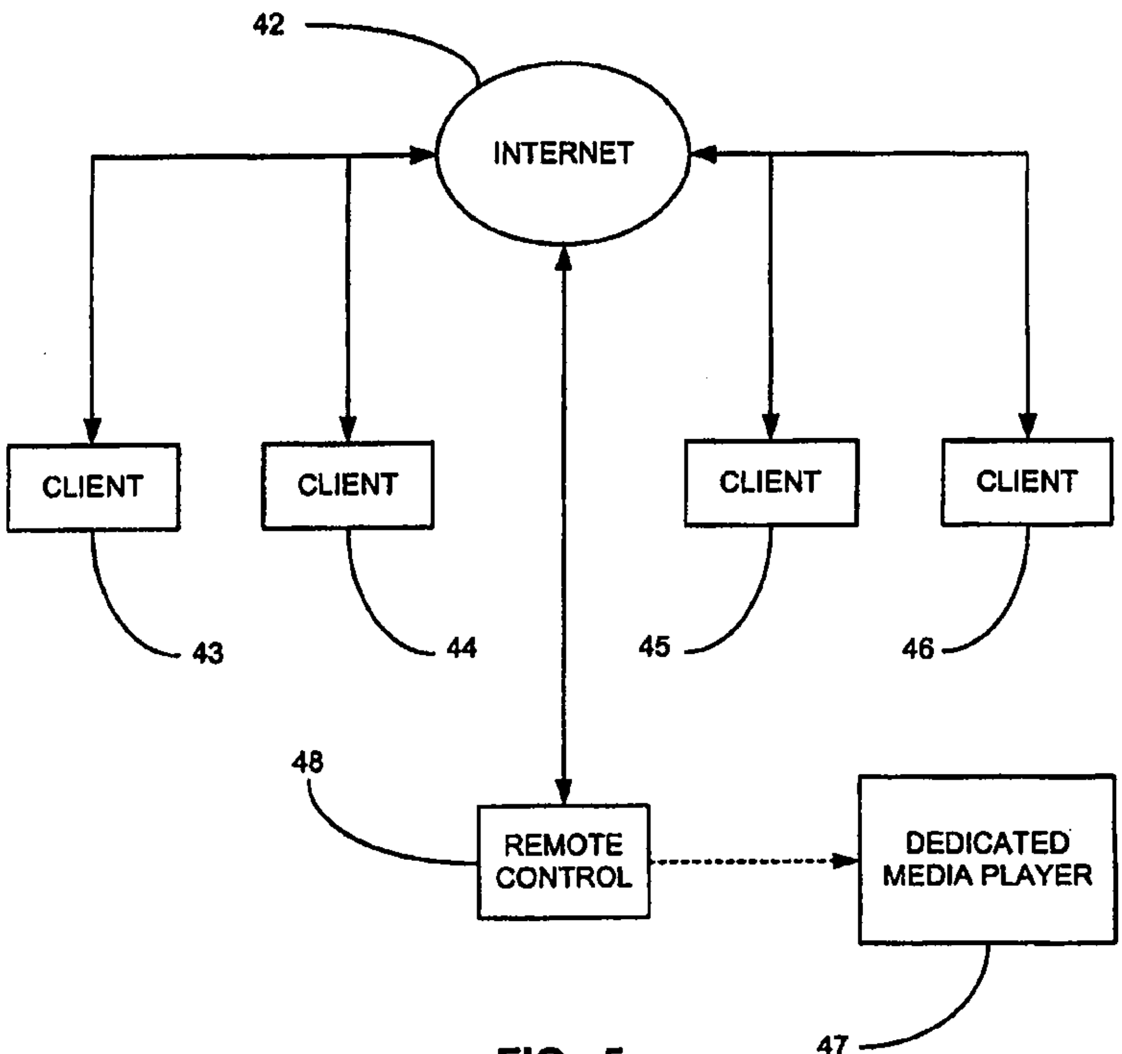
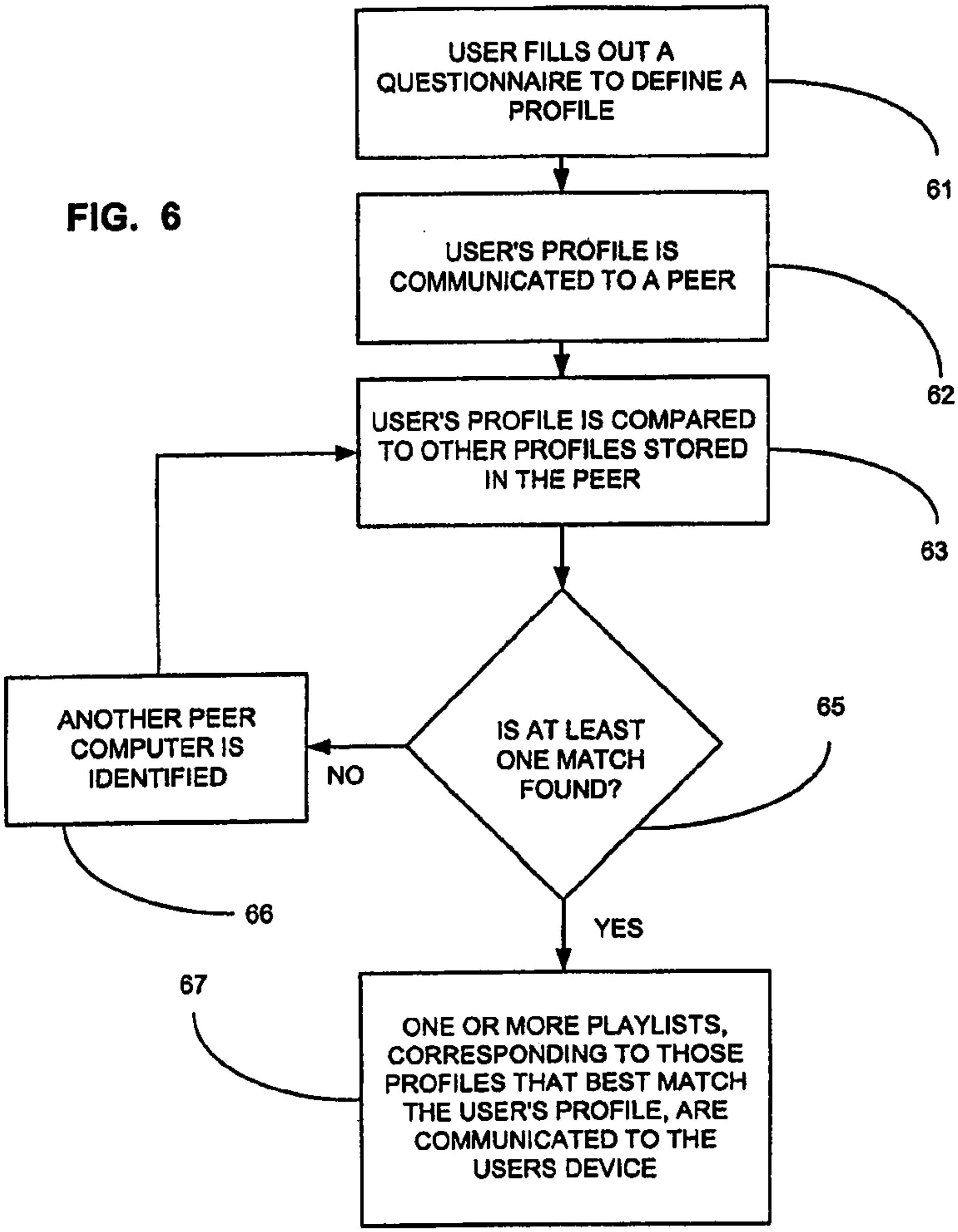

42
INTERNET
CLIENT
CLIENT
CLIENT
CLIENT
43
44
45
46
48
REMOTE CONTROL
DEDICATED MEDIA PLAYER
47

FIG. 5

FIG. 6


USER FILLS OUT A QUESTIONNAIRE TO DEFINE A PROFILE
61
USER'S PROFILE IS COMMUNICATED TO A PEER
62
USER'S PROFILE IS COMPARED TO OTHER PROFILES STORED IN THE PEER
63
IS AT LEAST ONE MATCH FOUND?
65
NO
ANOTHER PEER COMPUTER IS IDENTIFIED
66
YES
67
ONE OR MORE PLAYLISTS, CORRESPONDING TO THOSE PROFILES THAT BEST MATCH THE USER'S PROFILE, ARE COMMUNICATED TO THE USERS DEVICE

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

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 hardware 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. 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;

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 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 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 remove 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 listing 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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1. Becham v. Synthes USA, 482 Fed. Appx. 387

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Cases	-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. *SeeGa. Code Ann. § 13-8-54(b)* (repealed 2011). HB 173 also deemed the duration of certain covenants to be presumptively **[*389]** reasonable. *SeeGa. 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.[2]

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

[2] 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

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Bi et al. (43) **Pub. Date: Jul. 4, 2002**

(54) **INTERACTIVE REMOTE CONTROL OF AUDIO OR VIDEO PLAYBACK AND SELECTIONS**

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(21) Appl. No.: **09/994,011**

(22) Filed: **Nov. 6, 2001**

Related U.S. Application Data

(63) Non-provisional of provisional application No. 60/246,923, filed on Nov. 10, 2000.

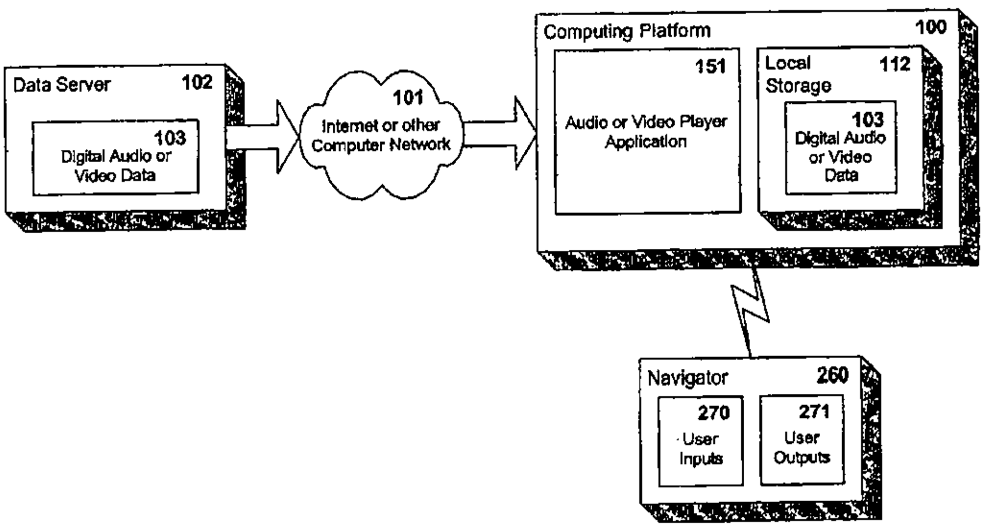
Publication Classification

(51) **Int. Cl.**^{7} **H04N 7/173**

(52) **U.S. Cl.** **725/89**; 725/109; 725/123; 725/134

(57) **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.



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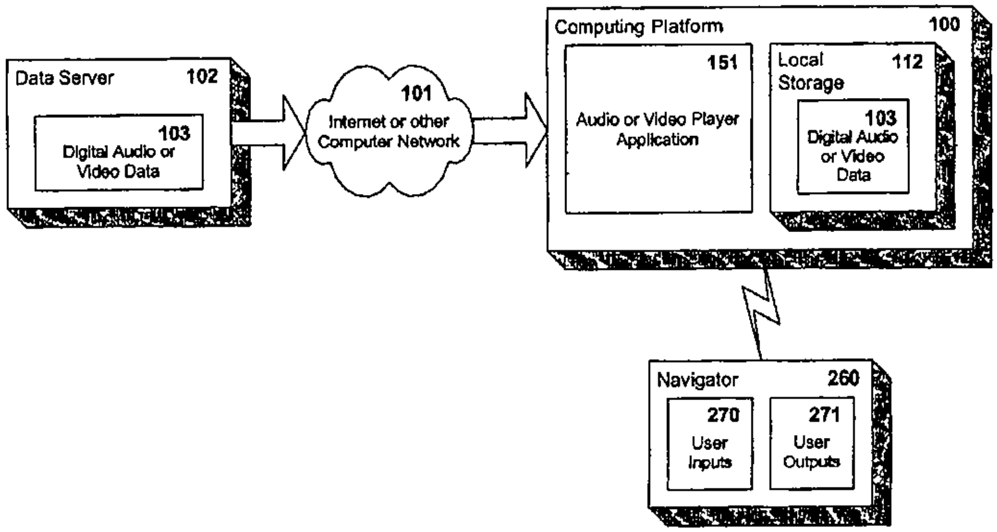
Data Server 102
103
Digital Audio or Video Data
101
Internet or other Computer Network
Computing Platform 100
151
Audio or Video Player Application
Local Storage 112
103
Digital Audio or Video Data
Navigator 260
270
User Inputs
271
User Outputs

Figure 1

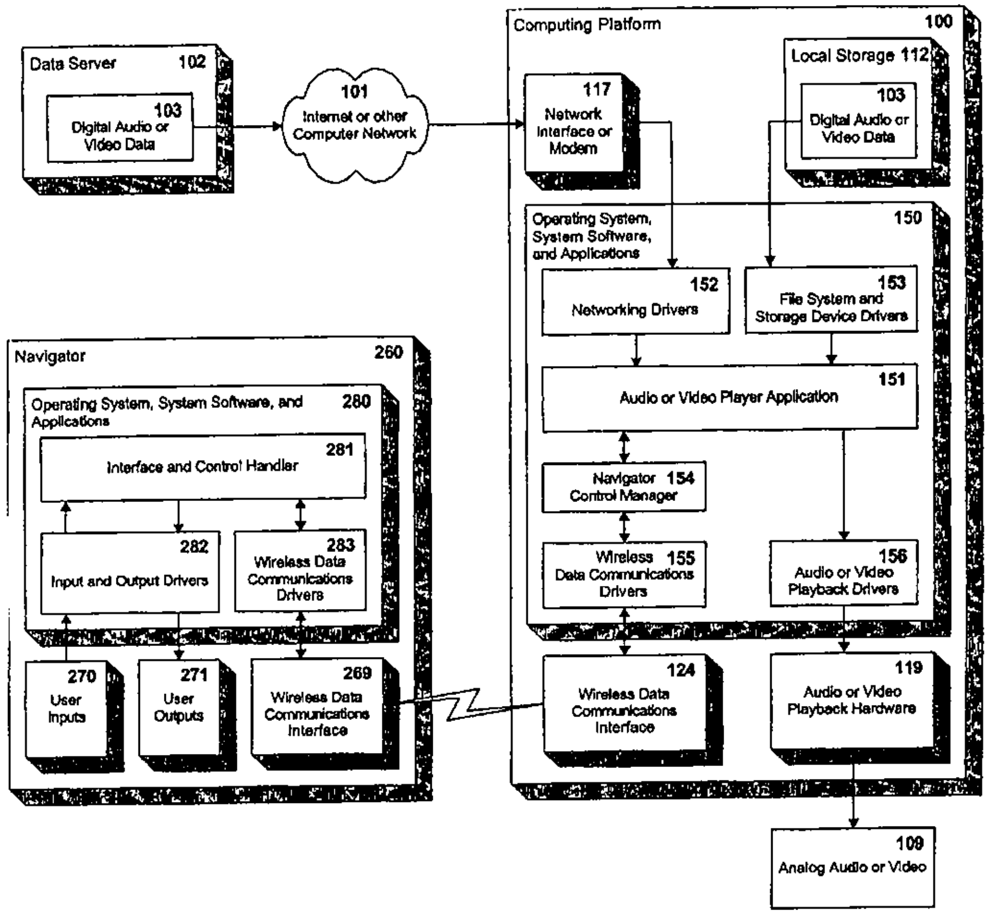
Data Server 102
103 Digital Audio or Video Data
101 Internet or other Computer Network
Computing Platform 100
117 Network Interface or Modem
Local Storage 112
103 Digital Audio or Video Data
Operating System, System Software, and Applications 150
152 Networking Drivers
153 File System and Storage Device Drivers
Audio or Video Player Application 151
Navigator 154 Control Manager
Wireless 155 Data Communications Drivers
156 Audio or Video Playback Drivers
124 Wireless Data Communications Interface
119 Audio or Video Playback Hardware
109 Analog Audio or Video
Navigator 260
Operating System, System Software, and Applications 280
Interface and Control Handler 281
282 Input and Output Drivers
283 Wireless Data Communications Drivers
270 User Inputs
271 User Outputs
269 Wireless Data Communications Interface

Figure 2

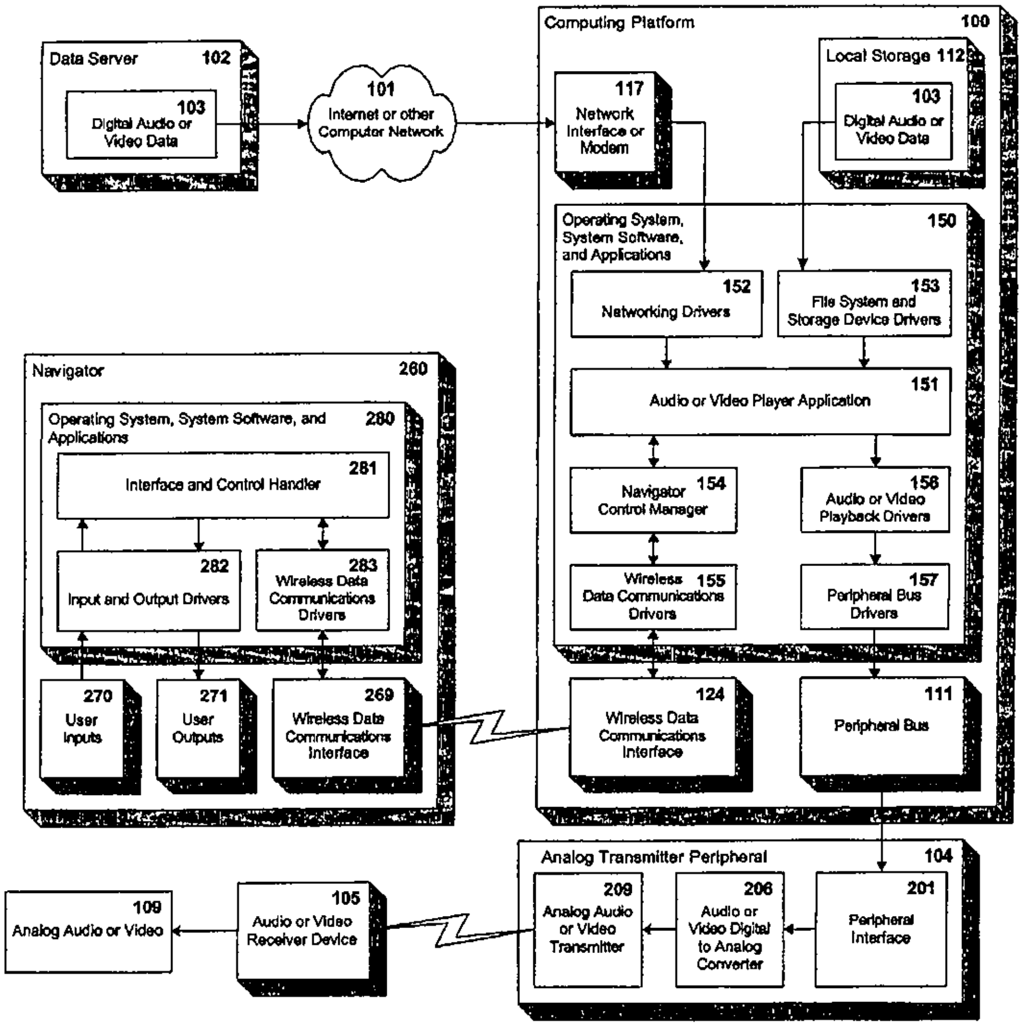
Data Server 102
103 Digital Audio or Video Data
101 Internet or other Computer Network
Computing Platform 100
117 Network Interface or Modem
Local Storage 112
103 Digital Audio or Video Data
Operating System, System Software, and Applications 150
152 Networking Drivers
153 File System and Storage Device Drivers
151 Audio or Video Player Application
Navigator Control Manager 154
156 Audio or Video Playback Drivers
Wireless Data Communications Drivers 155
157 Peripheral Bus Drivers
124 Wireless Data Communications Interface
111 Peripheral Bus
Navigator 260
Operating System, System Software, and Applications 280
281 Interface and Control Handler
282 Input and Output Drivers
283 Wireless Data Communications Drivers
270 User Inputs
271 User Outputs
269 Wireless Data Communications Interface
Analog Transmitter Peripheral 104
209 Analog Audio or Video Transmitter
206 Audio or Video Digital to Analog Converter
201 Peripheral Interface
105 Audio or Video Receiver Device
109 Analog Audio or Video

Figure 3

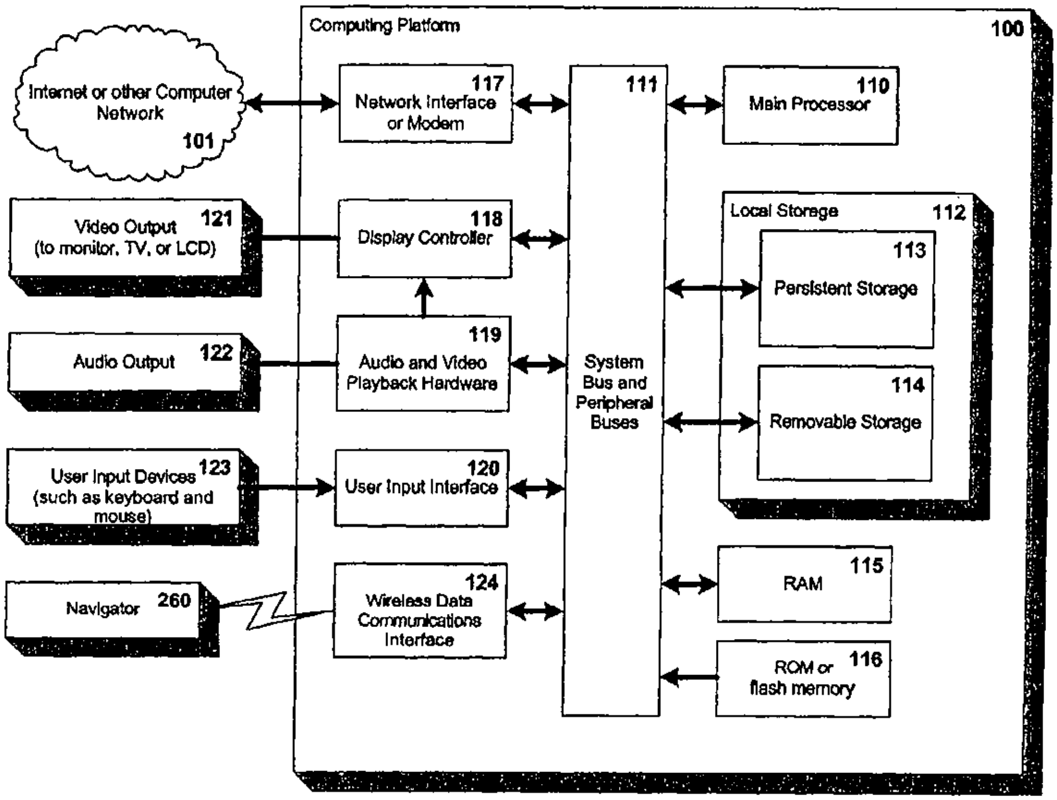
Computing Platform
100
Internet or other Computer Network
101
117
Network Interface or Modem
111
110
Main Processor
Video Output
121
(to monitor, TV, or LCD)
118
Display Controller
Local Storage
112
113
Persistent Storage
Audio Output
122
119
Audio and Video Playback Hardware
System Bus and Peripheral Buses
114
Removable Storage
User Input Devices
123
(such as keyboard and mouse)
120
User Input Interface
115
RAM
Navigator
260
124
Wireless Data Communications Interface
ROM or
116
flash memory

Figure 4

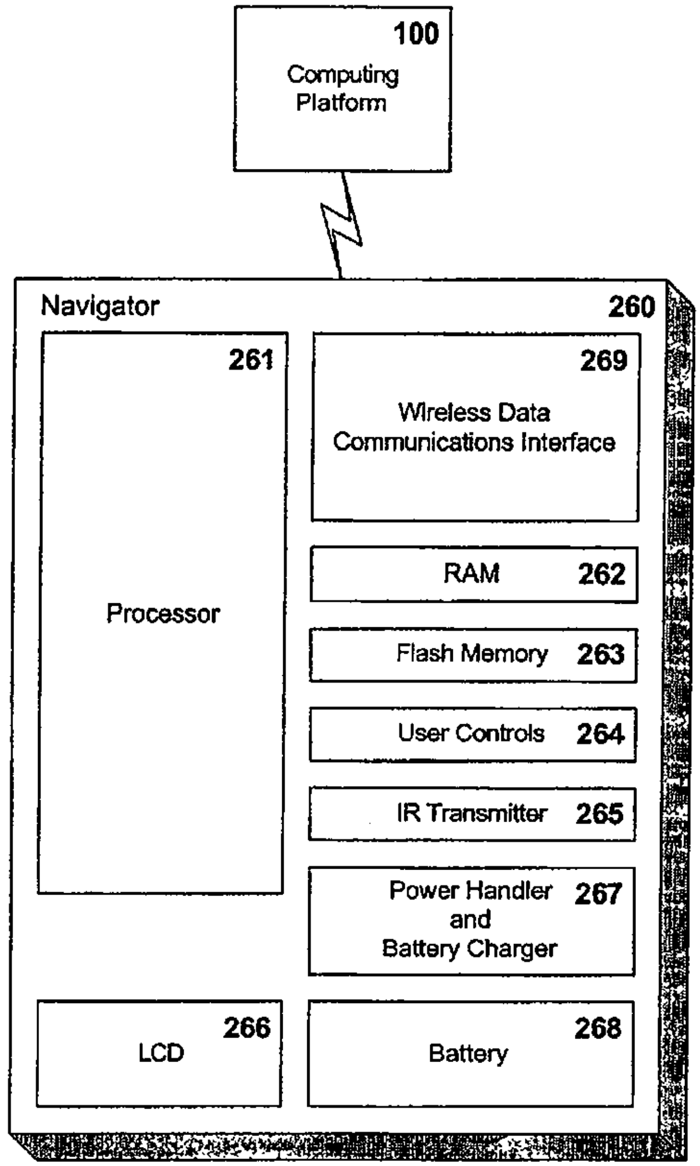
100
Computing
Platform
Navigator
260
261
Processor
269
Wireless Data
Communications Interface
RAM
262
Flash Memory
263
User Controls
264
IR Transmitter
265
Power Handler
and
Battery Charger
267
266
LCD
268
Battery

