No. 24-1097

IN THE

United States Court of Appeals for the Federal Circuit

GOOGLE LLC,

Plaintiff-Appellee,

v.

SONOS, INC.,

Defendant-Appellant.

On Appeal from the United States District Court for the Northern District of California
Nos. 3:22-cv-06754-WHA and 3:21-cv-07559-WHA, Hon. William Alsup

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CLAIM LANGUAGE AT ISSUE

U.S. Patent No. 10,848,885: Claim 1

1. A first zone player comprising:

a network interface that is configured to communicatively couple the first zone player to at least one data network;

one or more processors;

a non-transitory computer-readable medium; and

program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

(i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and

(ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the second zone player is different than the third zone player;

after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone scenes has been selected for invocation;

after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and

based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

U.S. Patent No. 10,469,966: Claim 1

1. A computing device comprising:

one or more processors;

a non-transitory computer-readable medium;

and program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone player is operating in a standalone mode in which the first zone player is configured to play back media individually:

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked;

based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene; displaying a representation of the first zone scene and a representation of the second zone scene; and while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and

based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

U.S. Patent No. 10,779,033: Claim 1

1. A computing device comprising:

at least one processor;

a non-transitory computer-readable medium; and

program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

operating in a first mode in which the computing device is configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service;

while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the remote playback queue;

while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

based on receiving the user input, transmitting an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the

remote playback queue from the cloud-based media service; and (iii) play back the retrieved at least one media item;

detecting an indication that playback responsibility for the remote playback queue has been successfully transferred from the computing device to the at least one given playback device; and

after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the remote playback queue to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the remote playback queue and the computing device is no longer configured for playback of the remote playback queue.

U.S. Patent No. 9,967,615: Claim 13

13. A tangible, non-transitory computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause a control device to implement a method comprising:

causing a graphical interface to display a control interface including one or more transport controls to control playback by the control device;

after connecting to a local area network via a network interface, identifying playback devices connected to the local area network;

causing the graphical interface to display a selectable option for transferring playback from the control device;

detecting a set of inputs to transfer playback from the control device to a particular playback device, wherein the set of inputs comprises: (i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network:

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the particular playback device comprises:

> (a) causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;
>
> (b) causing playback at the control device to be stopped; and
>
> (c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number 24-1097

Short Case Caption Google LLC v. Sonos, Inc.

Filing Party/Entity Sonos, Inc.

Instructions:

1. Complete each section of the form and select none or N/A if appropriate.
2. Please enter only one item per box; attach additional pages as needed, and check the box to indicate such pages are attached.
3. In answering Sections 2 and 3, be specific as to which represented entities the answers apply; lack of specificity may result in non-compliance.
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I certify the following information and any attached sheets are accurate and complete to the best of my knowledge.

Date: 02/12/2024

Signature: /s/ E. Joshua Rosenkranz

Name: E. Joshua Rosenkranz

1. Represented Entities. Fed. Cir. R. 47.4(a)(1).	**2. Real Party in Interest.** Fed. Cir. R. 47.4(a)(2).	**3. Parent Corporations and Stockholders.** Fed. Cir. R. 47.4(a)(3).
Provide the full names of all entities represented by undersigned counsel in this case.	Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities. ☑ None/Not Applicable	Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities. ☐ None/Not Applicable
Sonos, Inc.		BlackRock Inc.

☐ Additional pages attached

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4).

☐ None/Not Applicable ☑ Additional pages attached

See attached		

5. Related Cases. Other than the originating case(s) for this case, are there related or prior cases that meet the criteria under Fed. Cir. R. 47.5(a)?

☑ Yes (file separate notice; see below) ☐ No ☐ N/A (amicus/movant)

If yes, concurrently file a separate Notice of Related Case Information that complies with Fed. Cir. R. 47.5(b). **Please do not duplicate information.** This separate Notice must only be filed with the first Certificate of Interest or, subsequently, if information changes during the pendency of the appeal. Fed. Cir. R. 47.5(b).

6. Organizational Victims and Bankruptcy Cases. Provide any information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees). Fed. Cir. R. 47.4(a)(6).

☑ None/Not Applicable ☐ Additional pages attached

Attachment

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4).

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TABLE OF CONTENTS

Page

TABLE OF AUTHORITIES

Page(s)

Cases

Statutes

Rules and Regulations

Other Authorities

STATEMENT OF RELATED CASES

This appeal may affect or be affected by Sonos's pending appeal from the Patent Trial and Appeal Board's decision holding claims 1-2, 6-14, 18-25, and 27-29 of the '615 patent unpatentable. *See Sonos, Inc. v. Google LLC*, No. 23-2040.

Google filed a mandamus petition seeking to have Sonos's case transferred from the Western District of Texas to the Northern District of California; this Court granted the petition. *In re Google LLC*, No. 21-170 (Judges Lourie, Bryson, and Taranto, per curiam). Sonos sought interlocutory review of a decision dismissing Sonos's claims for willful and indirect infringement; this Court denied the petition. *Sonos, Inc. v. Google LLC*, Nos. 22-134, 22-144 (Judges Dyk, Reyna, and Chen, per curiam).