Figure 5

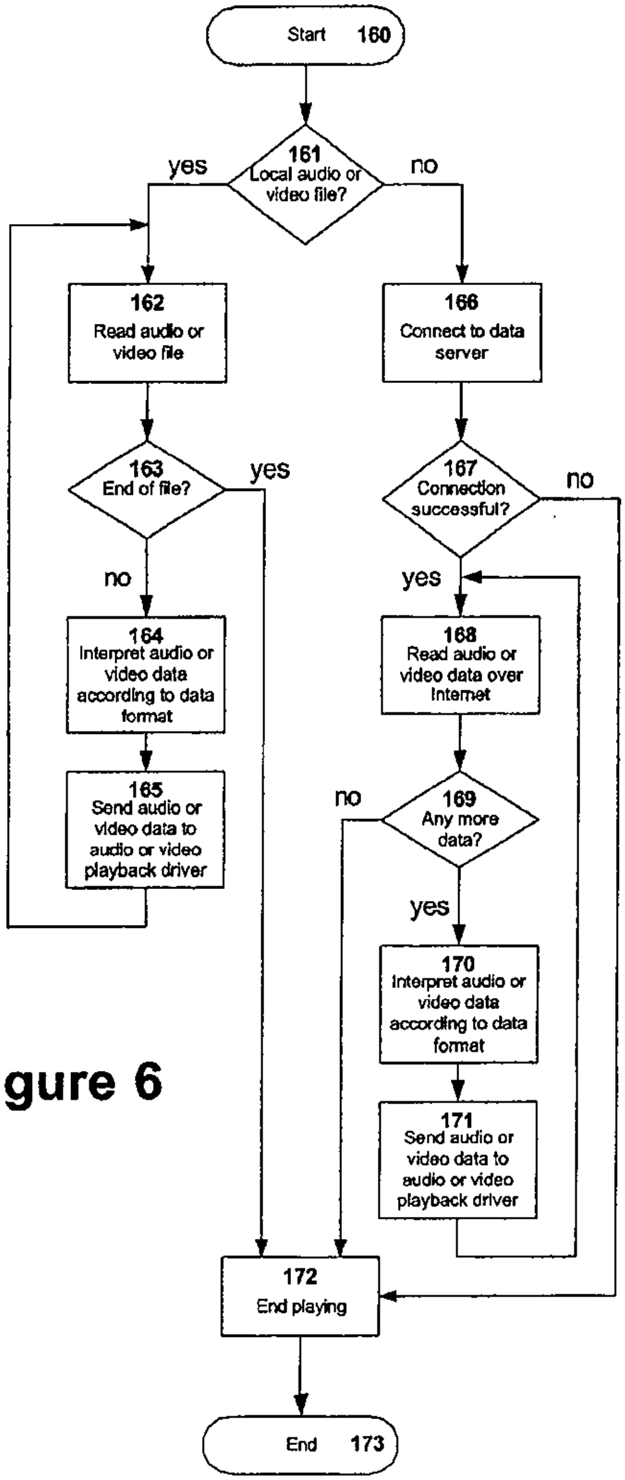
Start 160
161
Local audio or video file?
yes
no
162
Read audio or video file
163
End of file?
yes
no
164
Interpret audio or video data according to data format
165
Send audio or video data to audio or video playback driver
166
Connect to data server
167
Connection successful?
no
yes
168
Read audio or video data over Internet
169
Any more data?
no
yes
170
Interpret audio or video data according to data format
171
Send audio or video data to audio or video playback driver
172
End playing
End 173

Figure 6

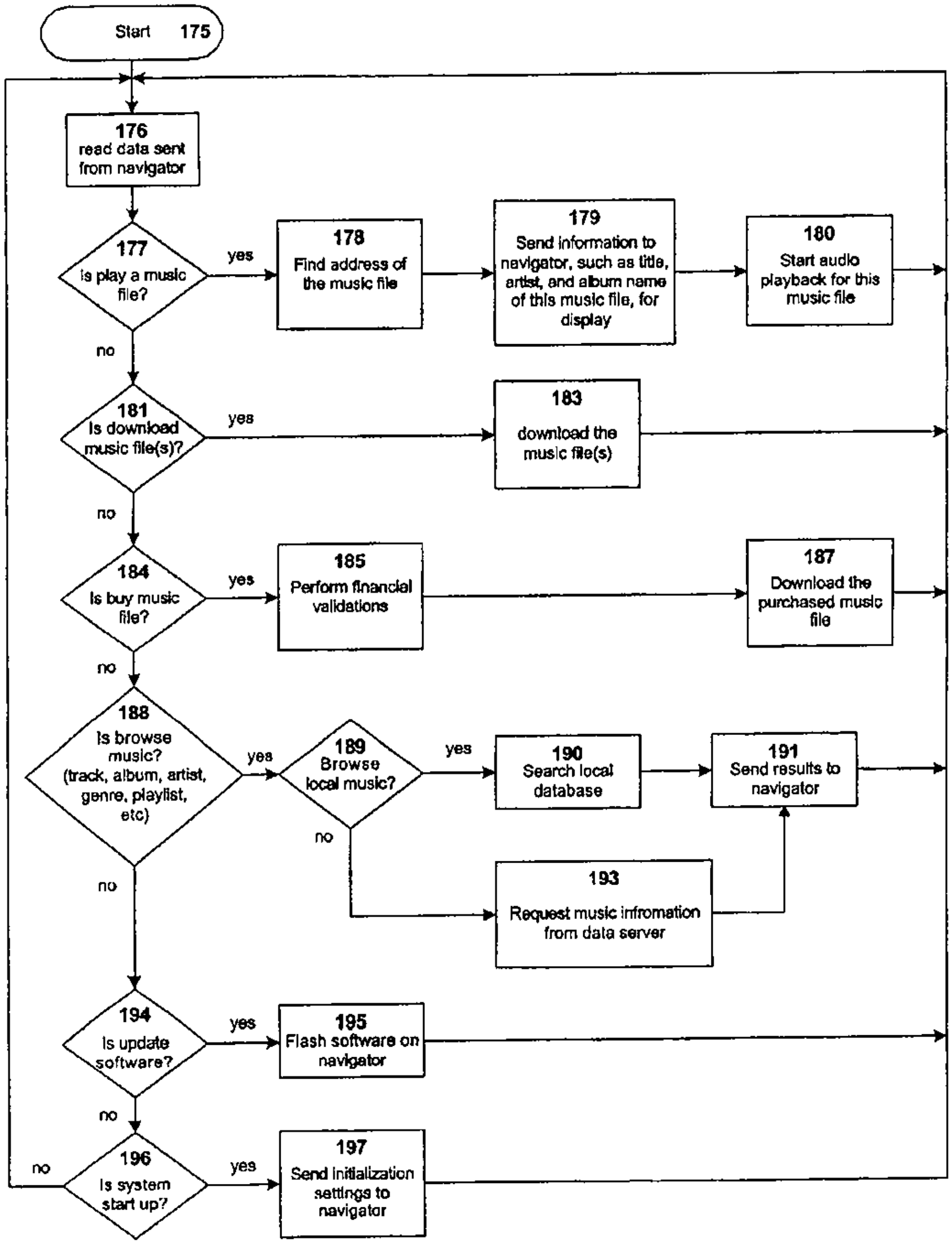
Start 175
176
read data sent from navigator
177
Is play a music file?
yes
178
Find address of the music file
179
Send information to navigator, such as title, artist, and album name of this music file, for display
180
Start audio playback for this music file
no
181
Is download music file(s)?
yes
183
download the music file(s)
no
184
Is buy music file?
yes
185
Perform financial validations
187
Download the purchased music file
no
188
Is browse music? (track, album, artist, genre, playlist, etc)
yes
189
Browse local music?
yes
190
Search local database
191
Send results to navigator
no
193
Request music infromation from data server
no
194
Is update software?
yes
195
Flash software on navigator
no
196
Is system start up?
yes
197
Send initialization settings to navigator
no

Figure 7

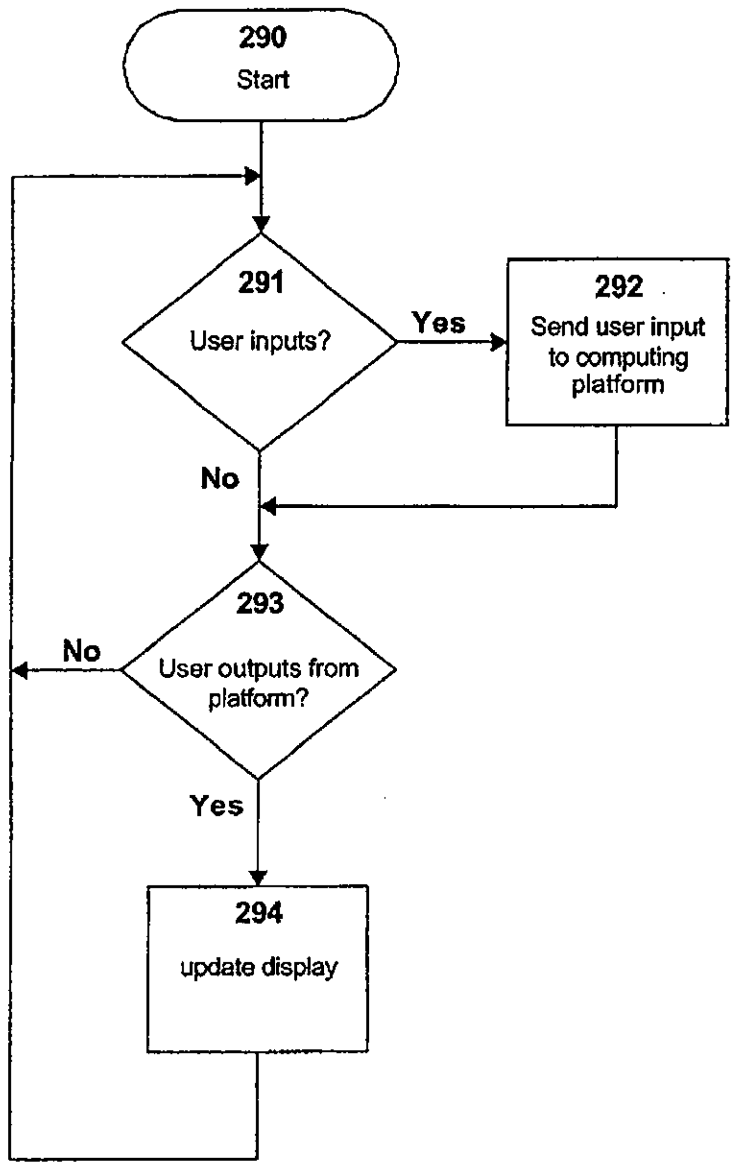
290
Start
291
User inputs?
Yes
292
Send user input to computing platform
No
293
User outputs from platform?
No
Yes
294
update display

Figure 8

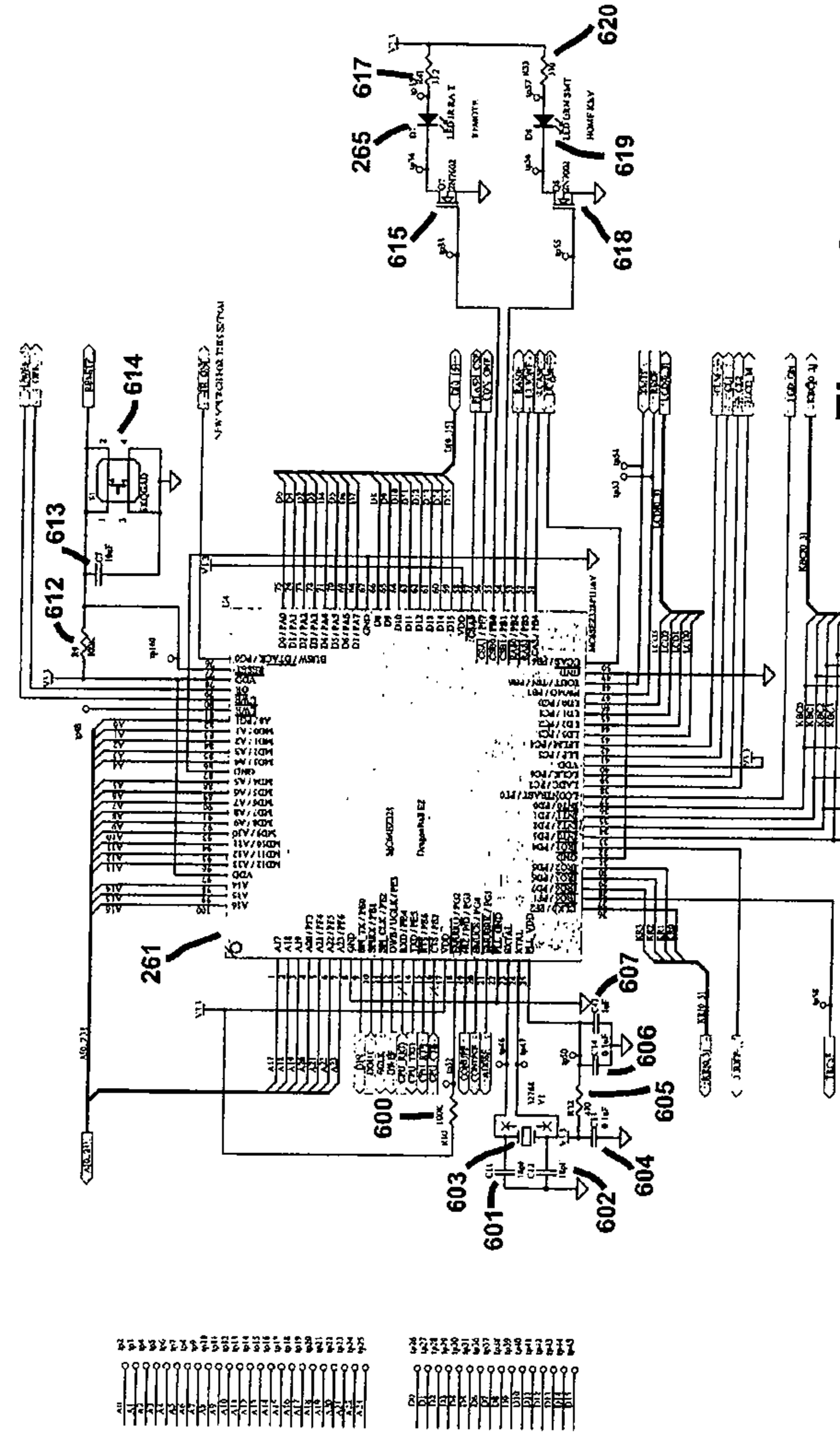
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Figure 9

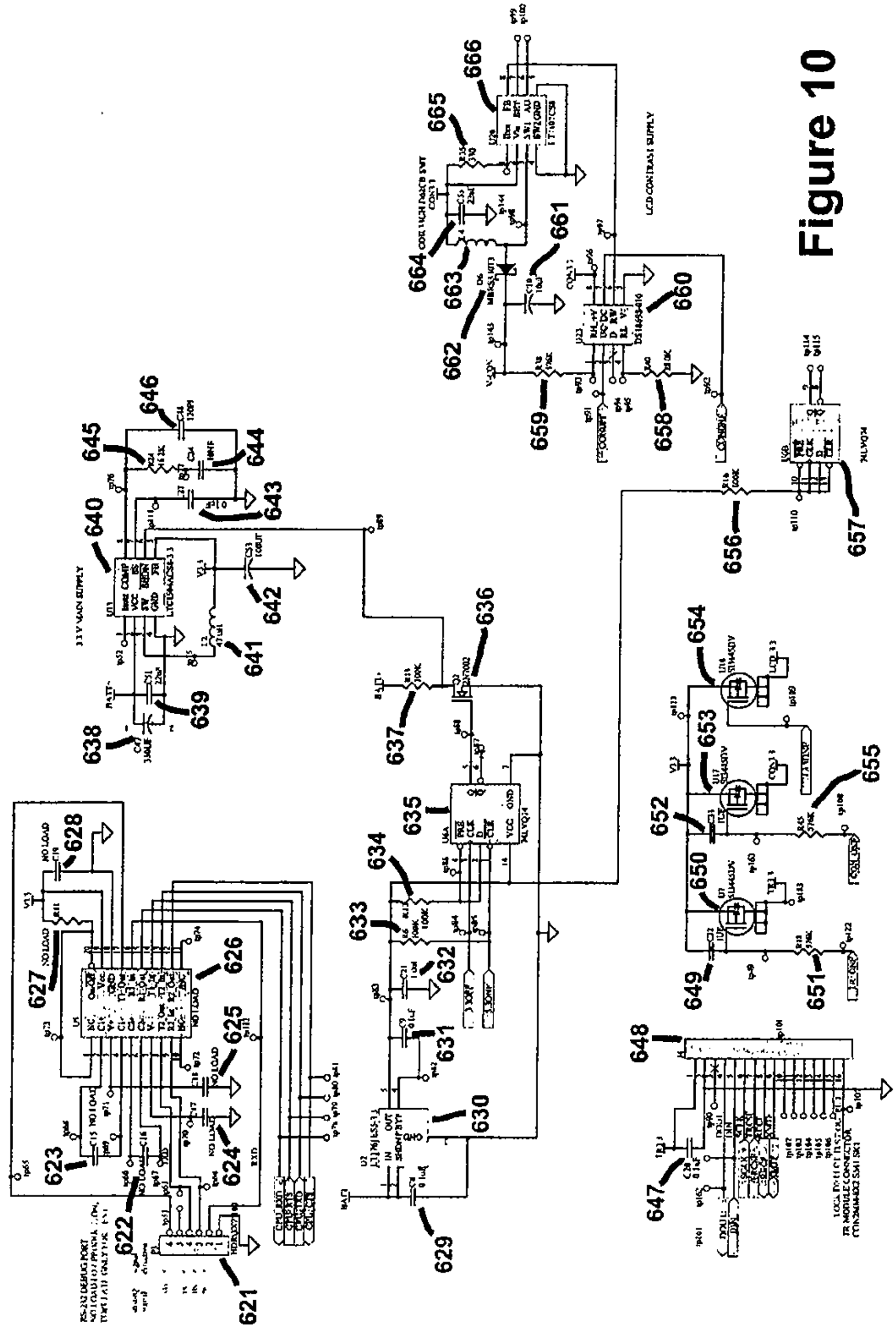
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Figure 10

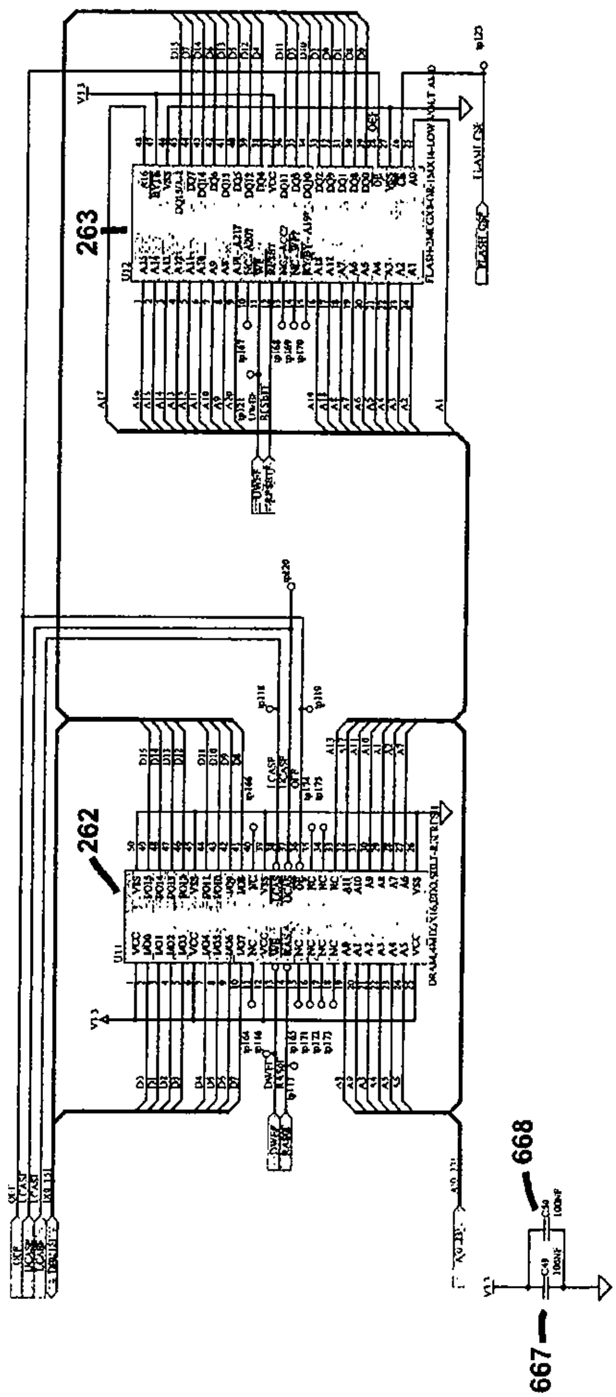

Figure 11

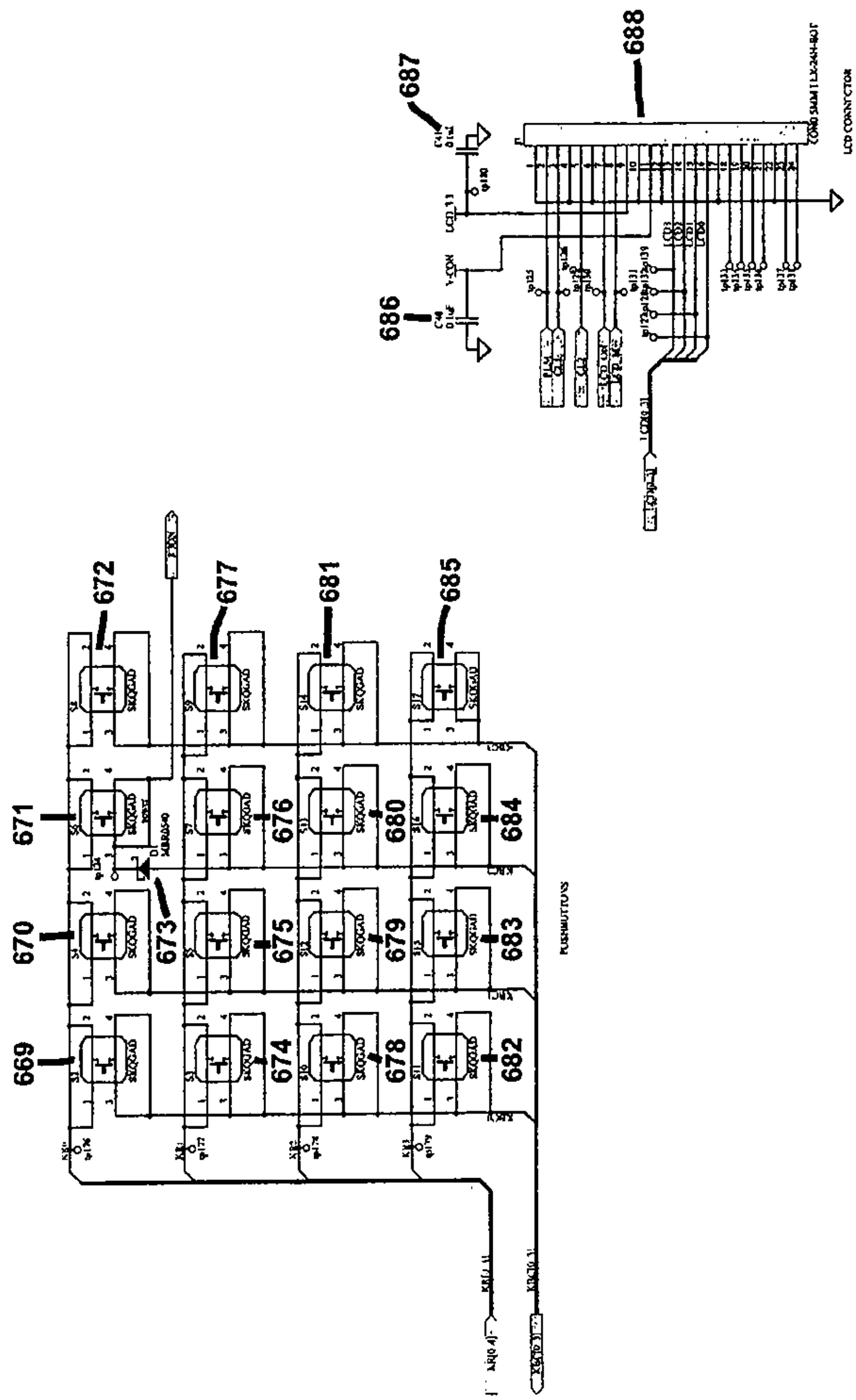
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Figure 12

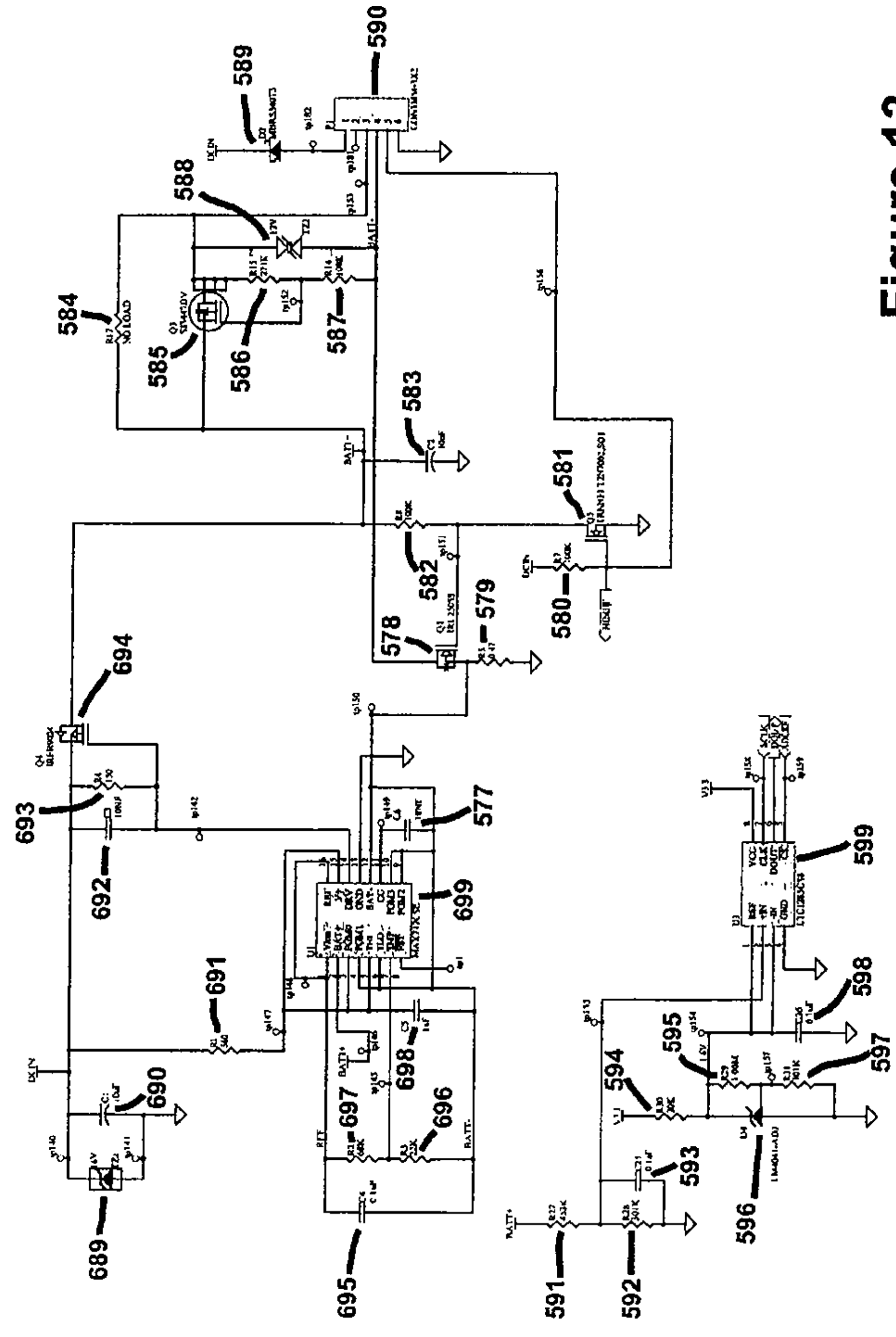
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Figure 13

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 though 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 though 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 components 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 4×4 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

(12) United States Patent
Erekson

(10) **Patent No.: US 6,622,018 B1**
(45) **Date of Patent: Sep. 16, 2003**

(54) **PORTABLE DEVICE CONTROL CONSOLE WITH WIRELESS CONNECTION**

(75) Inventor: **Rich Erekson**, Ogden, UT (US)

(73) Assignee: **3Com Corporation**, Santa Clara, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/558,413**

(22) Filed: **Apr. 24, 2000**

(51) **Int. Cl.**^{7} **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

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,917,405 A * 6/1999 Joao 340/426
6,091,957 A * 7/2000 Larkins et al. 455/456
6,161,066 A * 12/2000 Wright et al. 701/36
6,339,706 B1 * 1/2002 Tillgren et al. 455/419

* cited by examiner

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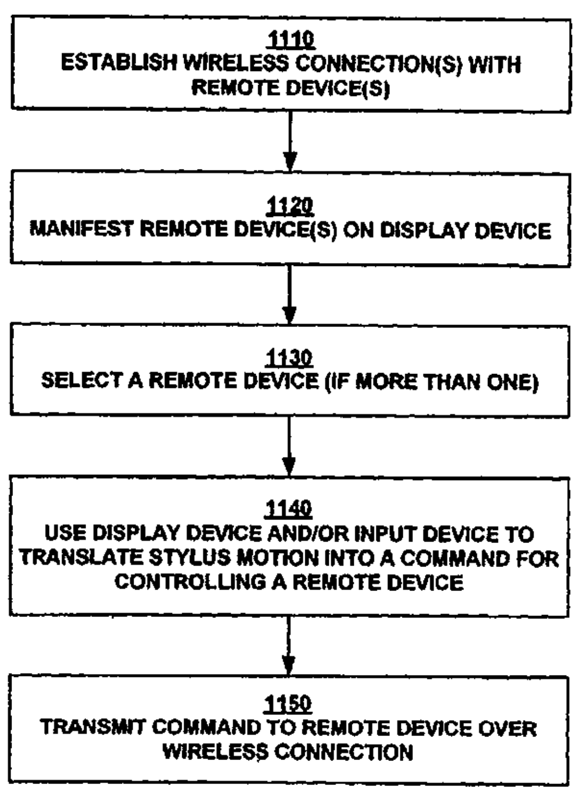
(57) **ABSTRACT**

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.

27 Claims, 12 Drawing Sheets

1100



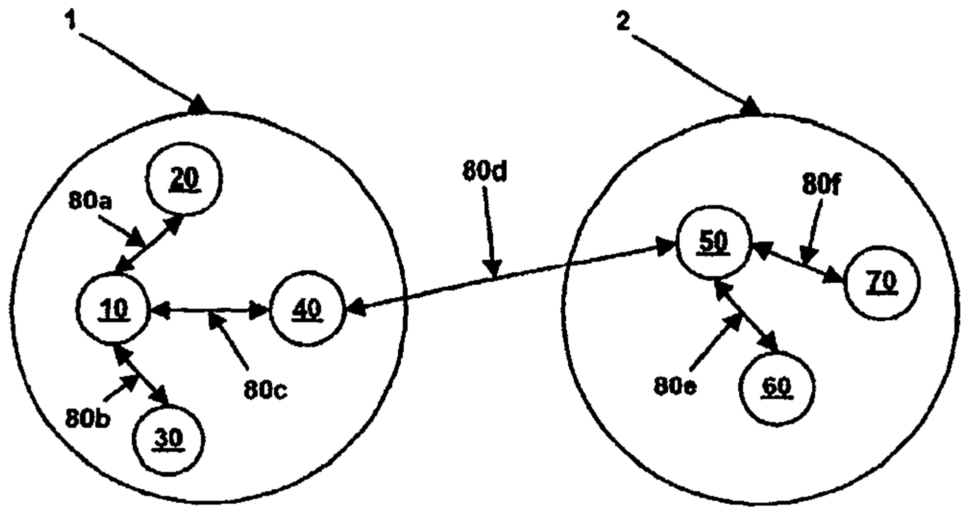


FIG. 1

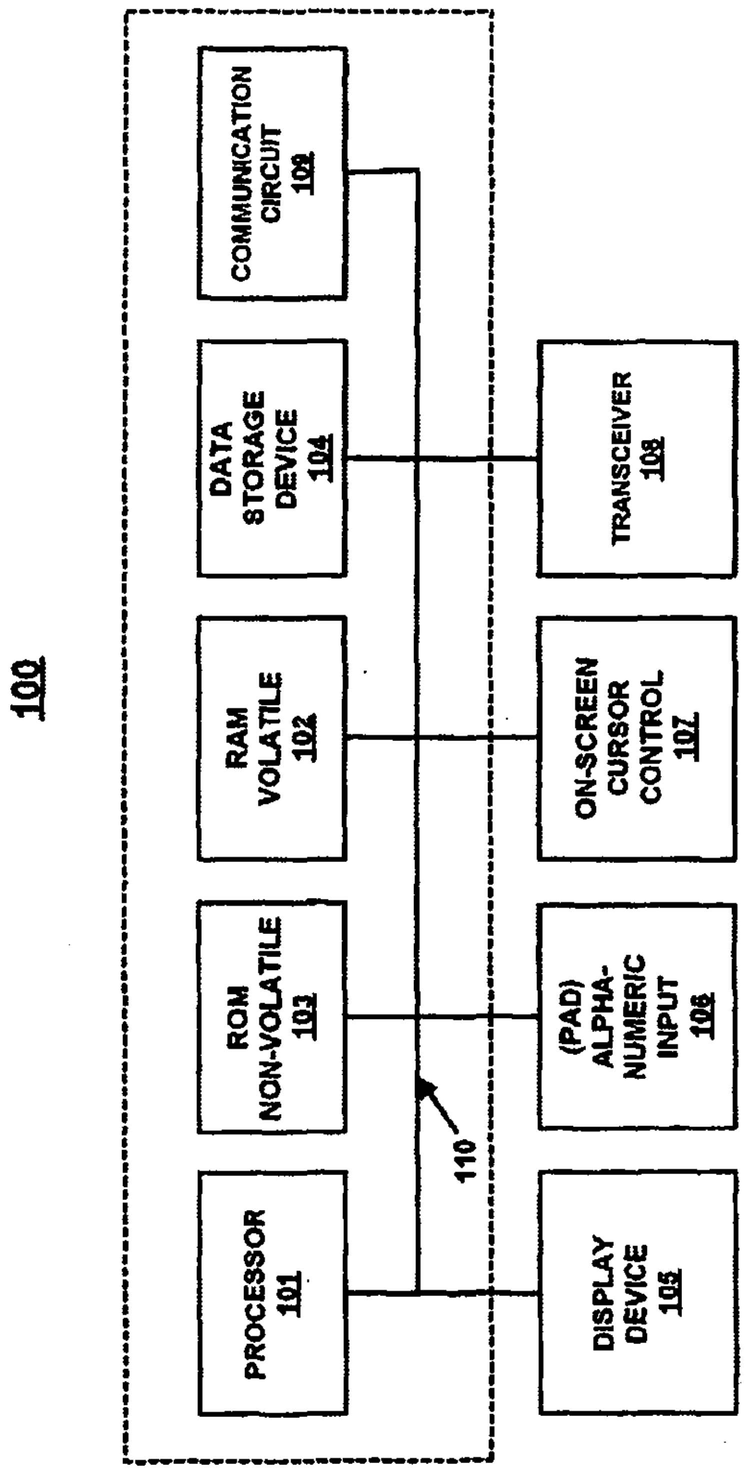

100
PROCESSOR 101
ROM NON-VOLATILE 103
RAM VOLATILE 102
DATA STORAGE DEVICE 104
COMMUNICATION CIRCUIT 109
110
DISPLAY DEVICE 105
(PAD) ALPHA-NUMERIC INPUT 106
ON-SCREEN CURSOR CONTROL 107
TRANSCEIVER 108

FIG. 2

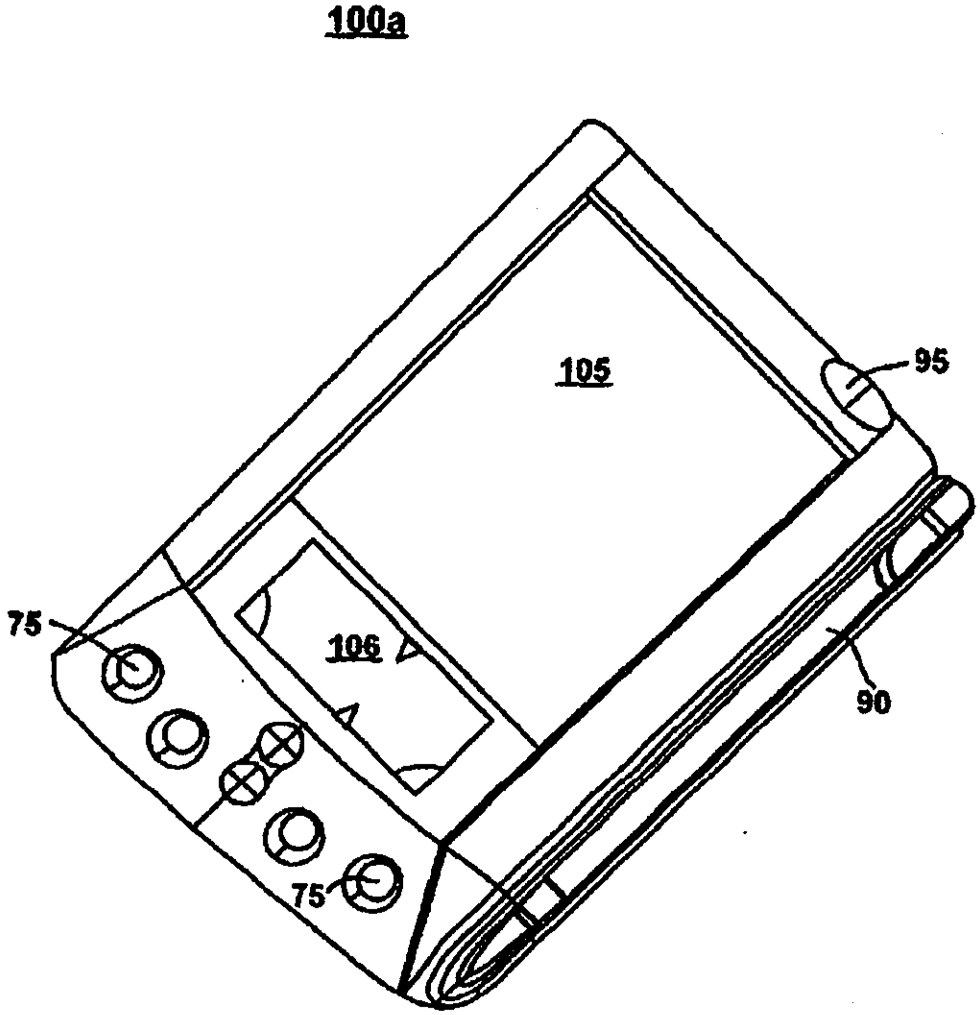


FIG. 3

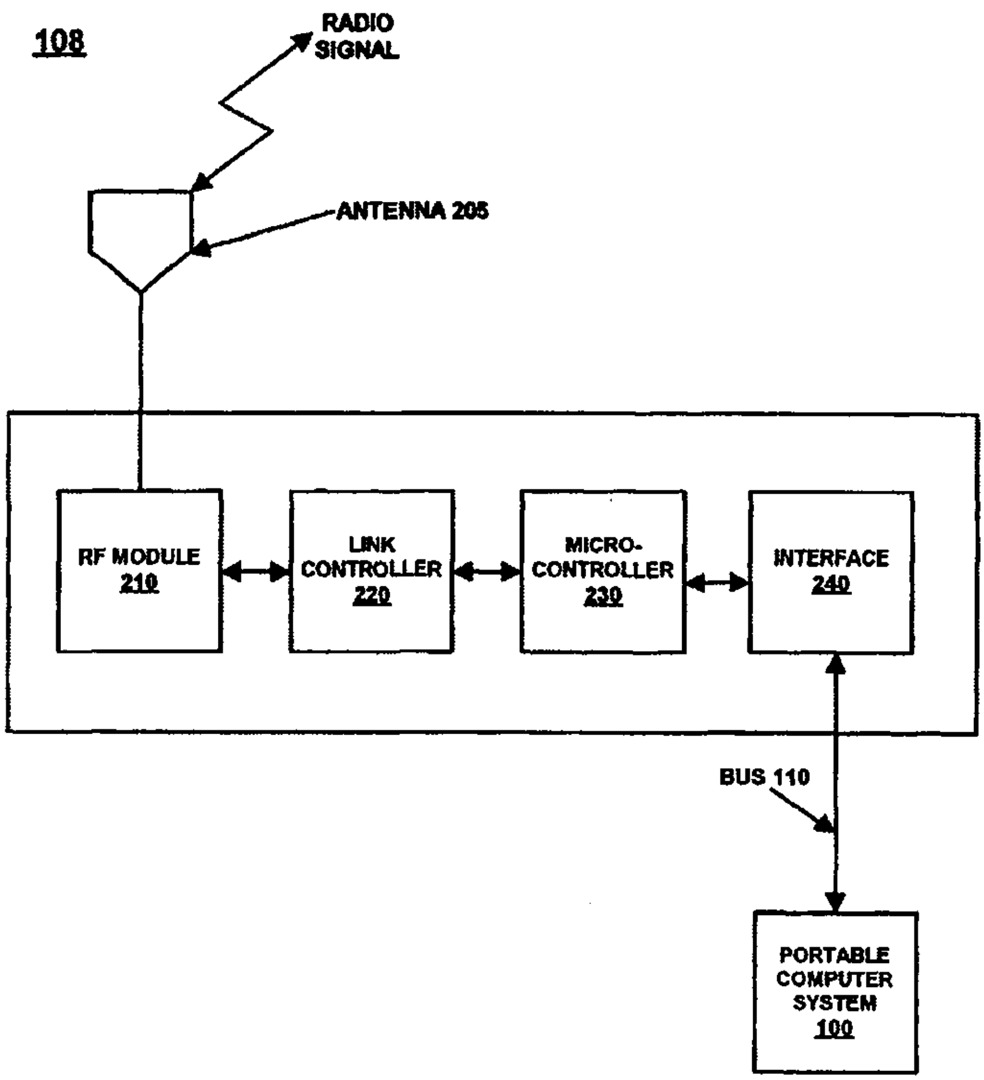

108
RADIO SIGNAL
ANTENNA 205
RF MODULE 210
LINK CONTROLLER 220
MICRO-CONTROLLER 230
INTERFACE 240
BUS 110
PORTABLE COMPUTER SYSTEM 100

FIG. 4A

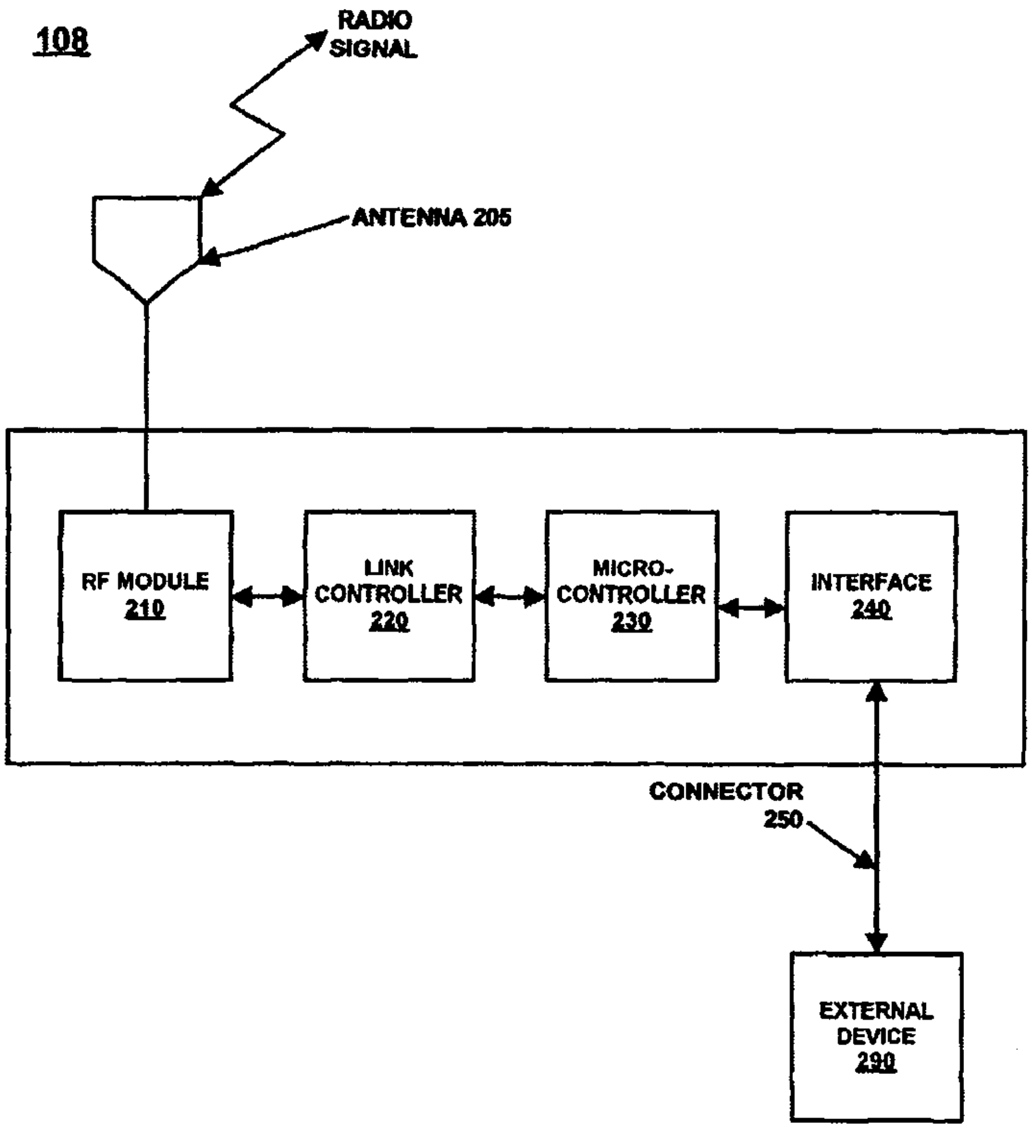

108
RADIO SIGNAL
ANTENNA 205
RF MODULE 210
LINK CONTROLLER 220
MICRO-CONTROLLER 230
INTERFACE 240
CONNECTOR 250
EXTERNAL DEVICE 290

FIG. 4B

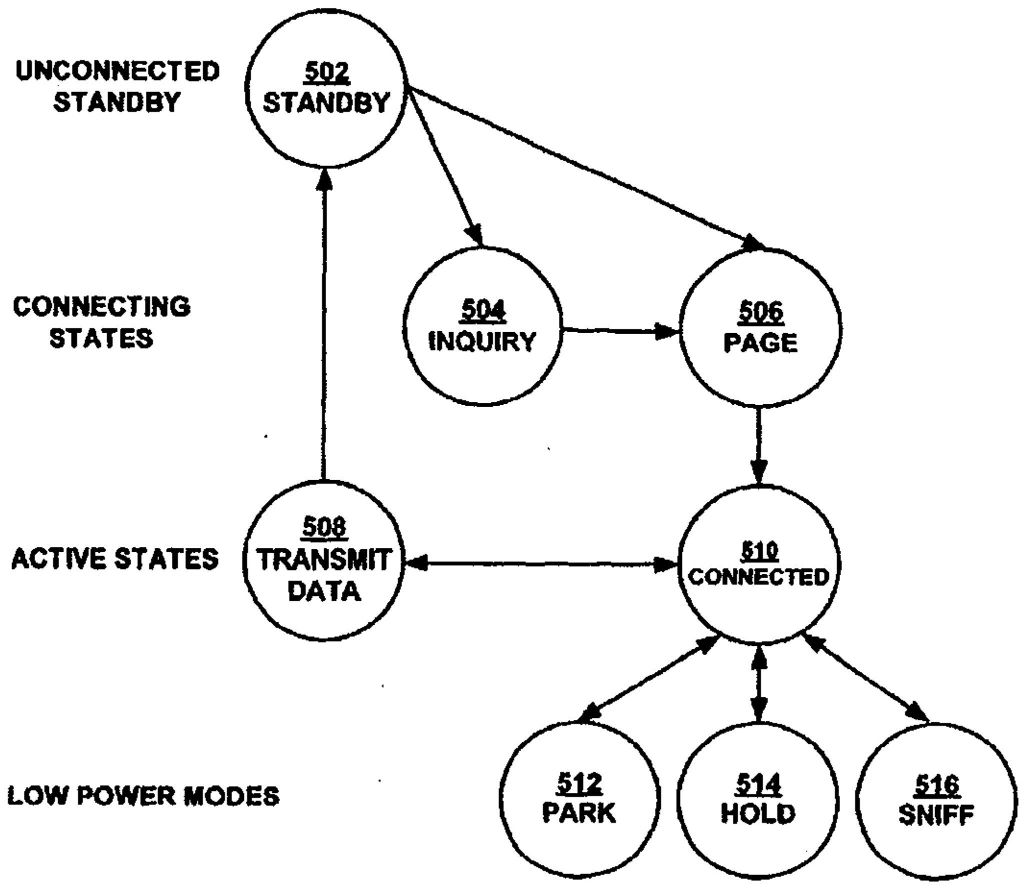

UNCONNECTED STANDBY
502 STANDBY
CONNECTING STATES
504 INQUIRY
506 PAGE
ACTIVE STATES
508 TRANSMIT DATA
510 CONNECTED
LOW POWER MODES
512 PARK
514 HOLD
516 SNIFF

FIG. 5

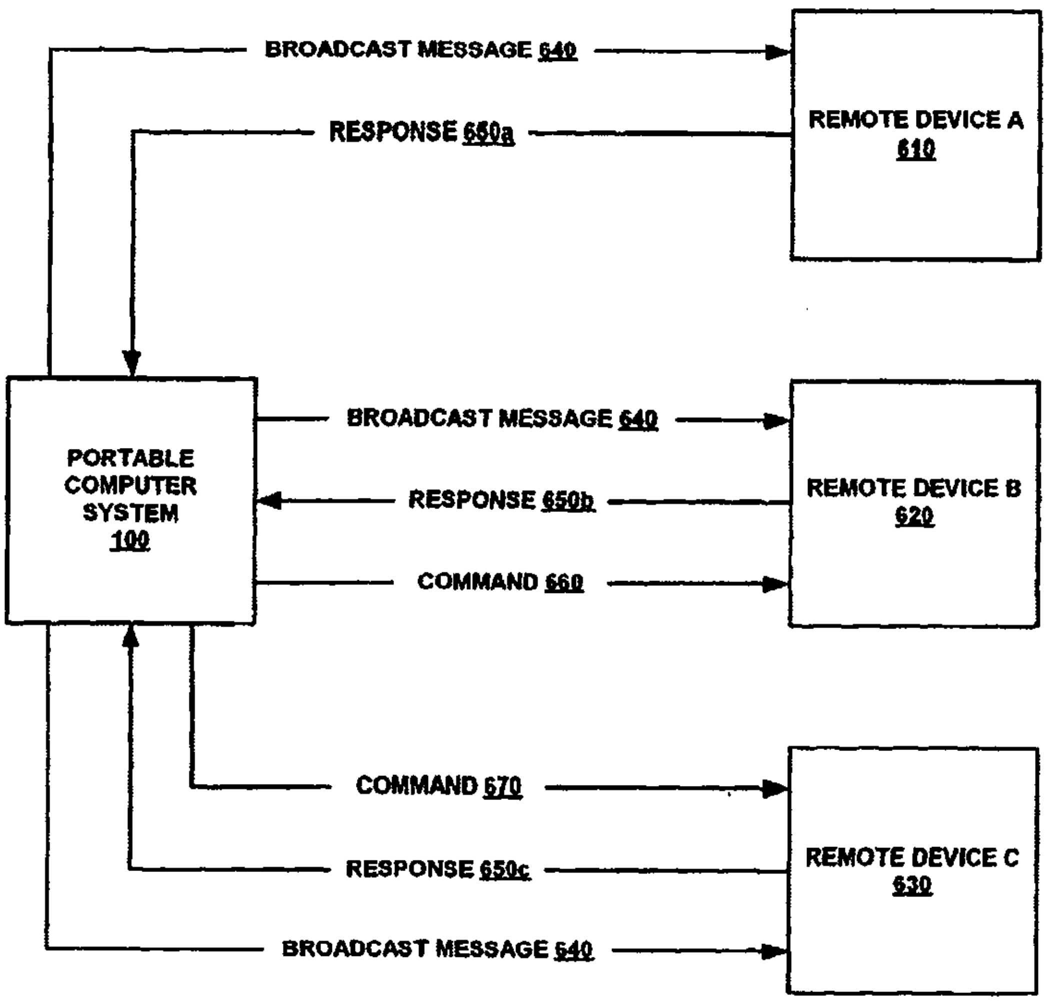

BROADCAST MESSAGE 640
RESPONSE 650a
REMOTE DEVICE A
610
PORTABLE COMPUTER SYSTEM
100
BROADCAST MESSAGE 640
RESPONSE 650b
COMMAND 660
REMOTE DEVICE B
620
COMMAND 670
RESPONSE 650c
BROADCAST MESSAGE 640
REMOTE DEVICE C
630