INTRODUCTION

The district court has strong views about "the way the patent system should work." Appx21412. But those views conflict with the Patent Act, the Federal Rules of Civil Procedure, and this Court's precedent. Undeterred, the district court rewrote patent law and reconstituted the judicial role to erase a $32.5 million jury verdict and throw out other patent claims that should have been tried.

To override the jury verdict, the district court recast the doctrine of prosecution laches in an unprecedented way to declare two of Sonos's patents unenforceable. The court recognized that Sonos prosecuted the patent family diligently through several continuation applications off a 2006 provisional application. The court also acknowledged that Sonos did nothing that extended its patents' terms. Yet the court held that Sonos took too long to prosecute the specific claims it asserted against Google here.

The court was most troubled that Sonos added the asserted claims in a continuation application after Google brought its infringing products to market. But Sonos disclosed the invention years before Google even began investing in those products, and informed Google

about that patent family. In fact, Sonos had already secured patents in the same family with broader claims covering Google's products. At any rate, "amend[ing] [to] insert claims intended to cover a competitor's product" is not "in any manner improper"—and, in fact, is entirely compatible with Congress's design. *Kingsdown Med. Consultants, Ltd. v. Hollister Inc.*, 863 F.2d 867, 874 (Fed. Cir. 1988). If this Court condones this novel application of prosecution laches, it will endanger many thousands of patents secured through standard continuation practice and discourage the early and complete disclosure of new innovations.

The district court also found the asserted claims invalid on the ground that Sonos did not supply adequate written description as of the claimed priority date. The court had previously rejected Google's summary judgment motion on written description, and Google did not try that defense or a priority-date challenge to the jury. Yet the court took the reins of Google's defense and crafted a narrative of Sonos's subterfuge to justify its invalidity ruling.

The court hinted at this story for the first time in the middle of trial, but waited until after trial to recount it fully, depriving Sonos of

any opportunity to present testimony refuting it. The court found that written description for the asserted claims depended on a single sentence that Sonos added to the specification by amendment in 2019. It ignored that the specification contained additional support for the claims and the sentence in question had been incorporated by reference into every earlier application in the priority chain. Nevertheless, the court concluded that Sonos had tricked the Patent Office into allowing the amendment. That finding was inconsistent with the record evidence and depended on multiple disputed facts that would have been for jurors to decide—if anyone had ever presented the issues to them.

These intrusions into the jury's domain were not isolated to the two patents that went to trial. On two other patents, the district court granted Google summary judgment of invalidity. But it did so only by resolving factual disputes about the prior art.

This is not how Congress said the patent system should work, nor how the Federal Rules say the judicial system should work. This Court should reverse the post-trial laches and invalidity rulings on the '885 and '966 patents. And it should vacate the summary judgment rulings on the '615 and '033 patents to allow Sonos to try its case to a jury.

STATEMENT OF JURISDICTION

The district court had jurisdiction under 28 U.S.C. §§ 1338 and 1367. It entered final judgment on October 10, 2023, and amended the judgment on November 14, 2023. Appx106; Appx107-108. Sonos filed a notice of appeal on October 17, 2023, and an amended notice on November 15, 2023. Appx11489-11490; Appx11491-11492. This Court has jurisdiction under 28 U.S.C. § 1295.

STATEMENT OF THE ISSUES

1. Whether the district court erred in applying prosecution laches to declare the '885 and '966 patents unenforceable, based on nothing but standard continuation practice that did not extend the patents' terms.

2. Whether the district court erred in granting judgment as a matter of law on the written description and priority date of the '885 and '966 patents, where the limited evidence that the court considered established a priority date no later than 2007, Google forfeited the issues, and Sonos had no opportunity to present relevant evidence on these factual questions.

3. Whether the district court erred by granting summary judgment of invalidity for the '615 and '033 patents where Sonos raised

genuine disputes of material fact about whether the prior art rendered the patents obvious.

STATEMENT OF THE CASE

Sonos Brings Home-Audio Systems Into The Internet Era

Flash back to the turn of the century. Home-audio technology looked "almost nothing like what you see today." Appx20253. Most homes had just "CD players or radios" that played in individual rooms. Appx20253. The rare multiroom systems were rigid and "low-tech." Appx20253-20254. Installers had to "pull wires through the walls or ceiling, repair drywall, and patch things," Appx20253-20254, and redo all the wiring to change the configuration. Wires connected each speaker to a central receiver that controlled the system. Appx20255-20256.

Sonos changed all of this. Appx20252-20253. Its founders envisioned "a new kind of home-audio system" built for "internet-based music services." Appx20253. Sonos disrupted the status quo in several fundamental ways.