FIG. 6

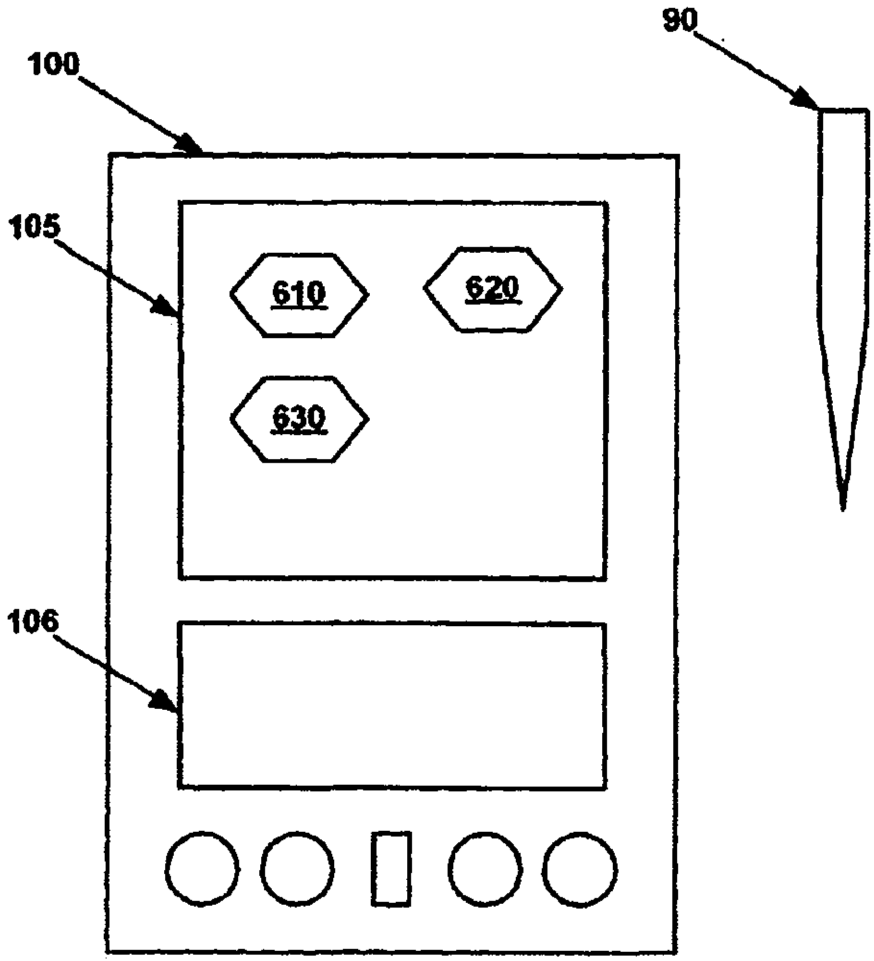


FIG. 7

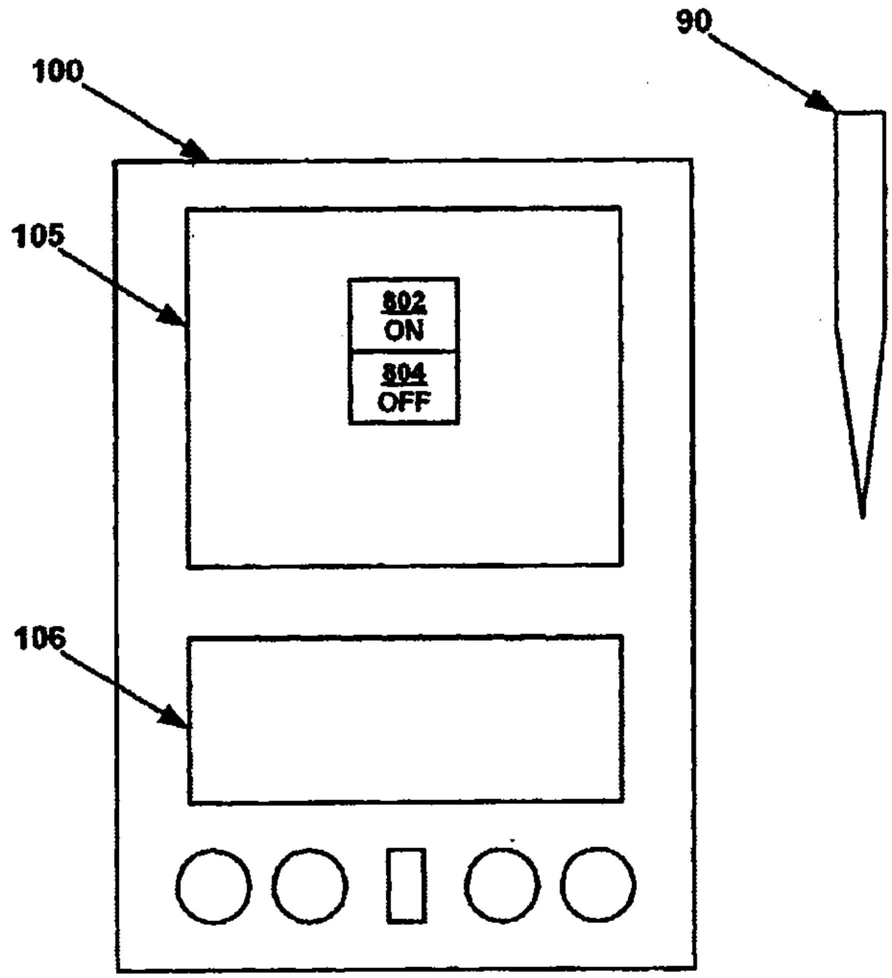


FIG. 8

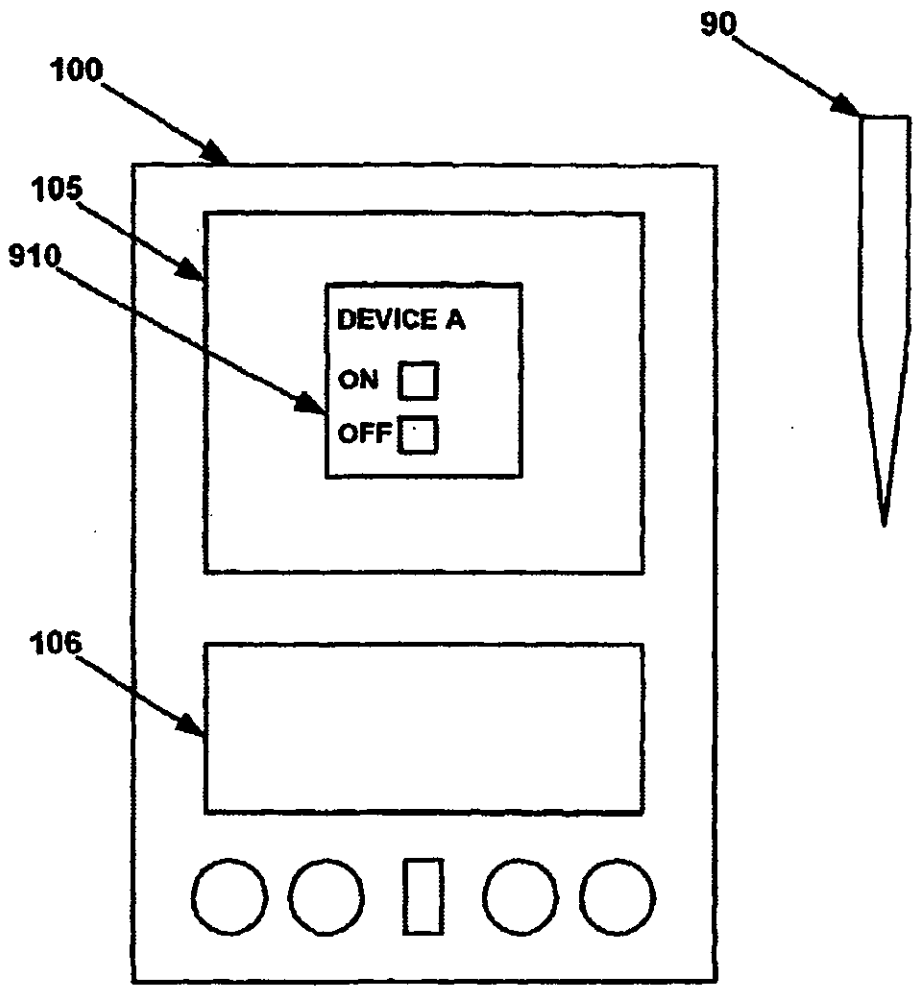


FIG. 9

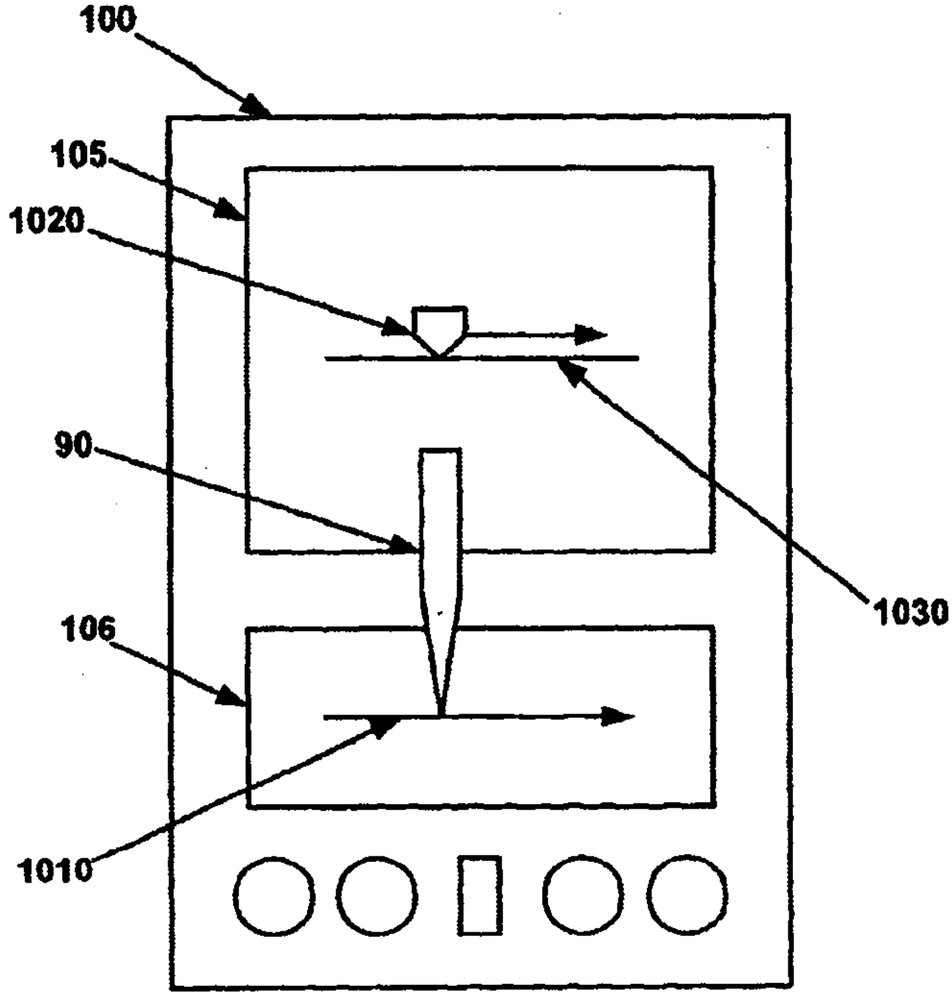


FIG. 10

1100

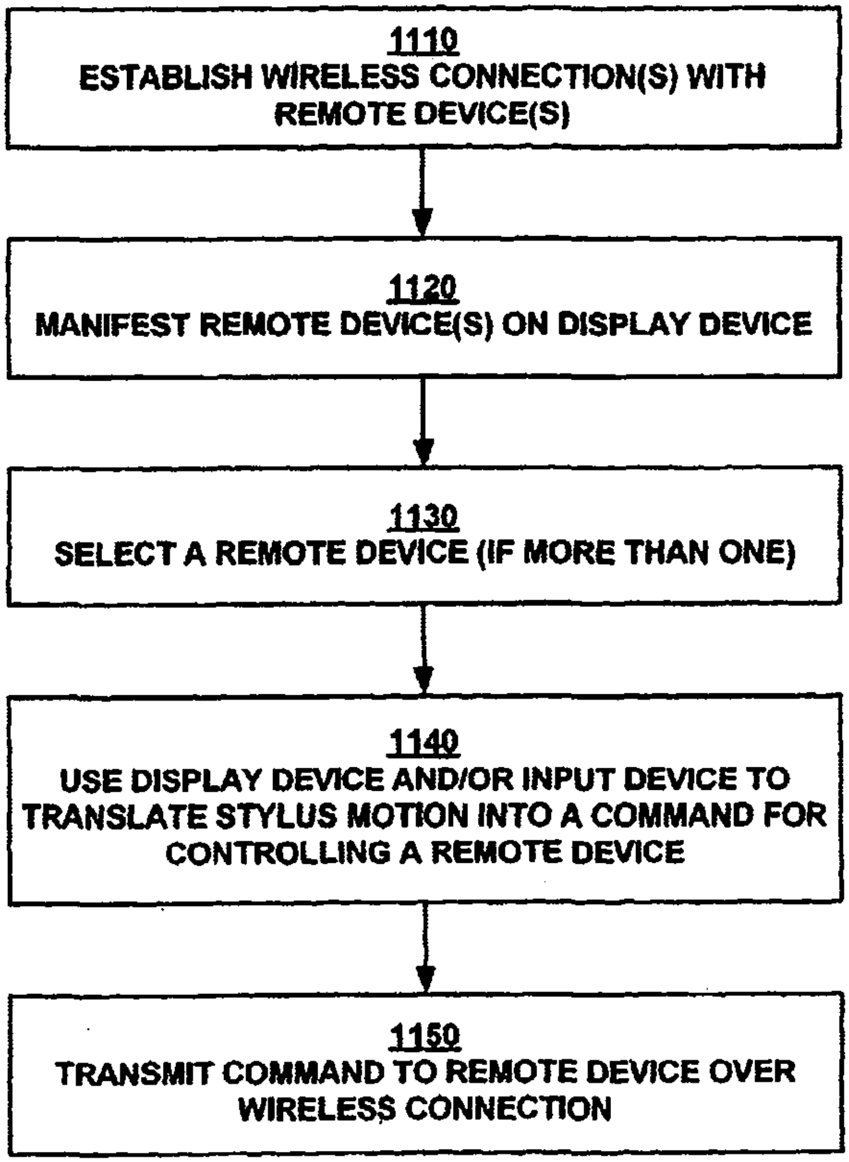

1110
ESTABLISH WIRELESS CONNECTION(S) WITH REMOTE DEVICE(S)
1120
MANIFEST REMOTE DEVICE(S) ON DISPLAY DEVICE
1130
SELECT A REMOTE DEVICE (IF MORE THAN ONE)
1140
USE DISPLAY DEVICE AND/OR INPUT DEVICE TO TRANSLATE STYLUS MOTION INTO A COMMAND FOR CONTROLLING A REMOTE DEVICE
1150
TRANSMIT COMMAND TO REMOTE DEVICE OVER WIRELESS CONNECTION

FIG. 11

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 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.

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 **80***a*–*c*. Similarly, devices **50**, **60** and **70** are coupled in piconet **2** using wireless connections **80***e*–*f*. Piconet **1** and piconet **2** are coupled using wireless connection **80***d*. 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 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 **100***a* of one embodiment of the portable computer system **100** (FIG. **2**) in accordance with the present invention. The top-side face **100***a* 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 **100***a* 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 **100***a* 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. **4**A and **4**B 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. **4**A and **4**B, 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. **4**A and **4**B, 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. **4**A and **4**B) 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 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 **650***a*, **650***b* and **650***c*, respectively. In the present embodiment, responses **650***a*–*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 **650***a*–*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 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 **650***a–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 ofthe 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.

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

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 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.

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.

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

US006502194B1

(12) **United States Patent**
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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(73) Assignee: **Synetix Technologies**, San Francisco, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/293,252**

(22) Filed: **Apr. 16, 1999**

(51) **Int. Cl.**[7] **H04L 12/00**; G06F 13/372

(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

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,788,675 A		11/1988	Jones et al.	370/69.1
4,829,372 A		5/1989	McCalley et al.	358/86
5,544,228 A		8/1996	Wagner et al.	379/67
5,553,140 A		9/1996	Kubota et al.	380/10
5,635,979 A		6/1997	Kostreski et al.	348/13
5,790,423 A		8/1998	Lau et al.	364/514
5,822,537 A	*	10/1998	Katseff et al.	370/231
6,138,147 A	*	10/2000	Weaver et al.	707/104.1
6,222,838 B1	*	4/2001	Sparks et al.	370/352
6,246,672 B1	*	6/2001	Lumelsky	370/310

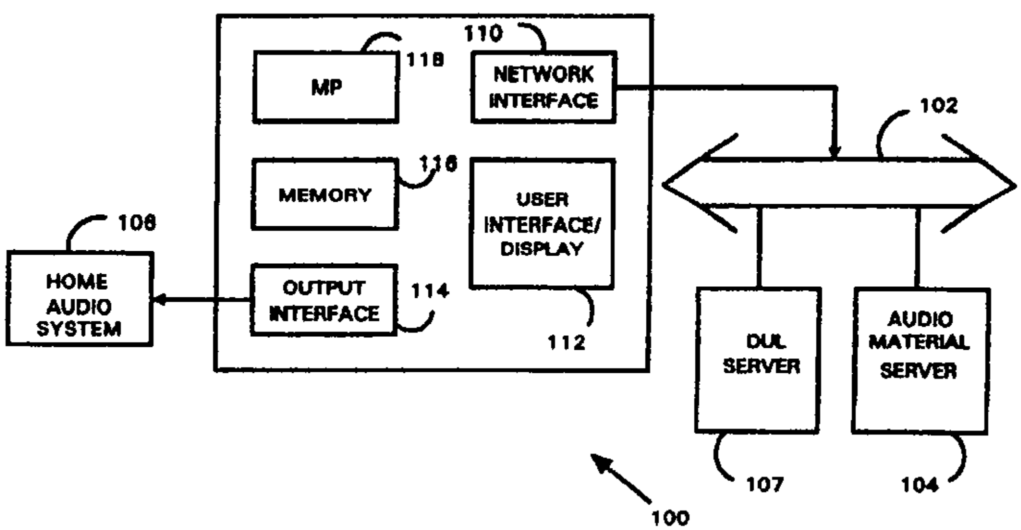
* cited by examiner

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 to 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



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9

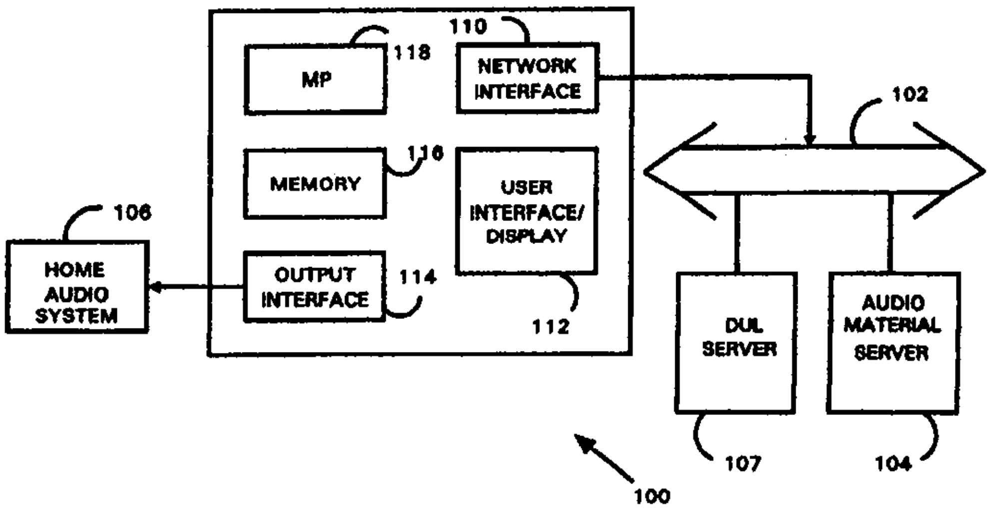
110
MP
118
NETWORK INTERFACE
102
MEMORY
116
USER INTERFACE/ DISPLAY
106
HOME AUDIO SYSTEM
OUTPUT INTERFACE
114
112
DUL SERVER
AUDIO MATERIAL SERVER
107
104
100

FIG. 1

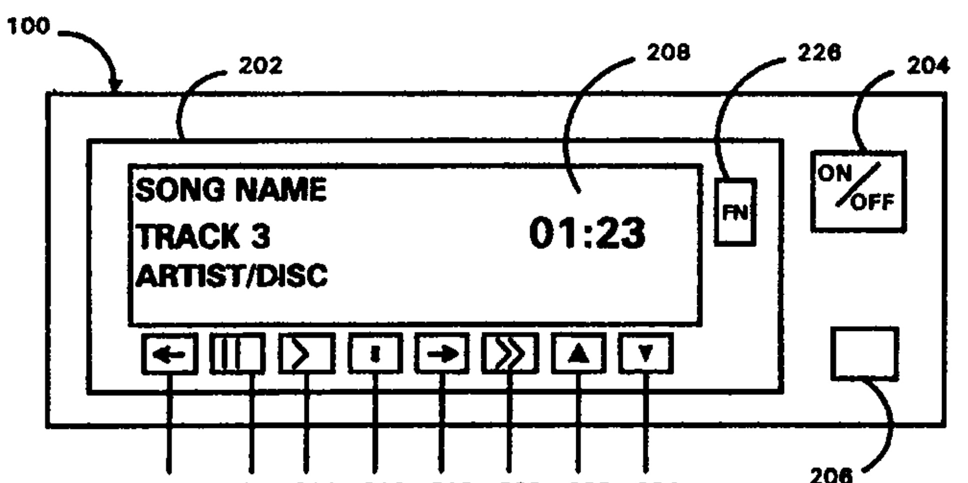
100
202
208
226
204
SONG NAME
TRACK 3
01:23
ARTIST/DISC
FN
ON/OFF
210 212 214 216 218 220 222 224
206

FIG. 2

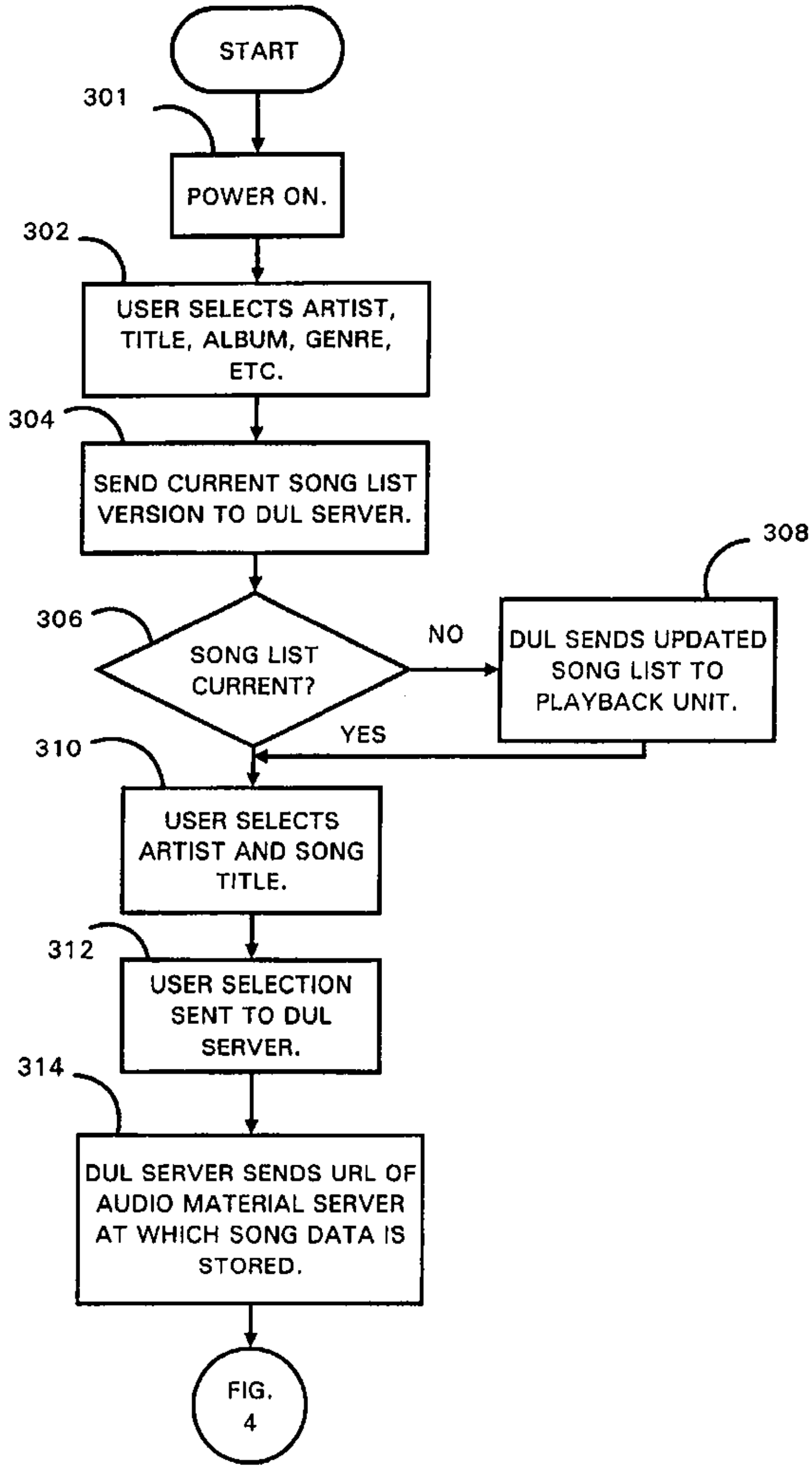
START
301
POWER ON.
302
USER SELECTS ARTIST, TITLE, ALBUM, GENRE, ETC.
304
SEND CURRENT SONG LIST VERSION TO DUL SERVER.
306
SONG LIST CURRENT?
NO
308
DUL SENDS UPDATED SONG LIST TO PLAYBACK UNIT.
YES
310
USER SELECTS ARTIST AND SONG TITLE.
312
USER SELECTION SENT TO DUL SERVER.
314
DUL SERVER SENDS URL OF AUDIO MATERIAL SERVER AT WHICH SONG DATA IS STORED.
FIG. 4

FIG. 3

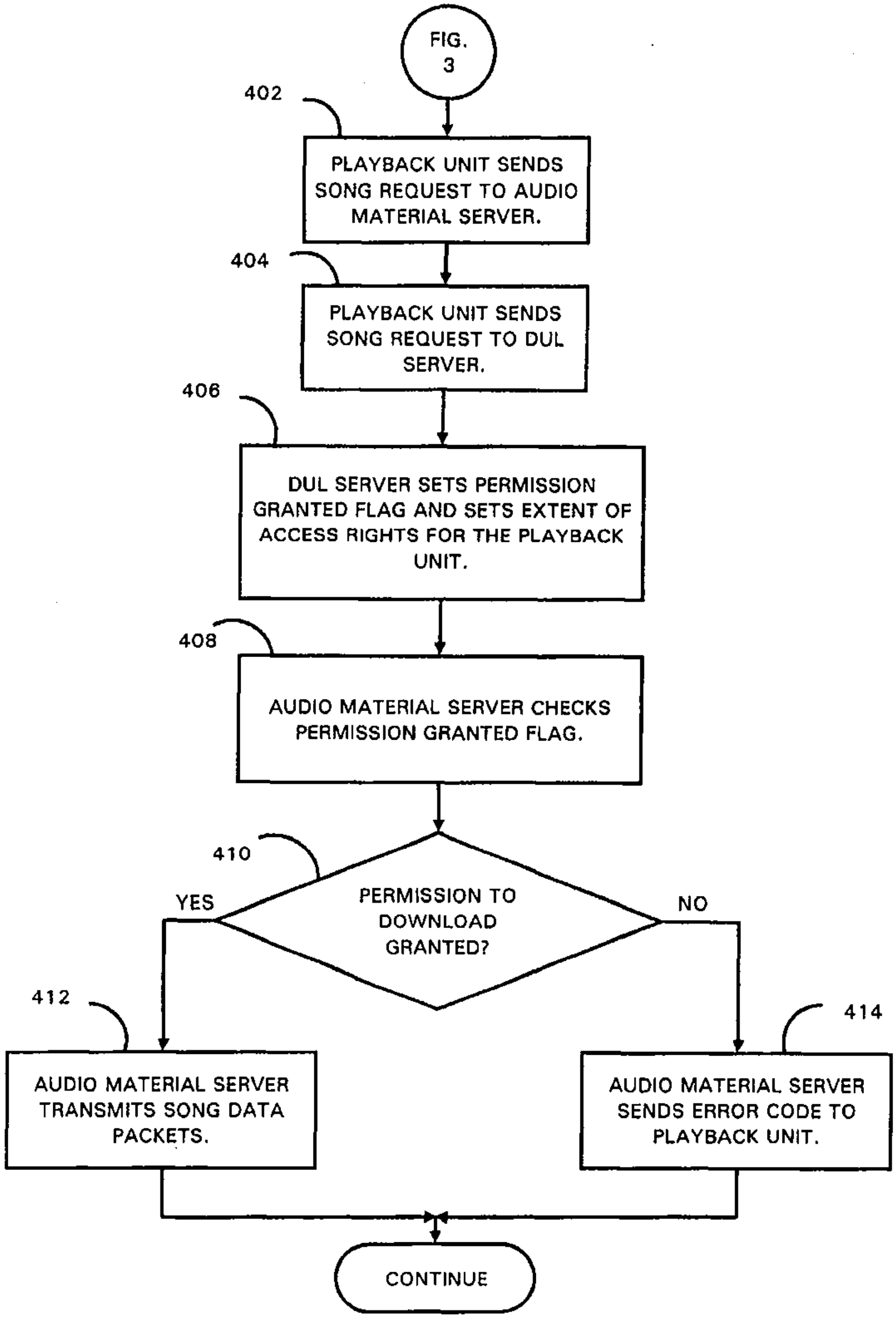
FIG. 3
402
PLAYBACK UNIT SENDS SONG REQUEST TO AUDIO MATERIAL SERVER.
404
PLAYBACK UNIT SENDS SONG REQUEST TO DUL SERVER.
406
DUL SERVER SETS PERMISSION GRANTED FLAG AND SETS EXTENT OF ACCESS RIGHTS FOR THE PLAYBACK UNIT.
408
AUDIO MATERIAL SERVER CHECKS PERMISSION GRANTED FLAG.
410
PERMISSION TO DOWNLOAD GRANTED?
YES
NO
412
AUDIO MATERIAL SERVER TRANSMITS SONG DATA PACKETS.
414
AUDIO MATERIAL SERVER SENDS ERROR CODE TO PLAYBACK UNIT.
CONTINUE

FIG. 4

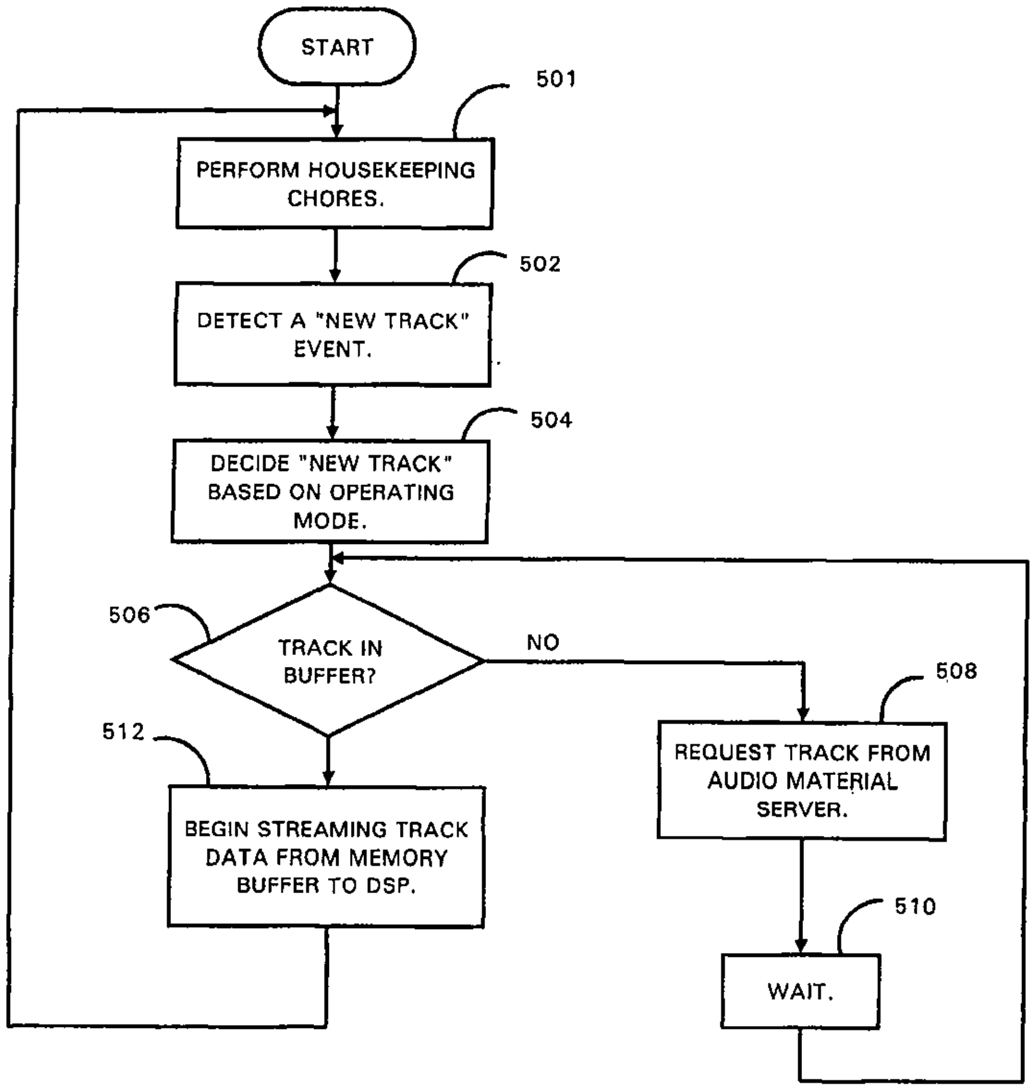
START
501
PERFORM HOUSEKEEPING CHORES.
502
DETECT A "NEW TRACK" EVENT.
504
DECIDE "NEW TRACK" BASED ON OPERATING MODE.
506
TRACK IN BUFFER?
NO
508
REQUEST TRACK FROM AUDIO MATERIAL SERVER.
510
WAIT.
512
BEGIN STREAMING TRACK DATA FROM MEMORY BUFFER TO DSP.

FIG. 5

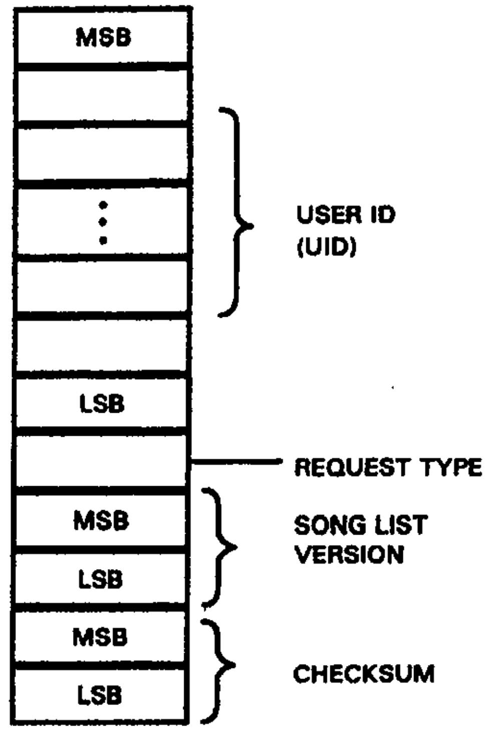
MSB
USER ID
(UID)
LSB
REQUEST TYPE
MSB
LSB
SONG LIST
VERSION
MSB
LSB
CHECKSUM

FIG. 6

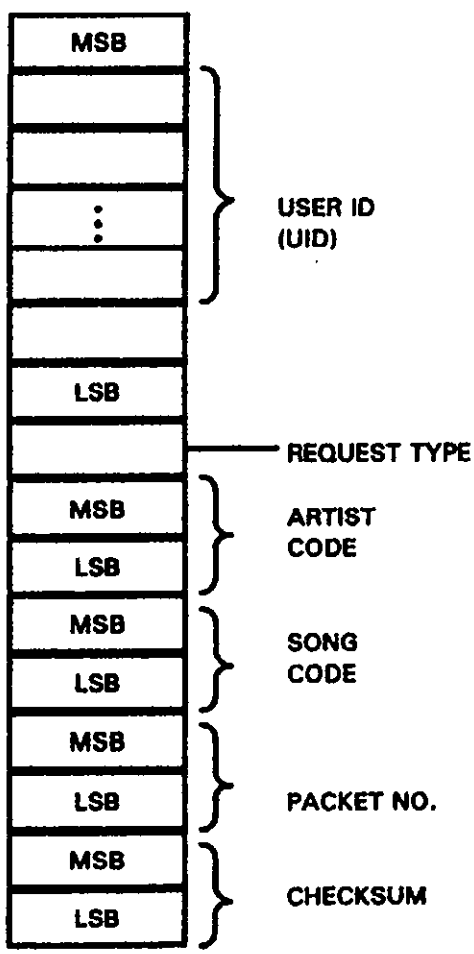
MSB
USER ID
(UID)
LSB
REQUEST TYPE
MSB
LSB
ARTIST
CODE
MSB
LSB
SONG
CODE
MSB
LSB
PACKET NO.
MSB
LSB
CHECKSUM

FIG. 7

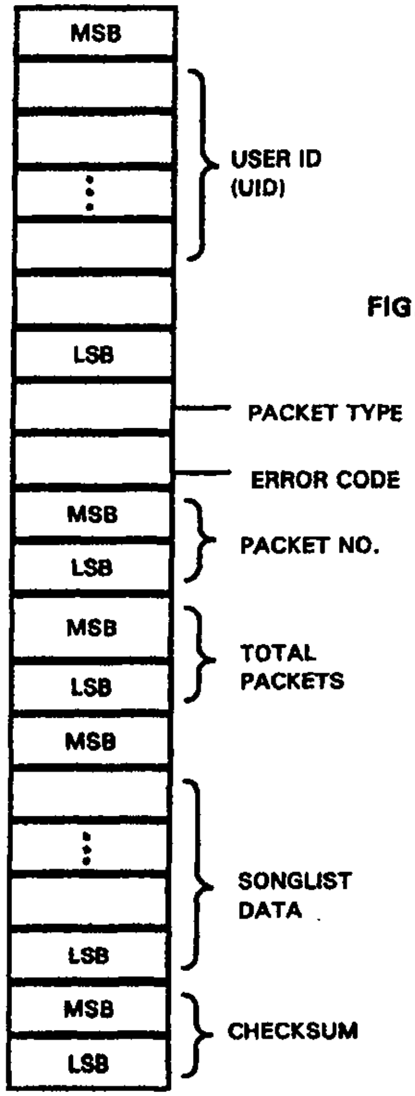
MSB
USER ID
(UID)
LSB
PACKET TYPE
ERROR CODE
MSB
PACKET NO.
LSB
MSB
TOTAL
PACKETS
LSB
MSB
SONGLIST
DATA
LSB
MSB
CHECKSUM
LSB

FIG. 8

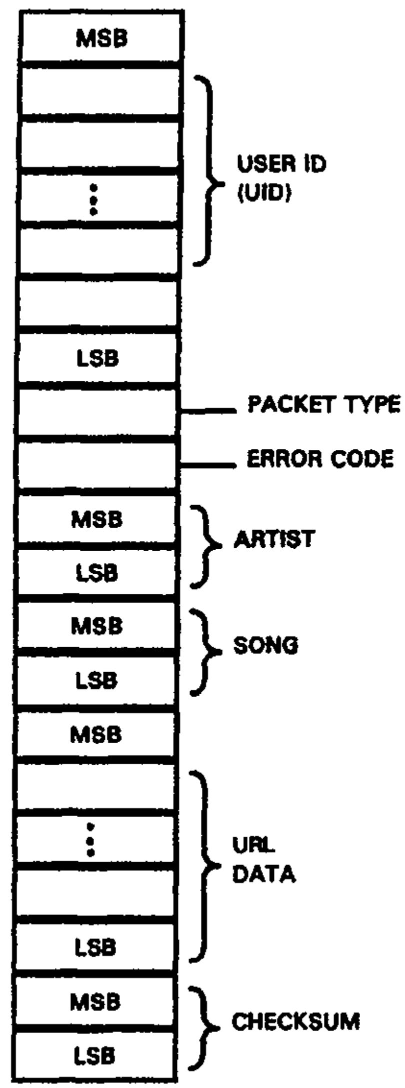
MSB
USER ID
(UID)
LSB
PACKET TYPE
ERROR CODE
MSB
ARTIST
LSB
MSB
SONG
LSB
MSB
URL
DATA
LSB
MSB
CHECKSUM
LSB

FIG. 9

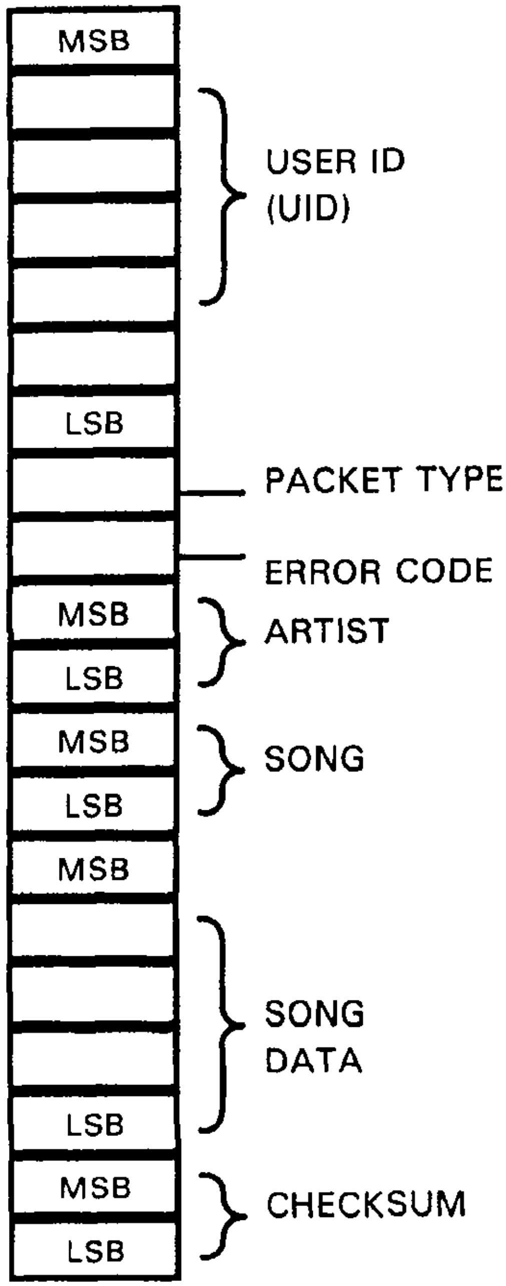
MSB
USER ID
(UID)
LSB
PACKET TYPE
ERROR CODE
MSB
ARTIST
LSB
MSB
SONG
LSB
MSB
SONG
DATA
LSB
MSB
CHECKSUM
LSB

FIG. 10

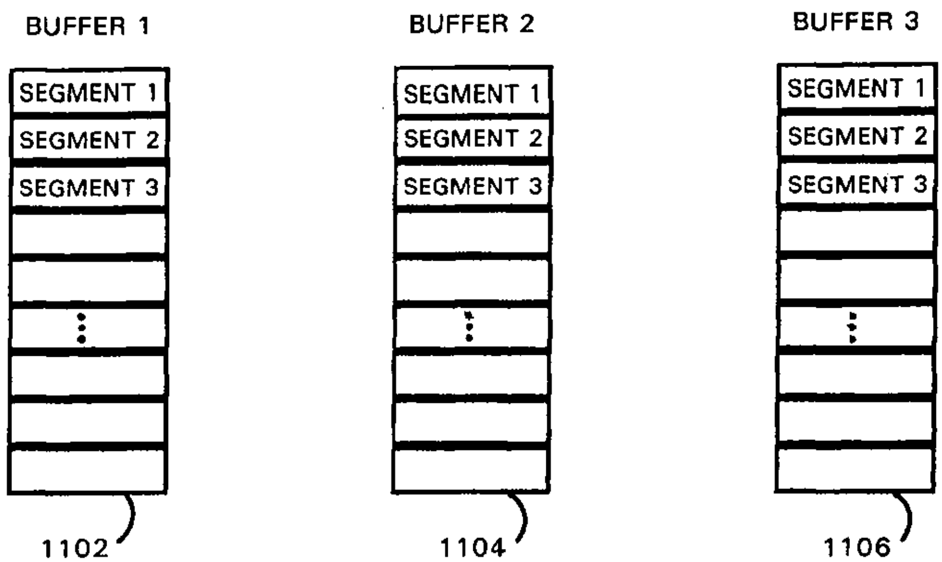
BUFFER 1
BUFFER 2
BUFFER 3
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 1
SEGMENT 2
SEGMENT 3
1102
1104
1106

FIG. 11

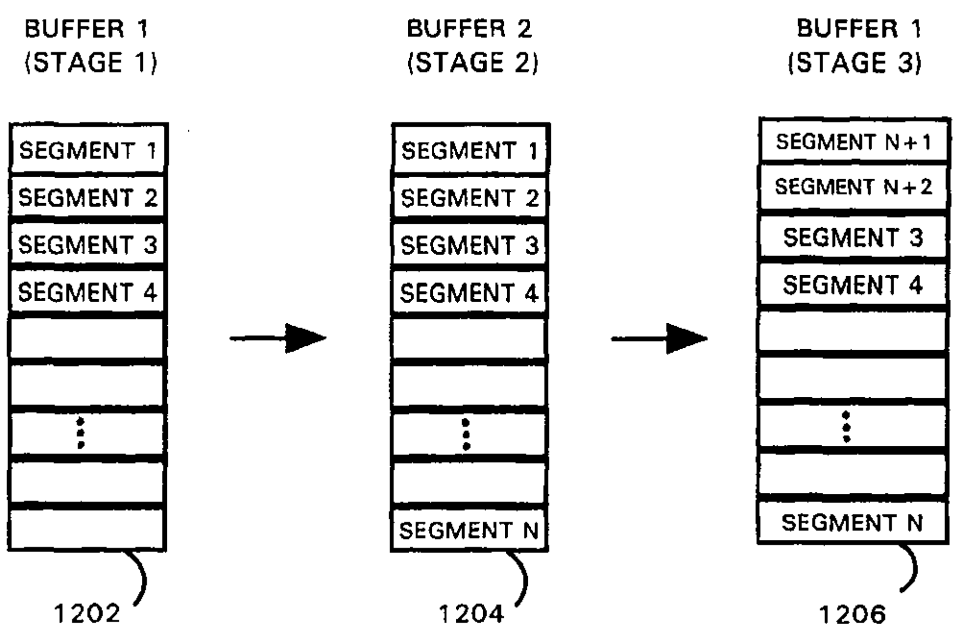
BUFFER 1
(STAGE 1)
BUFFER 2
(STAGE 2)
BUFFER 1
(STAGE 3)
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4
SEGMENT N
SEGMENT N+1
SEGMENT N+2
SEGMENT 3
SEGMENT 4
SEGMENT N
1202
1204
1206

FIG. 12

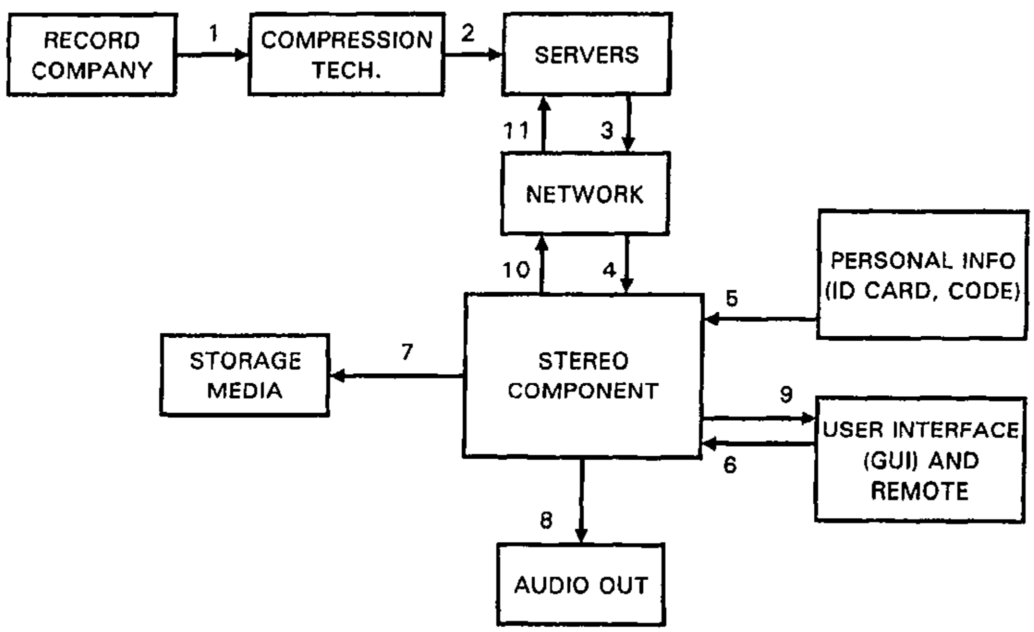
RECORD COMPANY
1
COMPRESSION TECH.
2
SERVERS
11
3
NETWORK
10
4
PERSONAL INFO (ID CARD, CODE)
5
STORAGE MEDIA
7
STEREO COMPONENT
9
USER INTERFACE (GUI) AND REMOTE
6
8
AUDIO OUT

FIG. 13

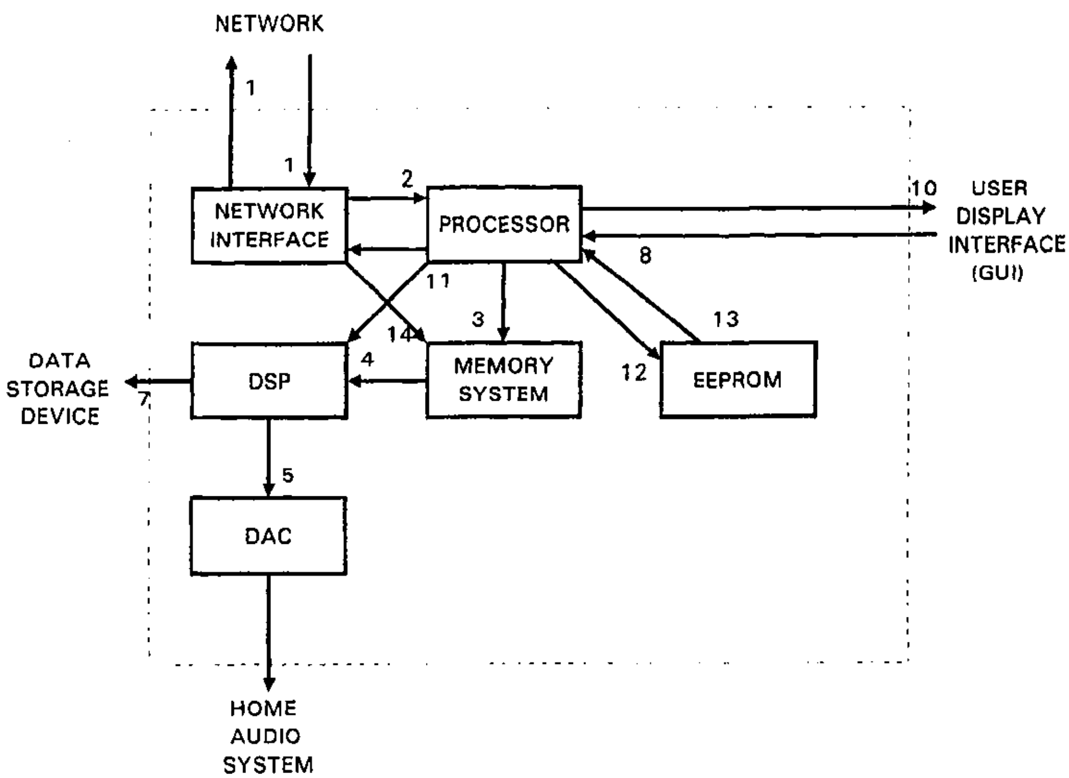
NETWORK
1
1
2
NETWORK INTERFACE
PROCESSOR
10
USER DISPLAY INTERFACE (GUI)
8
11
3
13
14
DATA STORAGE DEVICE
7
DSP
4
MEMORY SYSTEM
12
EEPROM
5
DAC
HOME AUDIO SYSTEM

FIG. 14

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 repertory from which the user may select and discourages many users 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 repertory 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 repertory 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 DAT 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 decompression. 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 DUTL 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 URL 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 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 URL 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 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 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 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 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;

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,

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 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

Microsoft® Windows Media™ Player 7 Handbook

Author	Seth McEvoy
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To see this book's discounted price, select a reseller below.

Chapter 2: How Does the Player Work?

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.

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10

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, .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 **Open** option
Open URL	**File** menu **Open URL** option
Shuffle	**Play** menu **Shuffle** option
Repeat	**Play** menu **Repeat** option
Volume	**Play** menu **Volume** option
Play/pause	**Play** menu **Play/pause** option
Stop	**Play** menu **Stop** option
Skip Back	**Play** menu **Skip Back** option
Skip Forward	**Play** menu **Skip Back** option
Return to Full Mode	**Play** menu **Skip Forward** option
Full Screen	**View** menu **Full Screen** option
Properties	**File** menu **Properties** option
Statistics	**View** menu **Statistics** option
Options	**Tools** menu **Options** option
Help	**Help** menu **Help Topics** option
About	**Help** menu **Windows Media Player** option
Exit	**File** menu **Exit** option

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.

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.

Top of Page

EXHIBIT 11

MICROSOFT® WINDOWS MEDIA™ PLAYER 7 HANDBOOK

SETH McEVOY

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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.

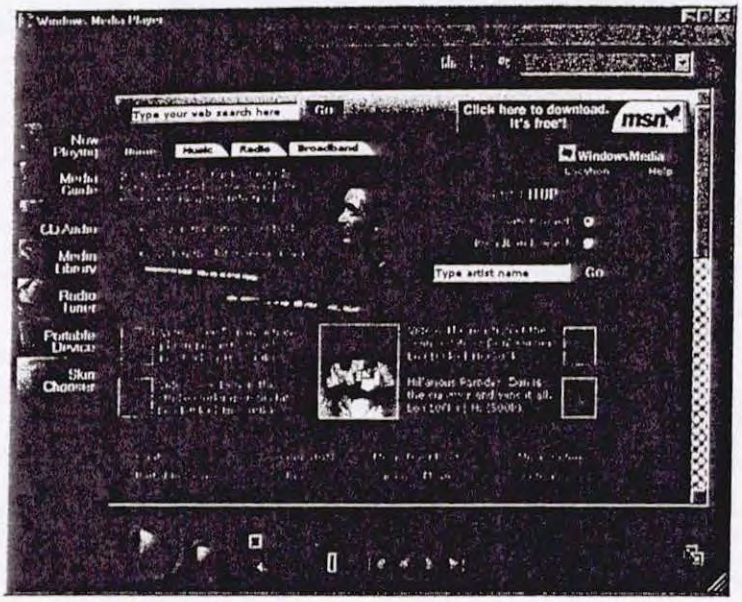

Figure 2.1a - *Full mode Player in **Media Guide** view with Internet connection.*

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.

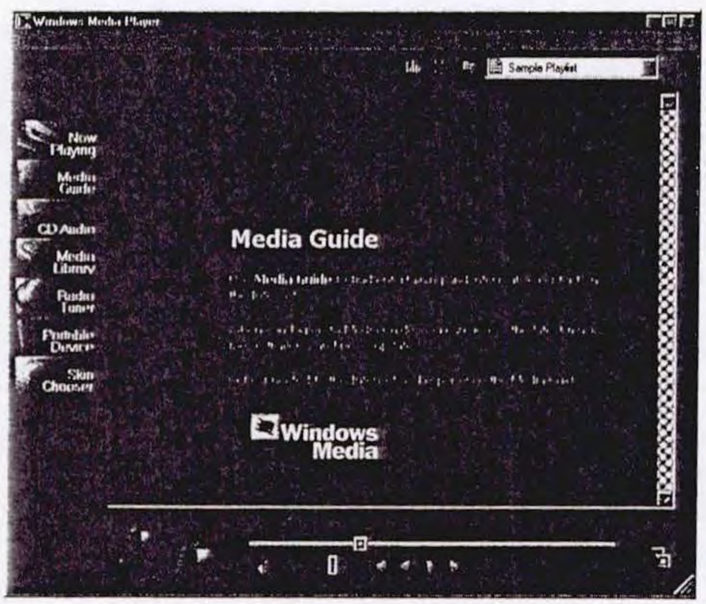

Figure 2.1b – ***Media Guide** view without an Internet connection.*

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.

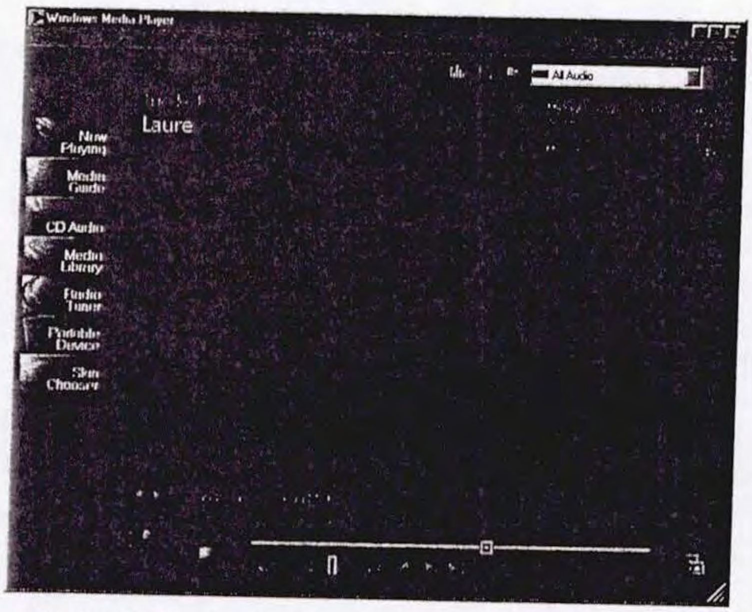

Figure 2.3 – *A playlist with more than one item.*

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 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, .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.

Compact mode menu command	Full mode menu command
Open	**File** menu **Open** option
Open URL	**File** menu **Open URL** option
Shuffle	**Play** menu **Shuffle** option
Repeat	**Play** menu **Repeat** option
Volume	**Play** menu **Volume** option
Play/Pause	**Play** menu **Play/Pause** option
Stop	**Play** menu **Stop** option
Skip Back	**Play** menu **Skip Back** option
Skip Forward	**Play** menu **Skip Back** option
Return to Full Mode	**Play** menu **Skip Forward** option
Full Screen	**View** menu **Full Screen** option
Properties	**File** menu **Properties** option
Statistics	**View** menu **Statistics** option
Options	**Tools** menu **Options** option
Help	**Help** menu **Help Topics** option
About	**Help** menu **About Windows Media Player** option
Exit	**File** menu **Exit** 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**.

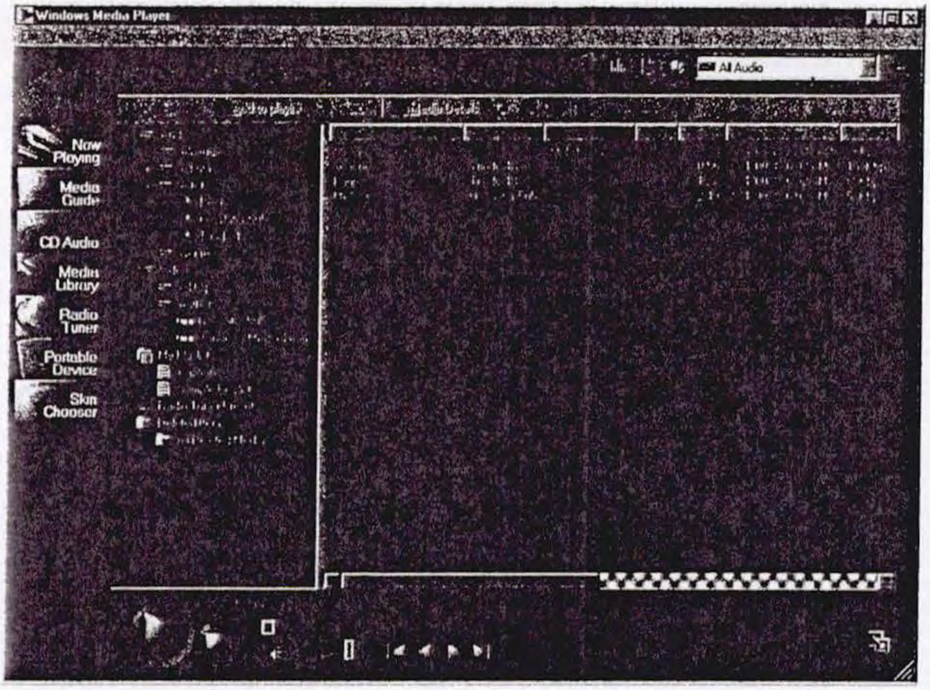

Figure 2.16 – *Media Library*.

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**.

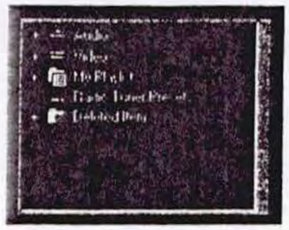

Figure 2.17 – *Five nodes of the* ***Media Library****.*

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.

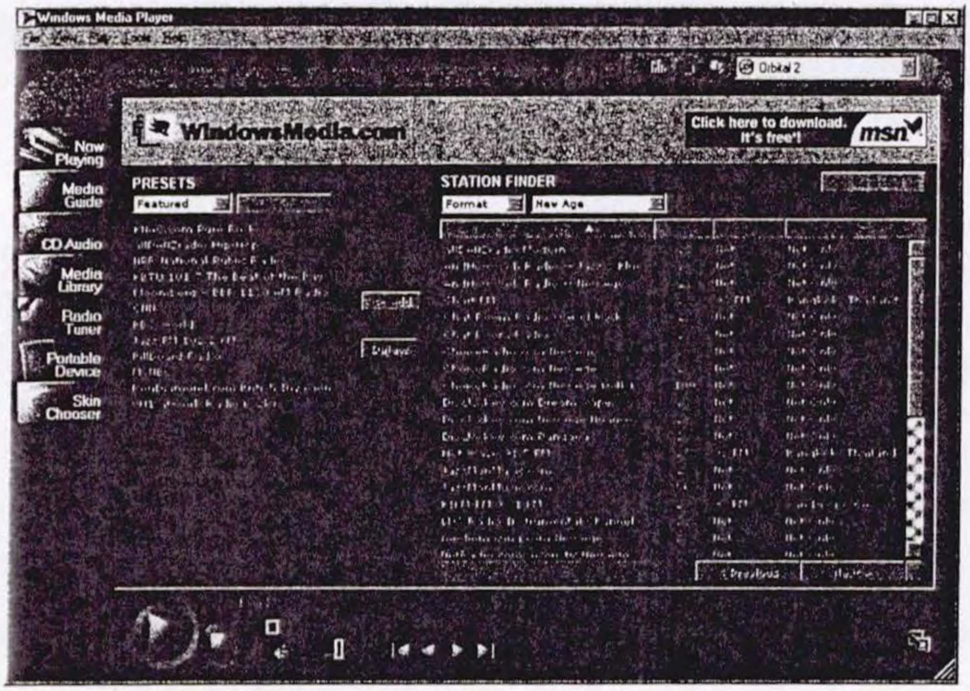

Figure 2.20 – ***Radio Tuner*** *view in the full mode Player.*

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

US 20030045955A1

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Janik (43) **Pub. Date: Mar. 6, 2003**

(54) **AUDIO CONVERTER DEVICE AND METHOD FOR USING THE SAME**

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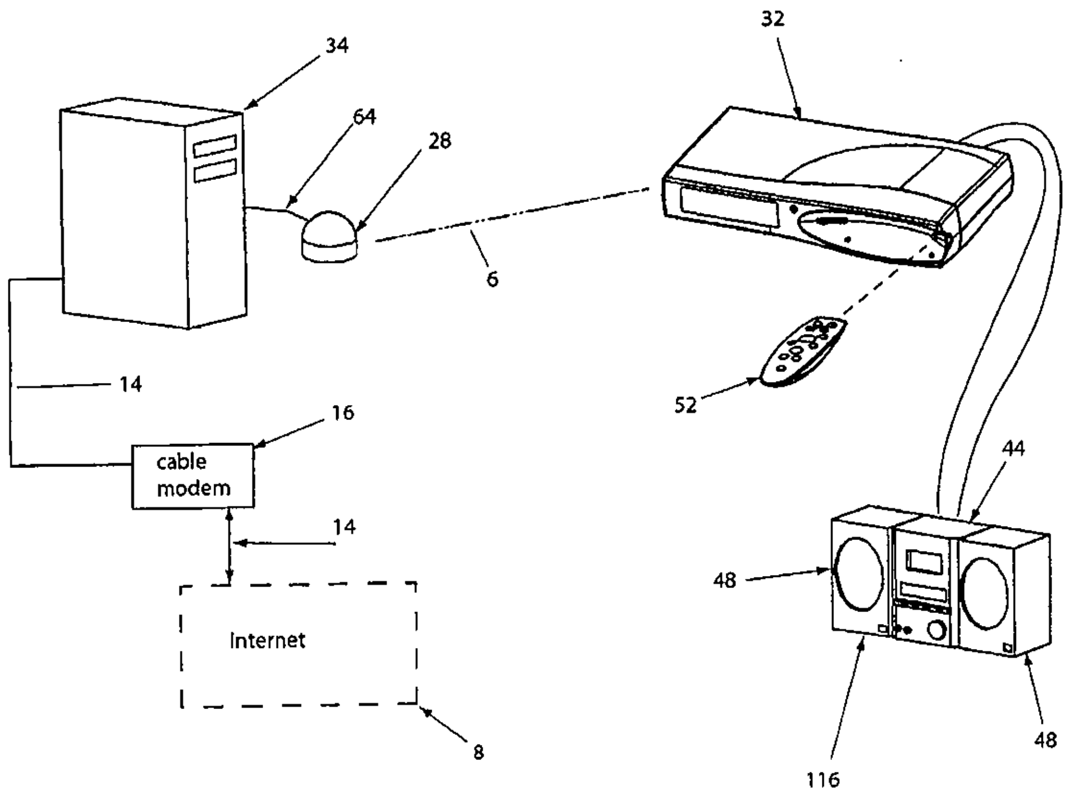
(22) Filed: **Sep. 1, 2001**

Publication Classification

(51) **Int. Cl.**^{7} **G06F 17/00**; H04B 3/00
(52) **U.S. Cl.** **700/94**; 381/77; 704/272

(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.



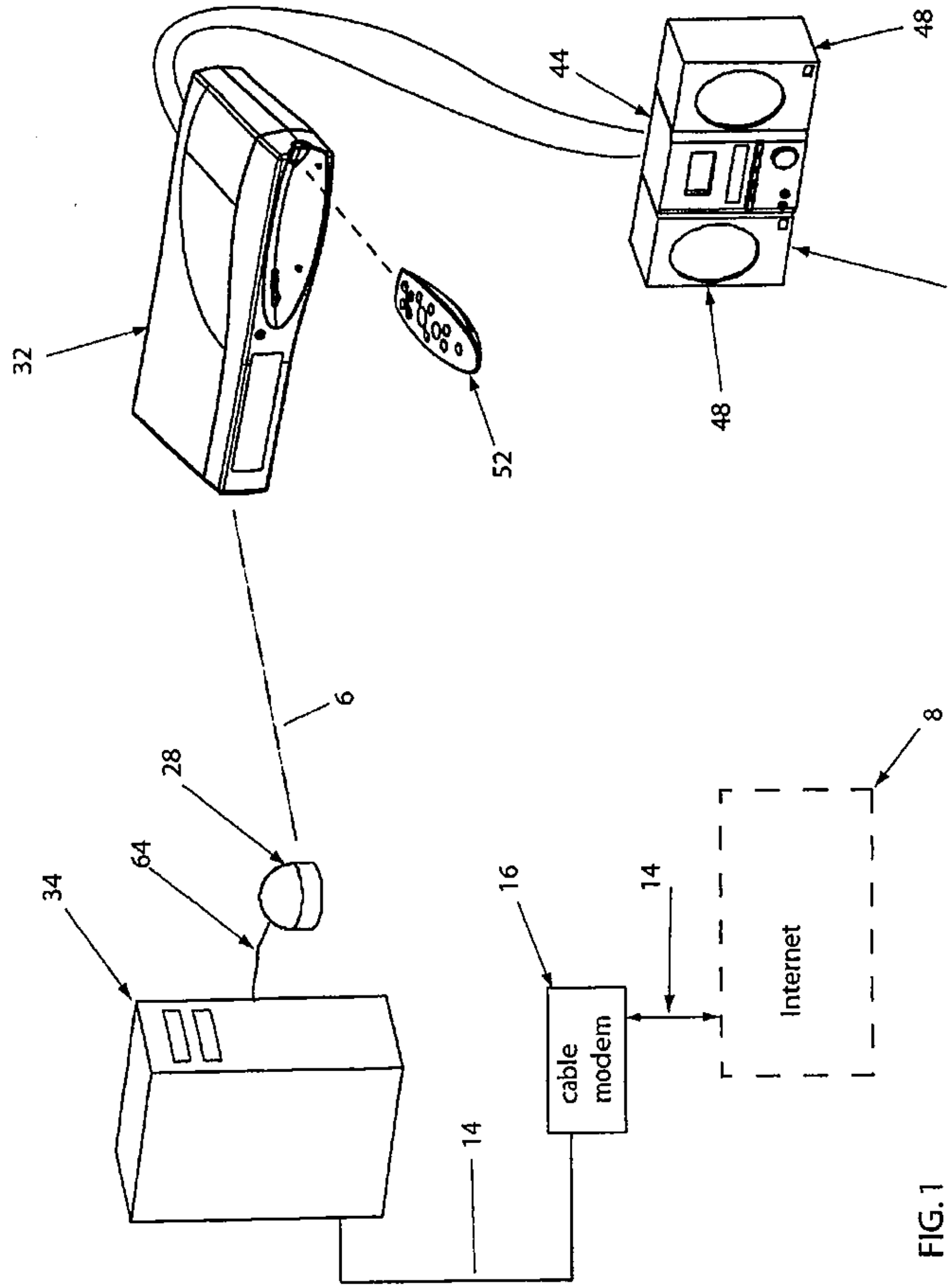


FIG. 1

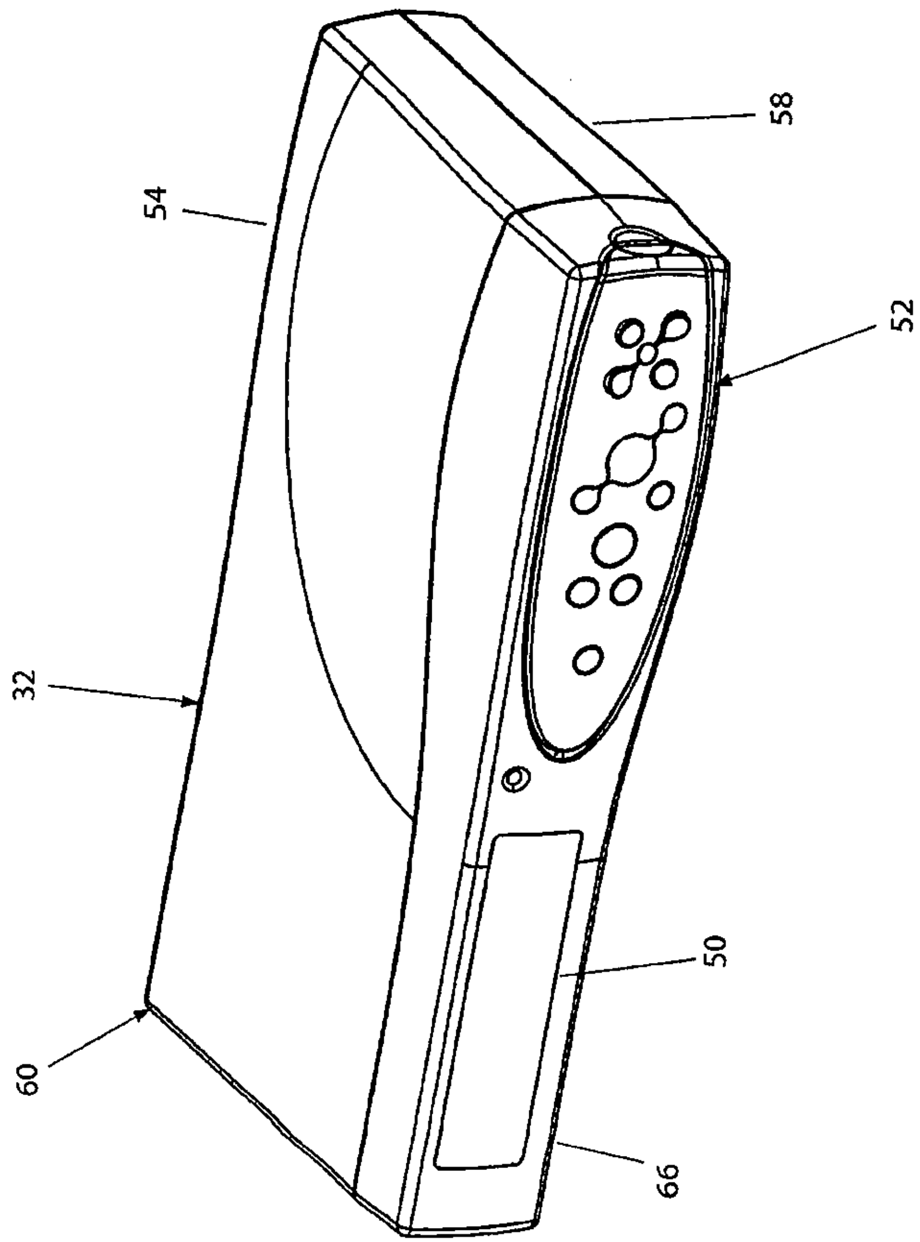


FIG. 2

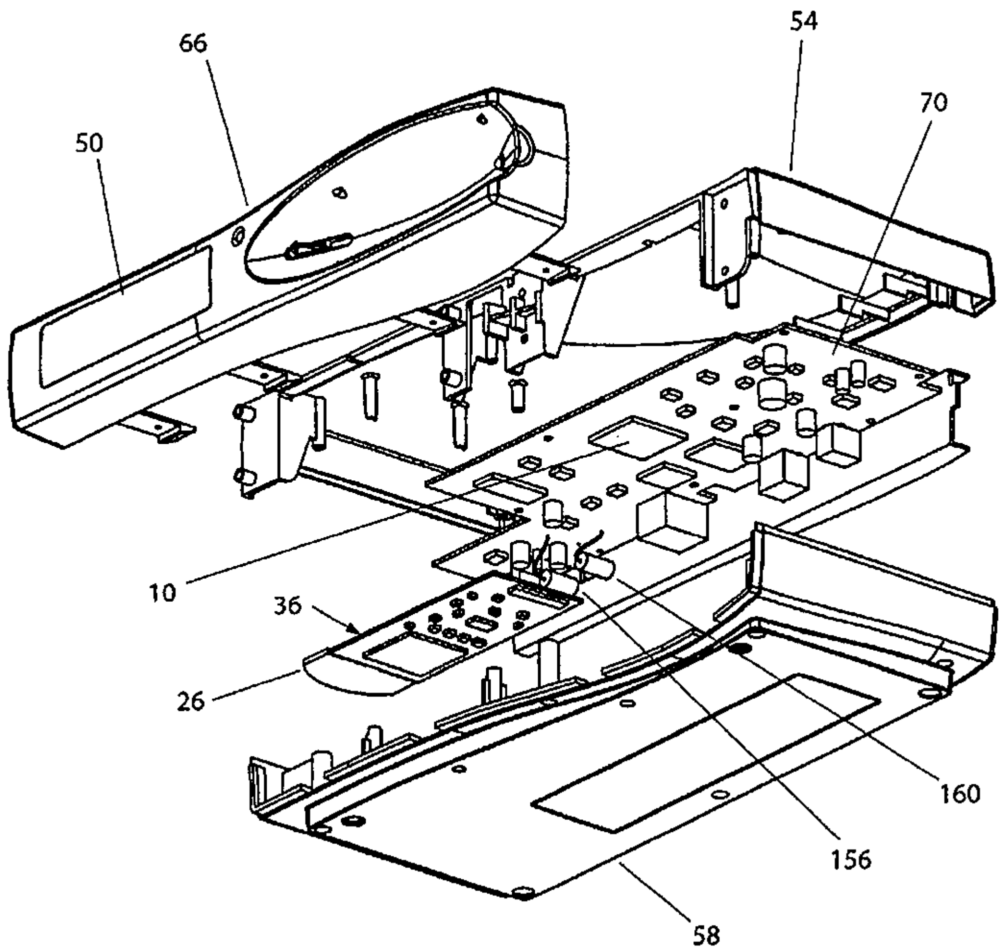
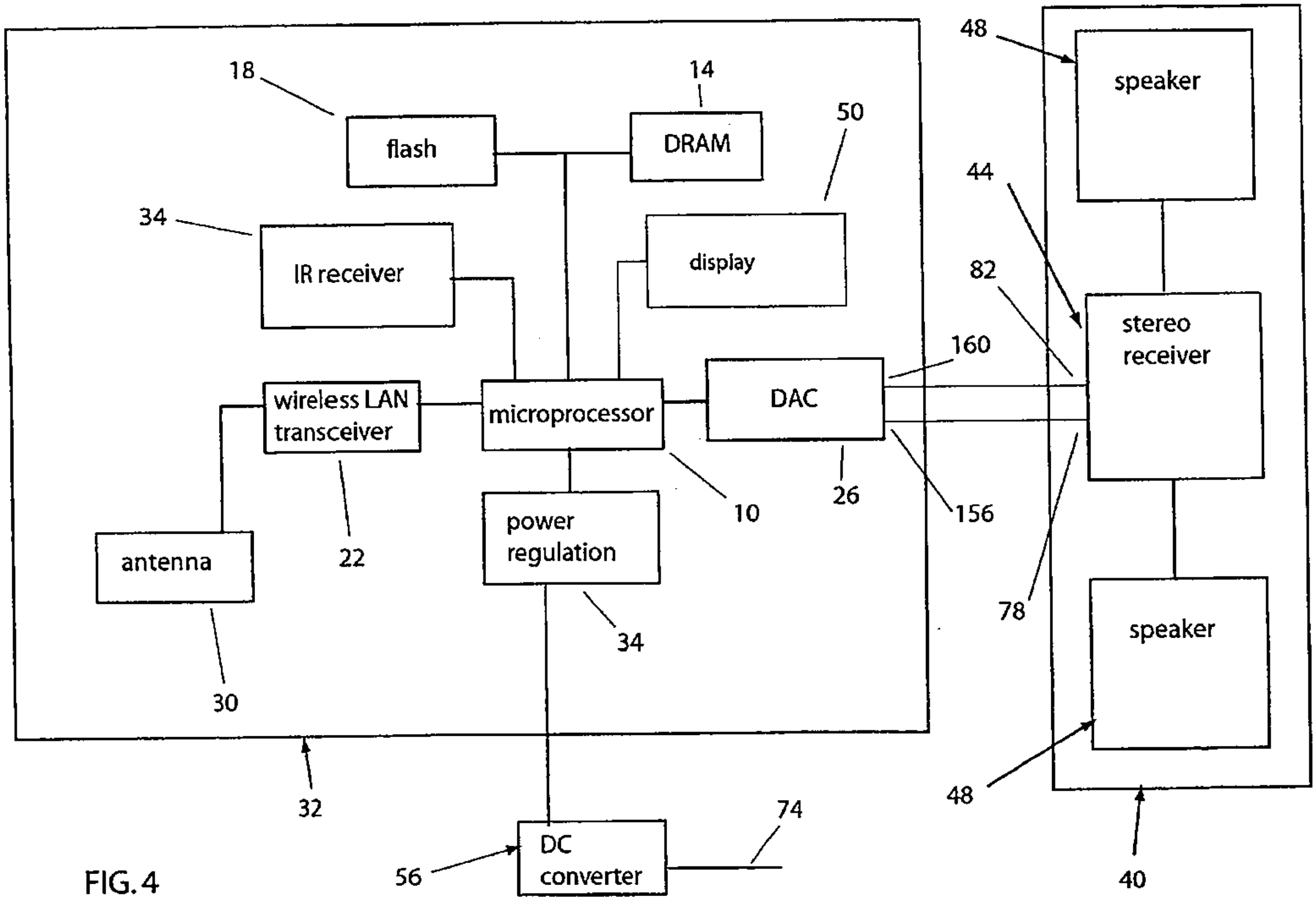


FIG. 3



speaker
48
44
82
stereo receiver
160
DAC
26
156
78
speaker
48
40
18
flash
14
DRAM
50
display
34
IR receiver
wireless LAN transceiver
microprocessor
10
power regulation
34
antenna
22
30
32
DC converter
56
74

FIG. 4

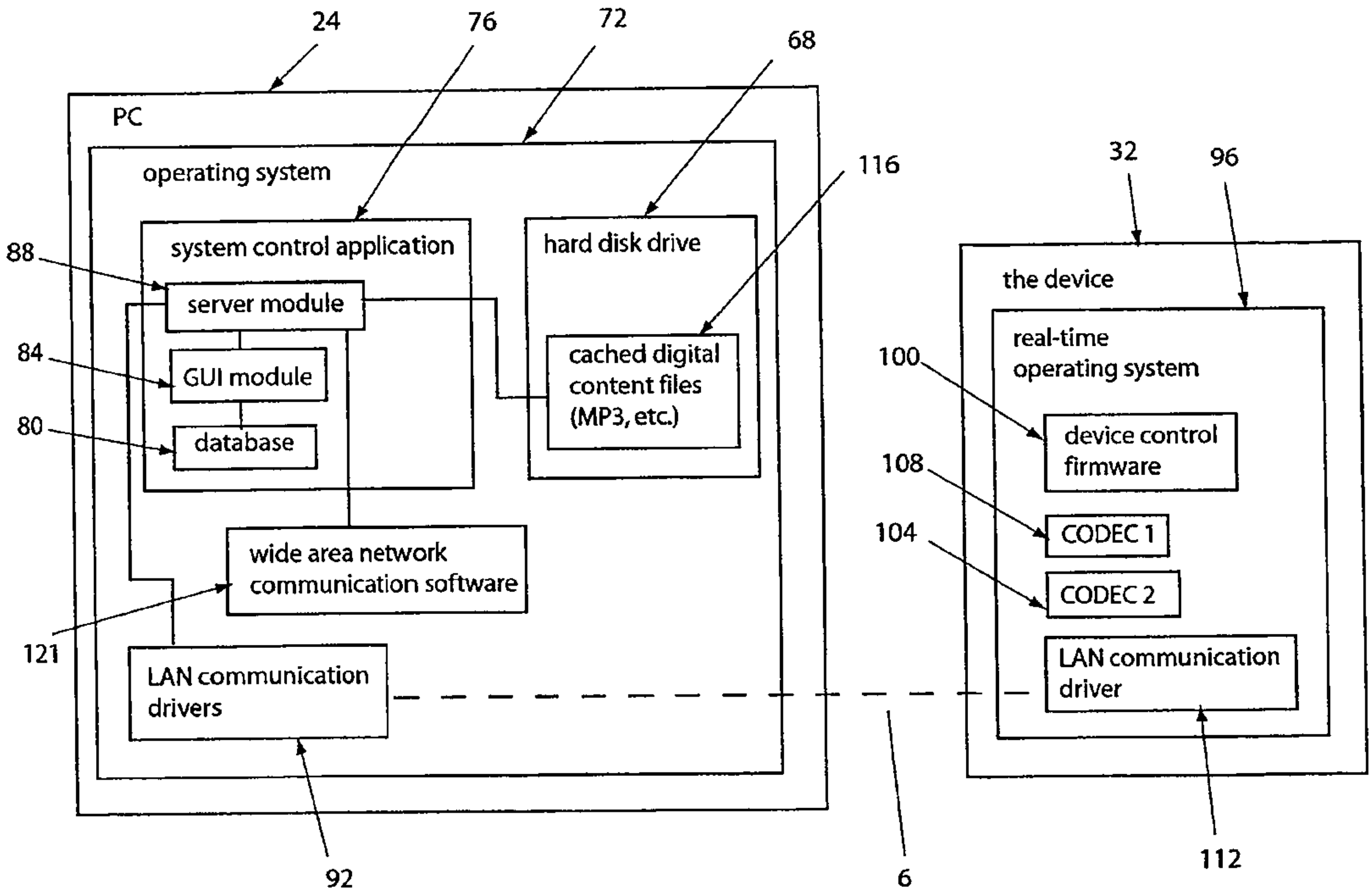

24
76
72
68
PC
operating system
116
32
96
system control application
hard disk drive
88
server module
the device
real-time
operating system
84
GUI module
cached digital
content files
(MP3, etc.)
100
80
database
device control
firmware
108
CODEC 1
104
wide area network
communication software
CODEC 2
121
LAN communication
drivers
LAN communication
driver
92
6
112

FIG. 5

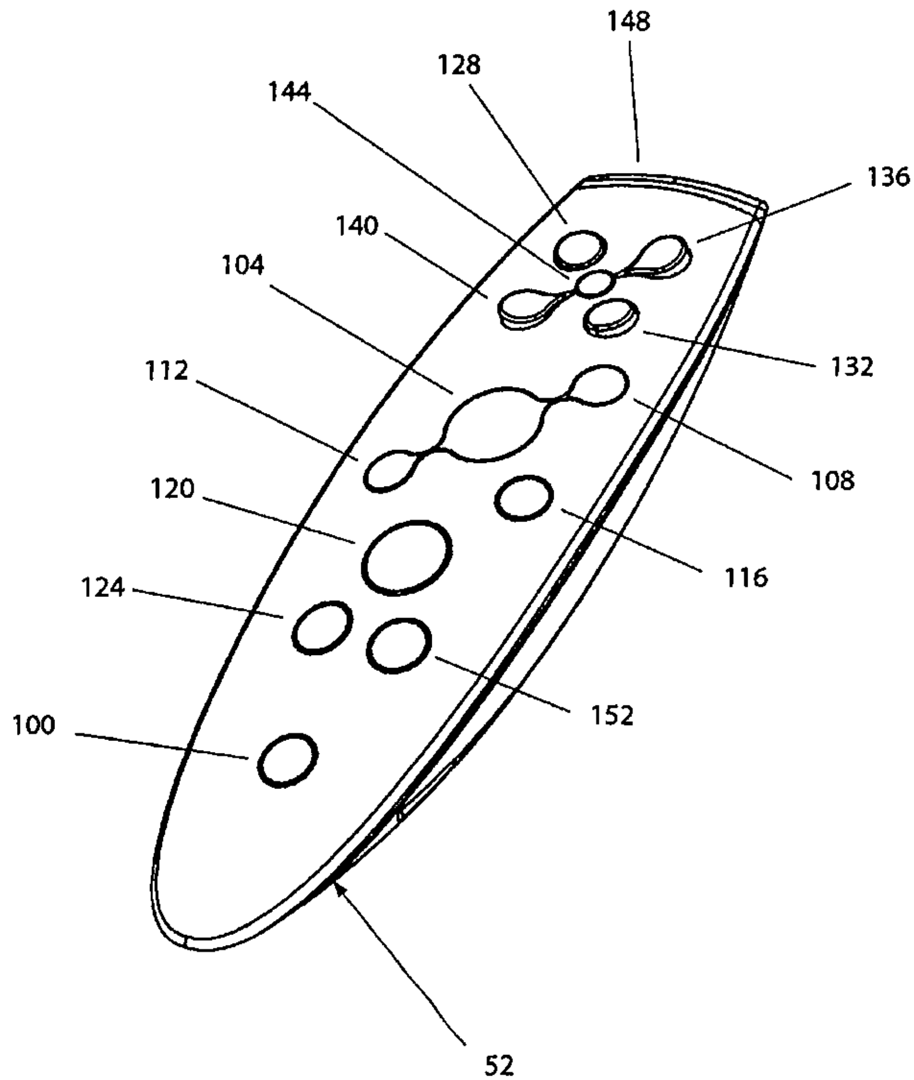


FIG. 6

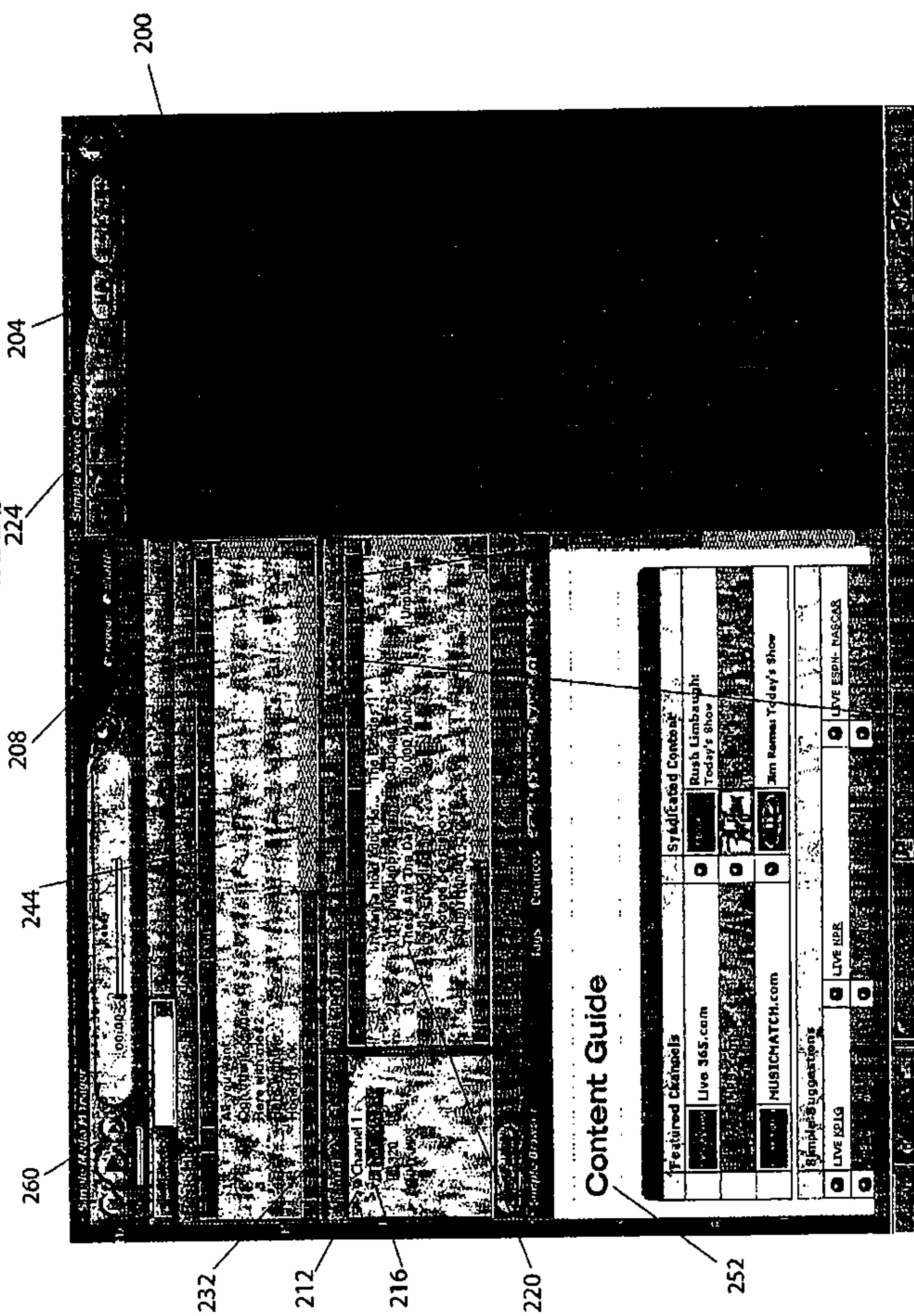

200
204
224
208
244
260
232
212
216
220
252
236
240
Content Guide
Featured Channels
Live 365.com
MUSICMATCH.com
Syndicated Content
Rush Limbaugh Today's Show
Simple Suggestions
LIVE NPR
LIVE ESPN- NASCAR

FIG.7

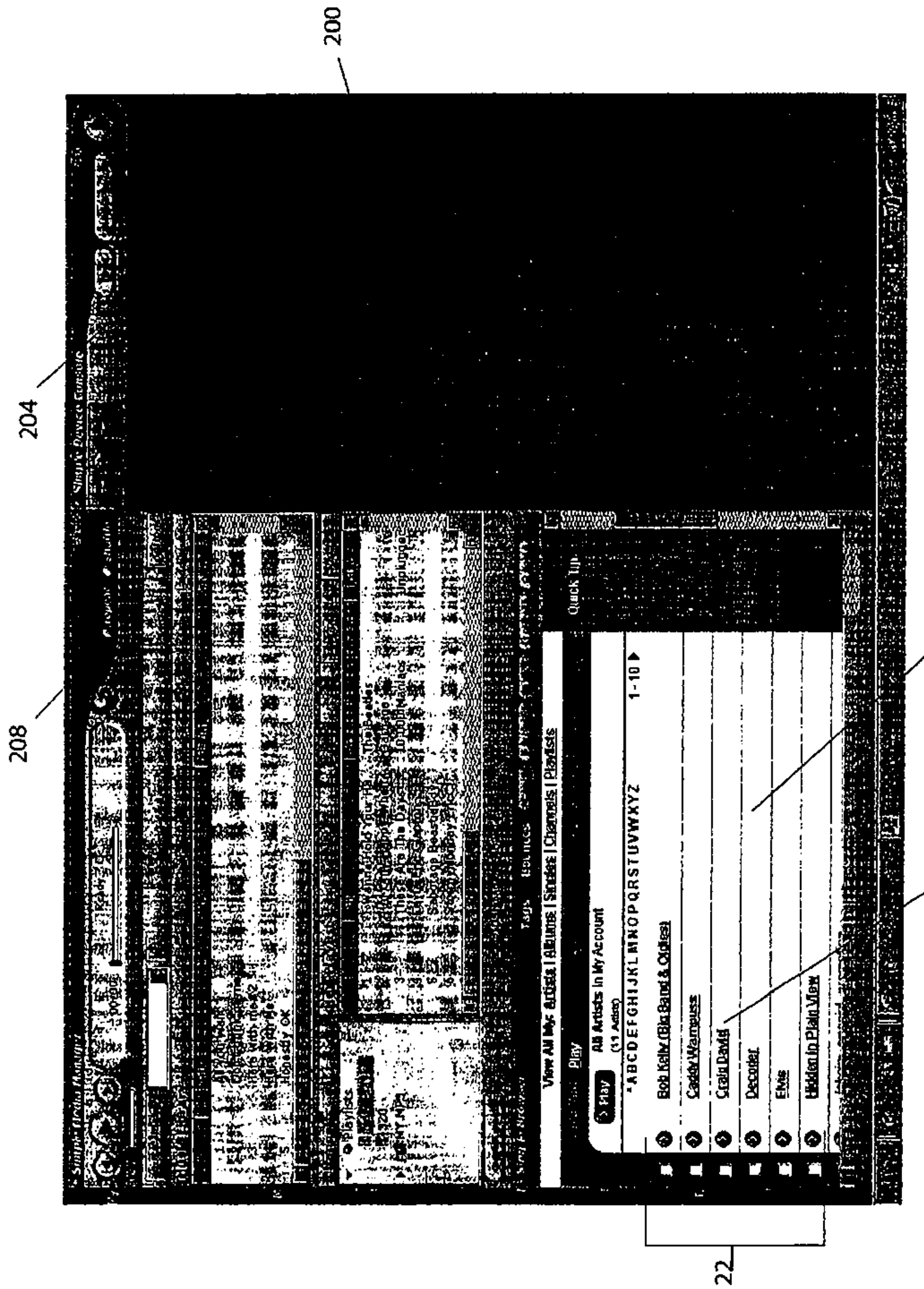

200
204
208
252
99
122
Quick Up
View All My: Artists | Albums | Singles | Channels | Playlists
Play
All Artists In My Account
1-10
Bob Kelly (Big Band & Oldies)
Craig David
Decoder
Elvis
Hidden in Plain View

FIG.8

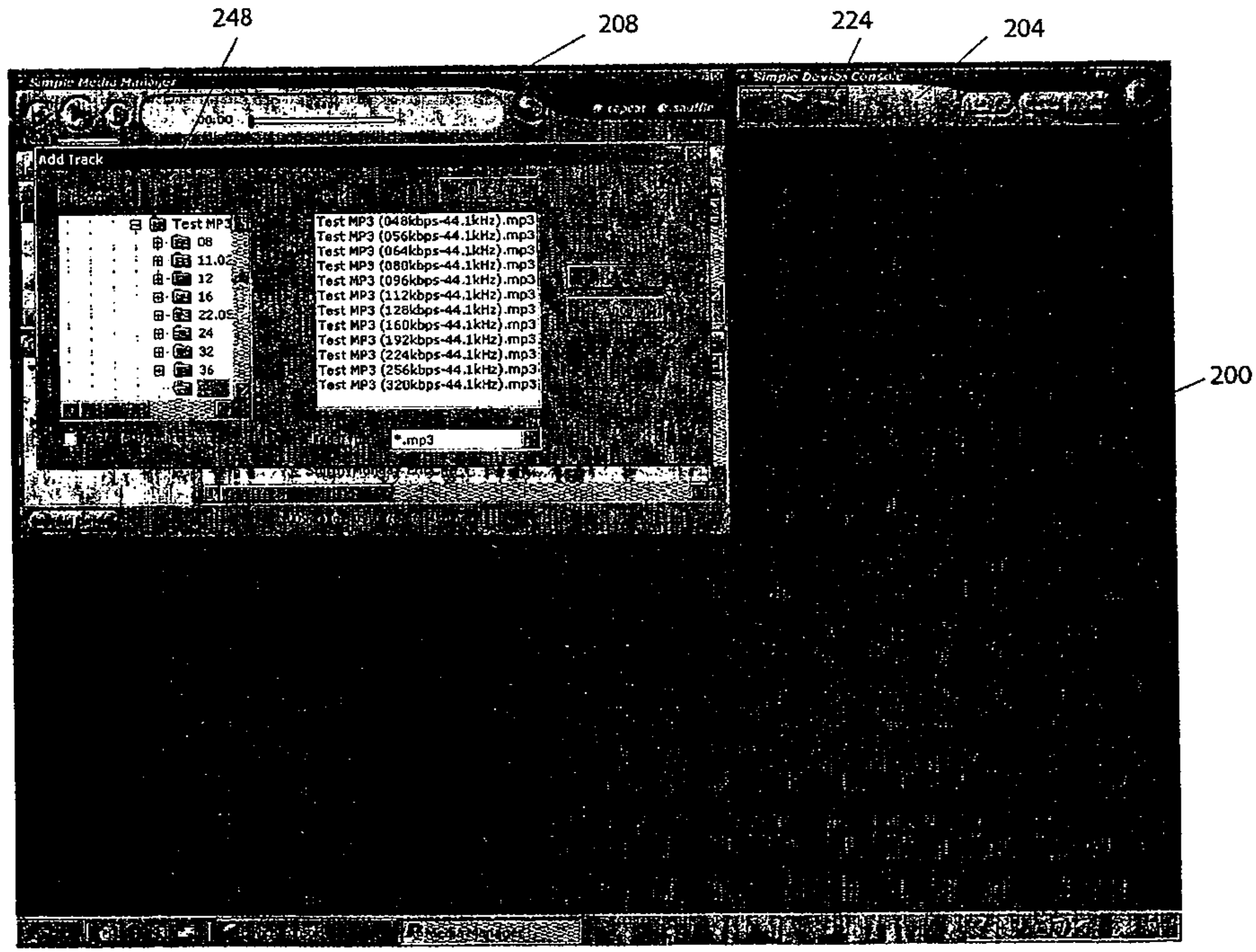

248
208
224
204
200
Add Track
Test MP3
08
11.02
12
16
22.09
24
32
36
Test MP3 (048kbps-44.1kHz).mp3
Test MP3 (056kbps-44.1kHz).mp3
Test MP3 (064kbps-44.1kHz).mp3
Test MP3 (080kbps-44.1kHz).mp3
Test MP3 (096kbps-44.1kHz).mp3
Test MP3 (112kbps-44.1kHz).mp3
Test MP3 (128kbps-44.1kHz).mp3
Test MP3 (160kbps-44.1kHz).mp3
Test MP3 (192kbps-44.1kHz).mp3
Test MP3 (224kbps-44.1kHz).mp3
Test MP3 (256kbps-44.1kHz).mp3
Test MP3 (320kbps-44.1kHz).mp3
*.mp3

FIG. 9

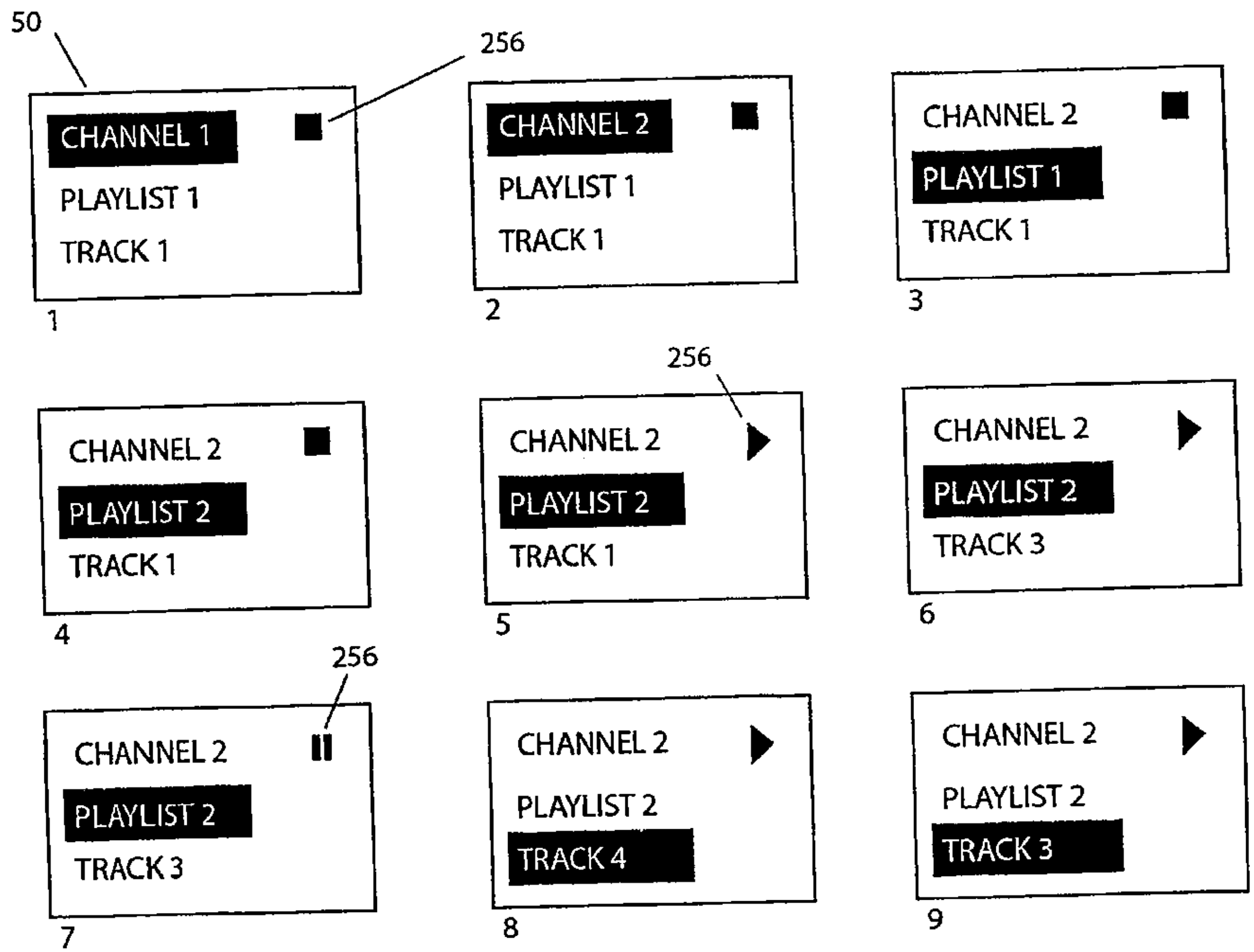

50
256
CHANNEL 1
PLAYLIST 1
TRACK 1
1
CHANNEL 2
PLAYLIST 1
TRACK 1
2
CHANNEL 2
PLAYLIST 1
TRACK 1
3
CHANNEL 2
PLAYLIST 2
TRACK 1
4
256
CHANNEL 2
PLAYLIST 2
TRACK 1
5
CHANNEL 2
PLAYLIST 2
TRACK 3
6
256
CHANNEL 2
PLAYLIST 2
TRACK 3
7
CHANNEL 2
PLAYLIST 2
TRACK 4
8
CHANNEL 2
PLAYLIST 2
TRACK 3
9

FIG. 10

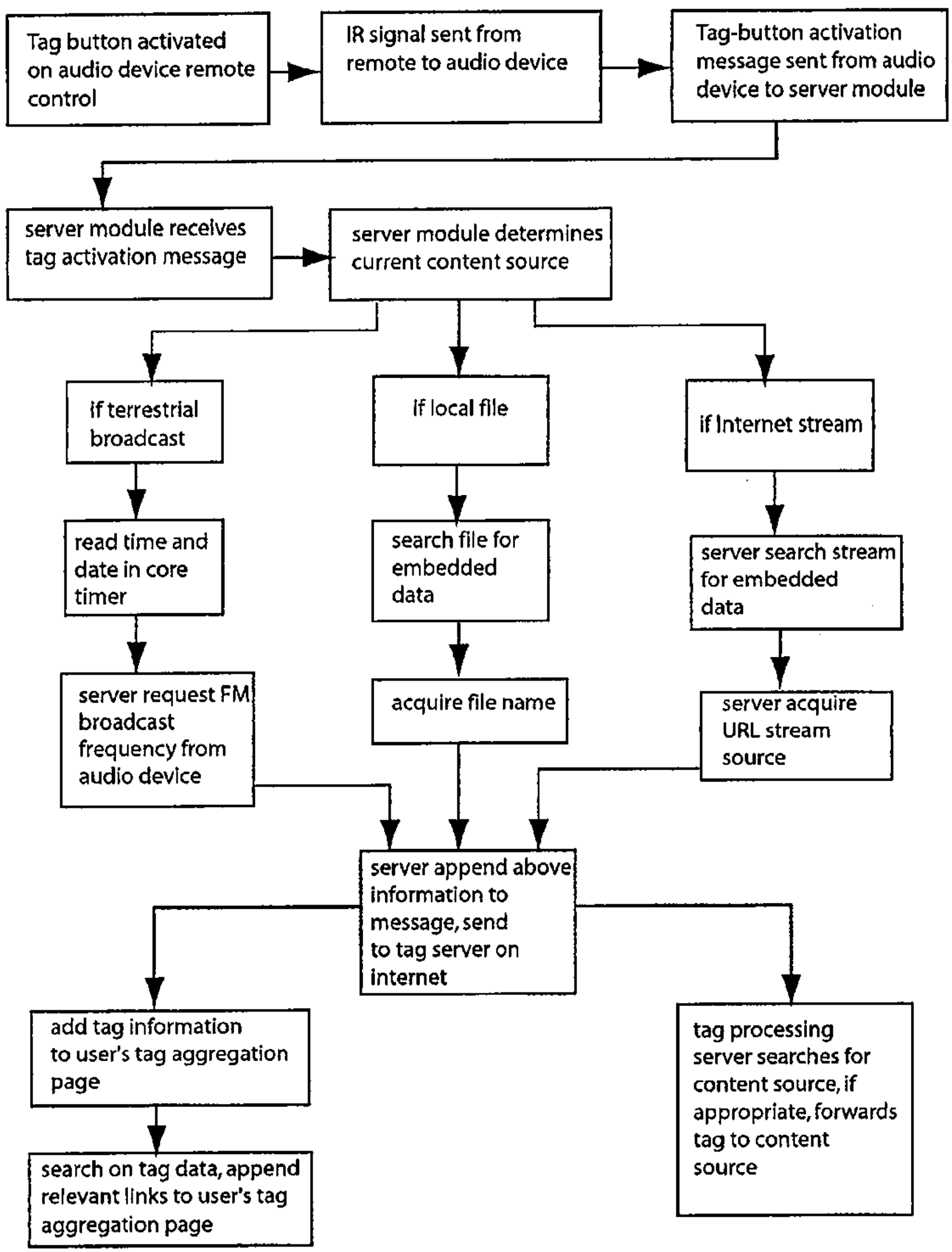

Tag button activated on audio device remote control
IR signal sent from remote to audio device
Tag-button activation message sent from audio device to server module
server module receives tag activation message
server module determines current content source
if terrestrial broadcast
if local file
if Internet stream
read time and date in core timer
search file for embedded data
server search stream for embedded data
server request FM broadcast frequency from audio device
acquire file name
server acquire URL stream source
server append above information to message, send to tag server on internet
add tag information to user's tag aggregation page
tag processing server searches for content source, if appropriate, forwards tag to content source
search on tag data, append relevant links to user's tag aggregation page

FIG. 11

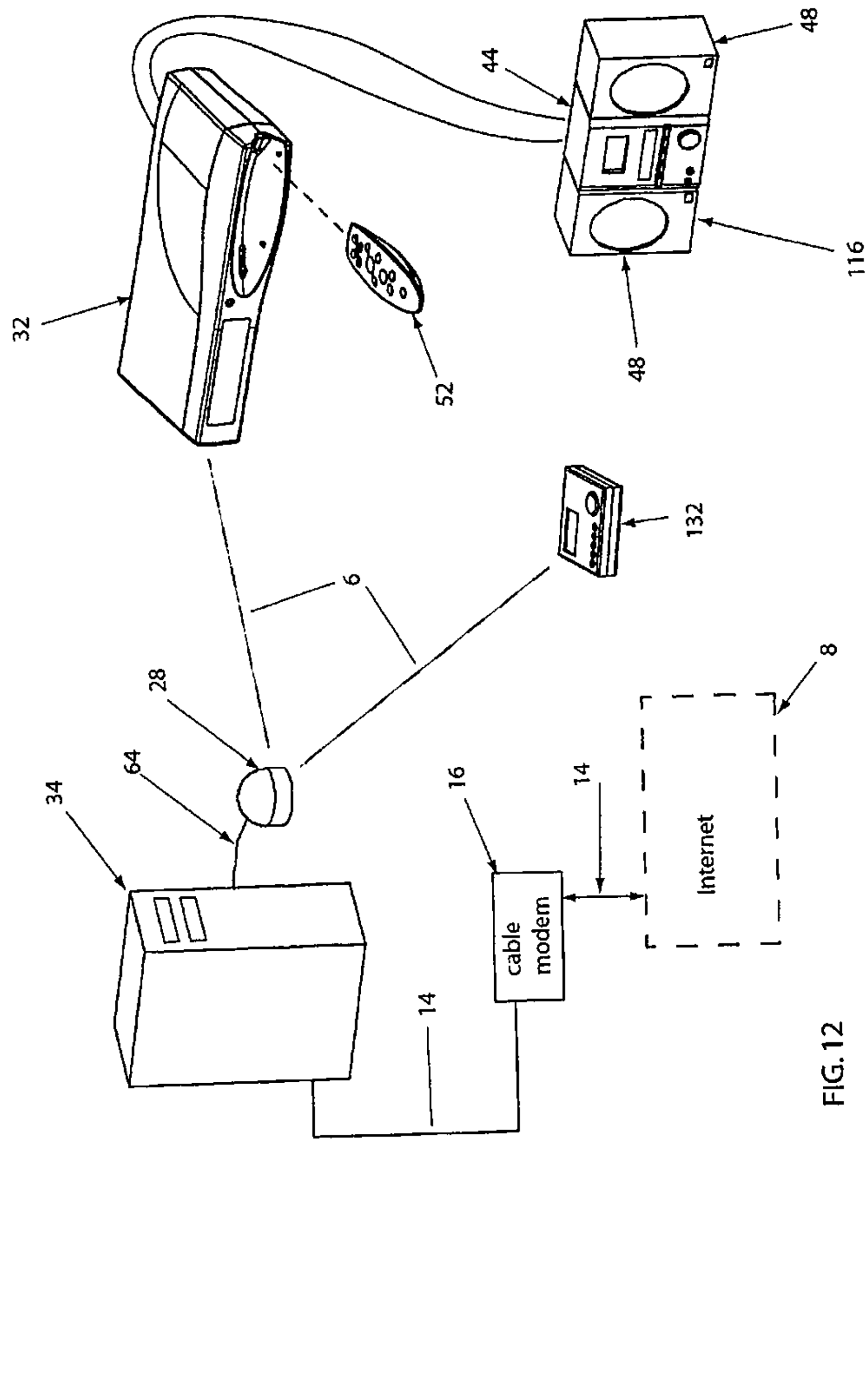


FIG.12

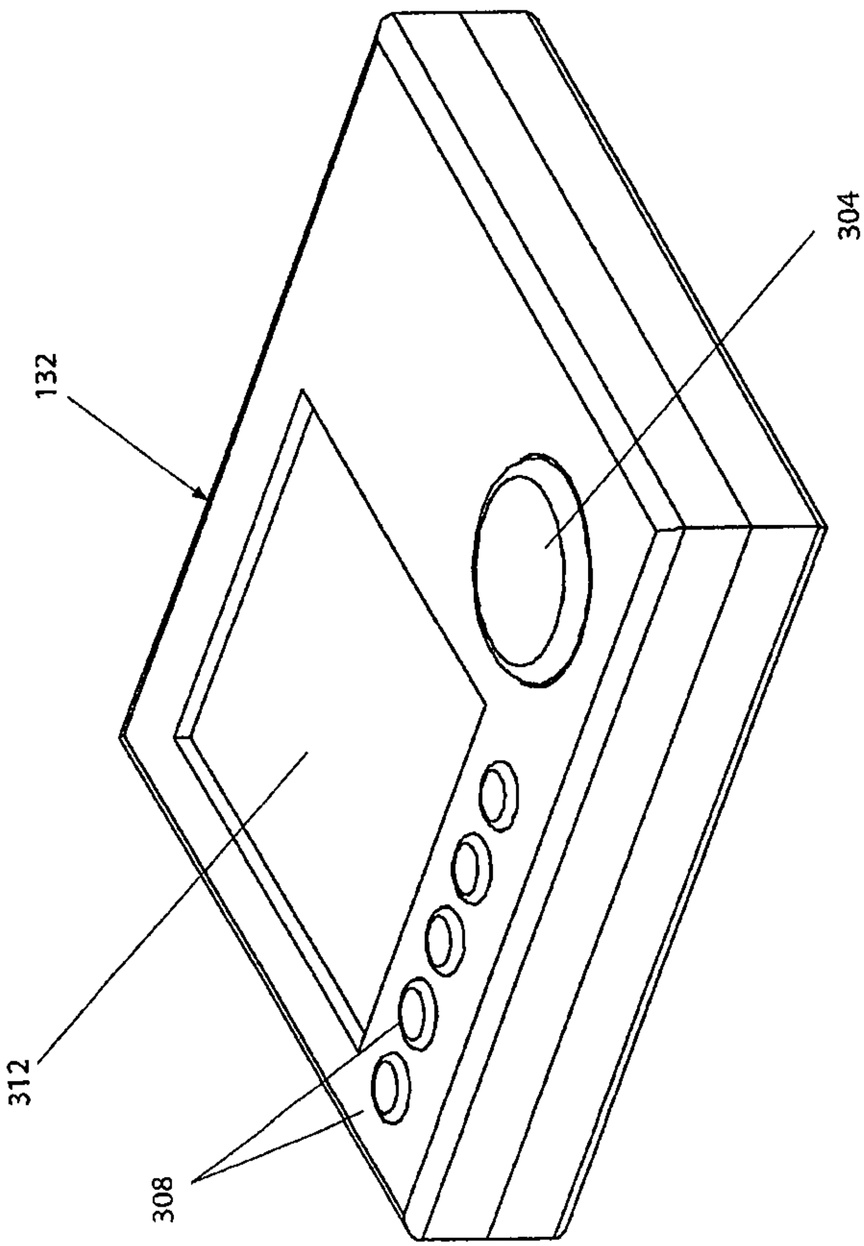


FIG. 13

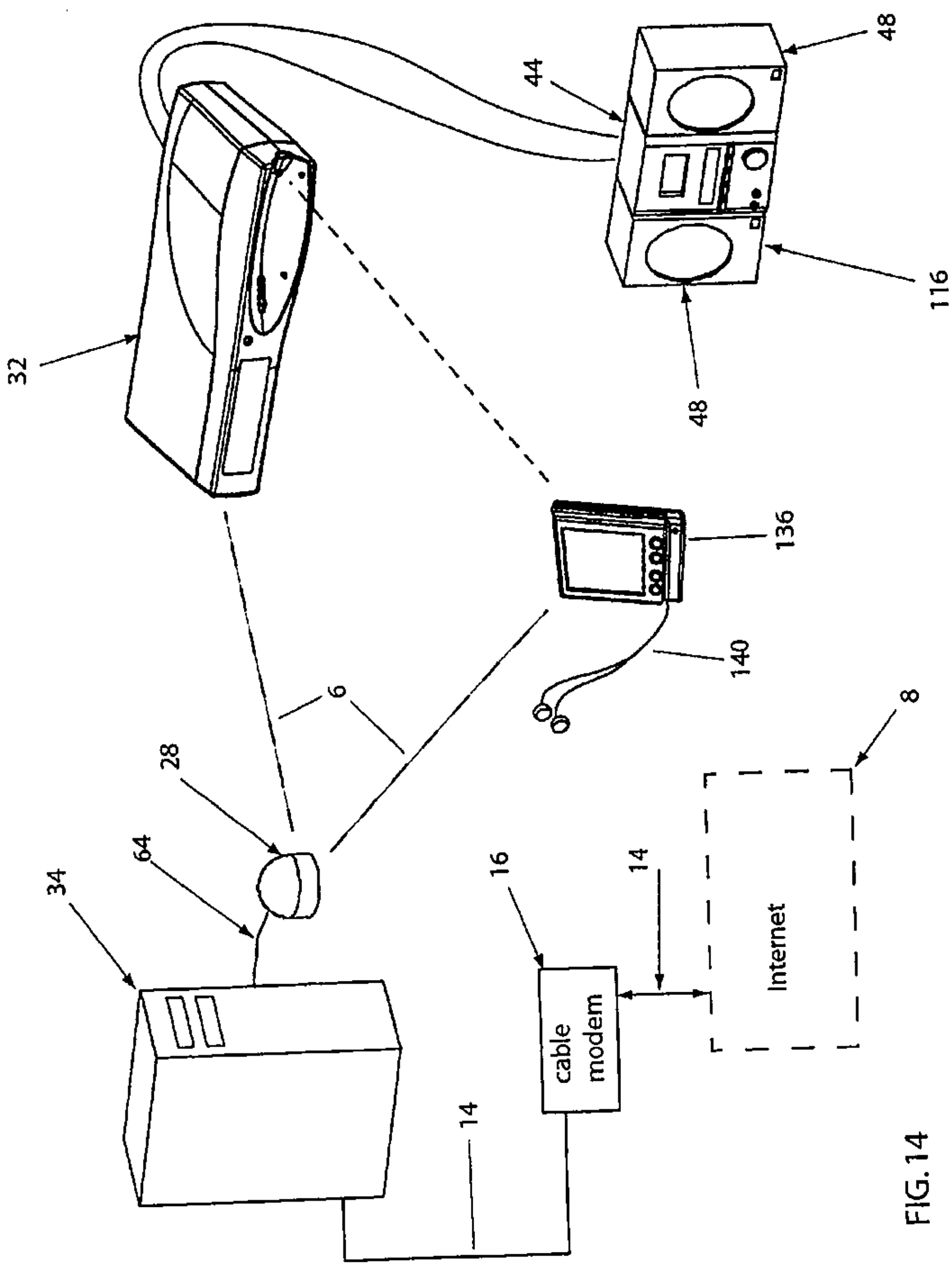


FIG. 14

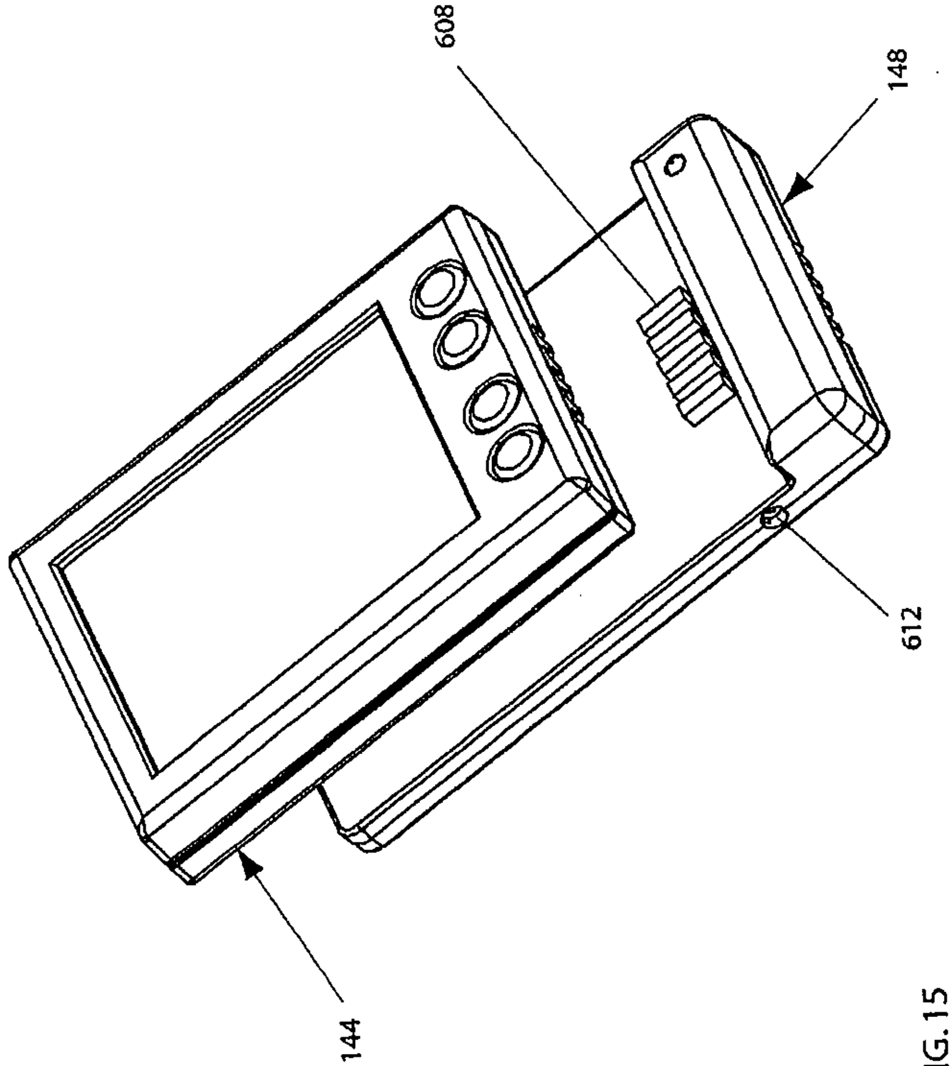


FIG.15

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 **8** 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 a 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 functional 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 an 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 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 they 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 **32**s 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 an 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 B

Title 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

Trials@uspto.gov
571-272-7822

Paper 15
Entered: March 20, 2014

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

Case IPR2013-00597
Patent 8,230,099 B2

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

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.

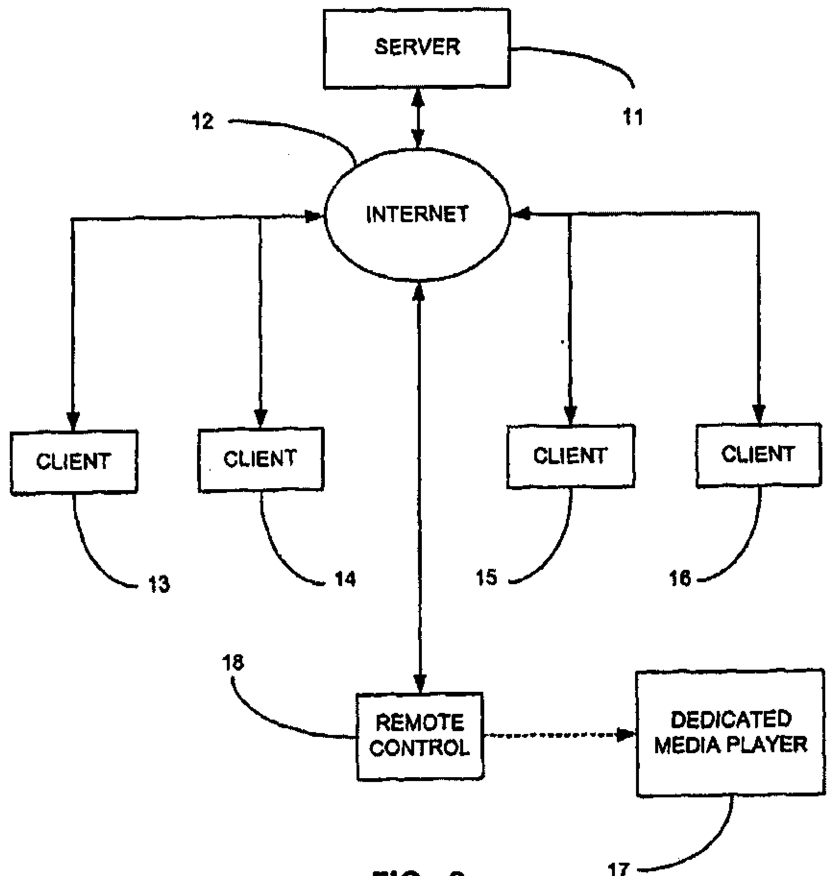

FIG. 2

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.

Reference	**Title**	**Ex. No.**
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.

Reference(s)	Basis	Claims Challenged
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.

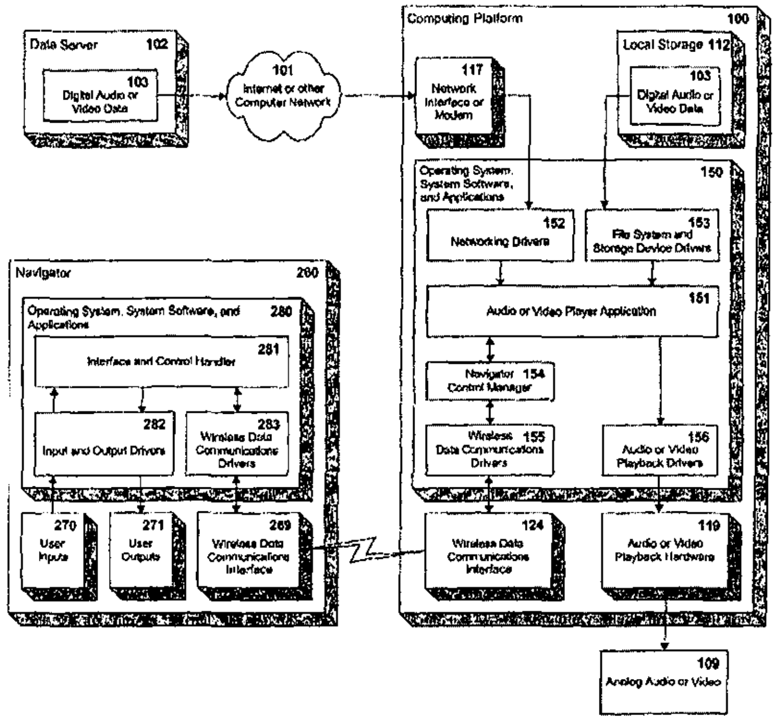

Figure 2

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.

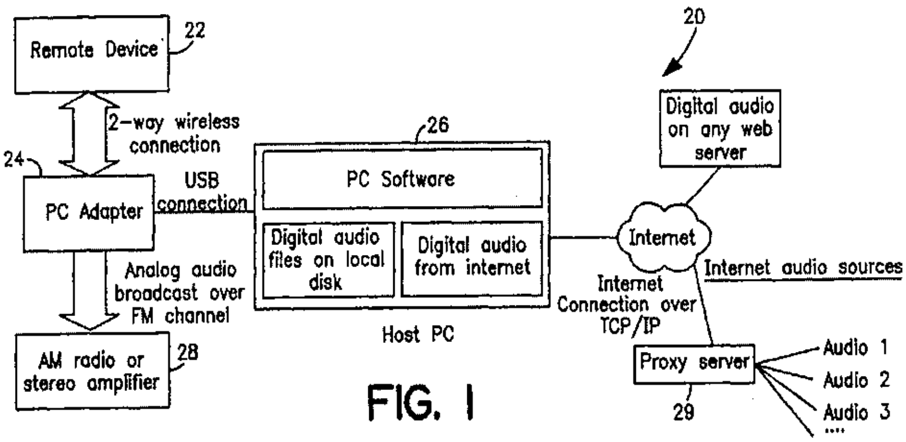

FIG. 1

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.

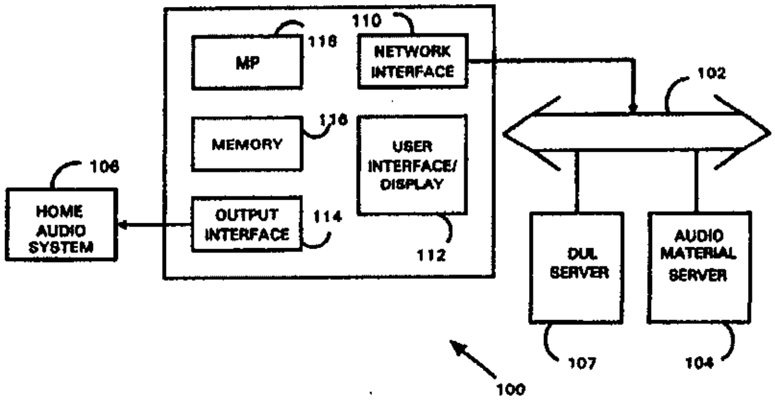

FIG. 1

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.

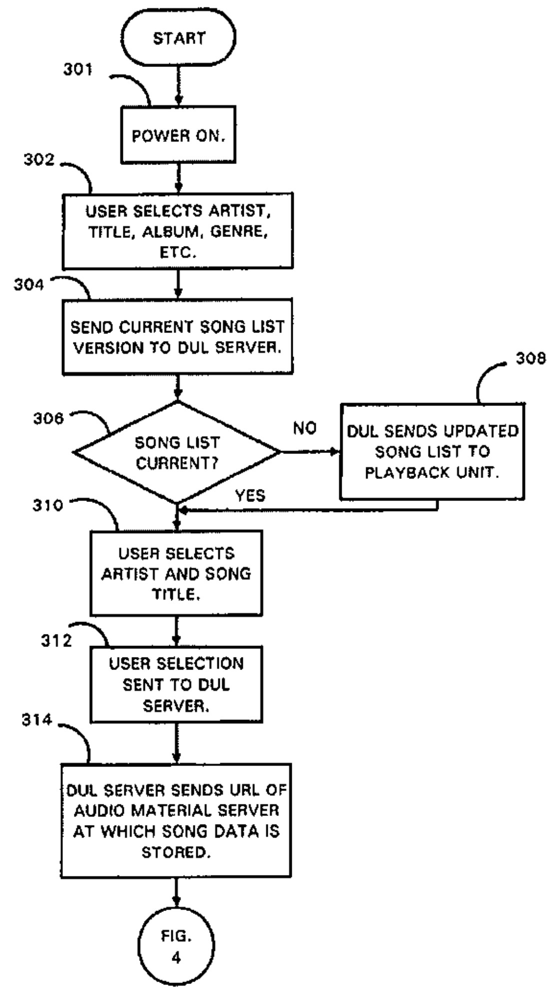

FIG. 3

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.

<u>Analysis</u>

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 the Office Trial Practice Guide[1] 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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[1] Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,765-66 (Aug. 14, 2012).