First, Sonos invented "intelligent network devices" called ZonePlayers that superseded the central receiver. These players would

go in each room of a house and "provide the music functionality for that particular room." Appx20257. Unlike traditional speakers, ZonePlayers had processors, ran software, and connected to the internet and other devices on the network. Appx20263-20264. Relatedly, Sonos eliminated wires by using "network technology" and "internet-based music sources." Appx20257. And Sonos ditched basic remote controls for a "smart controller that offered two-way communication" with the system. Appx20257.

When Sonos started this endeavor in the early 2000s, the necessary technology "was in its infancy." Appx20258. Smartphones did not exist yet, there were no legitimate online music services, and "few people had [even] thought of connecting … devices other than computers to the internet." Appx20258; Appx20265; Appx20284. Sonos overcame those challenges through years of painstaking engineering and released its first commercial products—the ZP100 (an audio player that connected to external speakers) and CR100 (a hardware controller)—in 2005. Appx20274-20275.

Sonos's controller allowed users to group ZP100s in different rooms of their house, such as the family room and the kitchen, to play

music in sync. Appx20268-20269; Appx20274-20275; Appx10763. And users could also dynamically change which rooms were part of a group whenever they wanted.

Industry experts lauded Sonos's system, calling it "easily the best music streaming product I have seen," and marveling that it could "play the same music throughout the house perfectly synchronized." Appx20281-20284 (quoting Appx34462-34463; Appx34464). Sonos continued to innovate at a rapid pace, launching a range of top-quality speakers designed for wireless home audio and transforming its controller from hardware into a smartphone app. Appx20286-20287. Sonos released its first controller app for the iPhone in 2008 and its first fully wireless smart speaker in 2009. Appx20286-20287; Appx1315; *contra* Appx54 (erroneously stating that Sonos did not release its first "internet-connected smart speaker" until 2014).

Sonos Patents Its Revolutionary Technology

This appeal involves four Sonos patents: a pair of "zone scene" patents (U.S. Patent Nos. 10,848,885 and 10,469,966) and a pair of "direct control" patents (U.S. Patent Nos. 10,779,033 and 9,967,615).

'885 and '966 patents: The zone-scene patents share a specification and claim priority to a September 2006 provisional application. Appx2052; Appx347. The patents relate to creating and invoking "zone scenes": predefined, saved groups of players, such as smart speakers, that can play synchronous audio. *E.g.*, Appx20287; Appx2089 2:36-45. The '885 patent covers zone scenes from the speaker's perspective, while the '966 patent covers them from the perspective of the controller (e.g., a smartphone). *E.g.*, Appx2094 11:36-40; Appx383 11:35-47.[1]

The patents explain the problem that the zone-scene invention was designed to address. Before this invention, speaker groups were "dynamic." Appx20287-20288. That meant a user would create an ad hoc group of speakers and invoke it immediately for synchronous playback, but the group was destroyed the moment the user chose to put one of the grouped speakers into a different group, or to play something individually on one of the previously grouped speakers. Appx20287-20288.

[1] While smart speakers are not the only type of "players" covered by Sonos's patents, for simplicity, this brief uses "speakers" to describe the broader category.

To address that problem, Sonos invented zone scenes. Zone scenes are predefined, saved groups of speakers that a user can invoke for synchronous playback whenever they want. Appx20288. For example, a user can create and save a "Morning" zone scene of speakers in her bedroom, kitchen, and bathroom, Appx20288, and also a partially overlapping "Downstairs" zone scene of all speakers on the first floor, including the kitchen, dining room, and family room, Appx20292-20293. The user can start the day with the Morning zone scene and then later seamlessly switch to Downstairs. But the switch does not destroy the Morning zone scene; the following morning, the user can revert to the Morning zone scene. The same speaker (here, the kitchen) can belong to multiple, coexisting zone scenes and thus "overlap." Appx20289-20293. And the user can play music individually on any speaker without destroying either the Morning or Downstairs zone scenes. Appx20291-20293.

Zone scenes thus improve the user experience by making it possible to "instantly" and repeatedly invoke a previously saved group instead of "redoing that work again and again of selecting the particular players" for a dynamic group. Appx20291.

Sonos conceived of zone scenes by 2005. Appx10954. But for a variety of technical and market reasons, it did not incorporate them into its first generation of products. *See* Appx20915. Sonos instead spent its limited resources adapting to a litany of seismic developments in the industry, including "the rise of the smartphone" and the invention of "every single music service that you use today." Appx20289-20291. Sonos overhauled its system hardware and software in 2020 to practice the zone-scene patents. Appx20287.

'033 and '615 patents: The direct-control patents share a different specification. They relate to using a "control device" such as a smartphone to transfer playback responsibility to a "playback device," such as a smart speaker, through an app like Spotify. *E.g.*, Appx282 2:10-19. Sonos calls this technology "direct control" because it allows a user to directly control a Sonos speaker or a group of speakers—by selecting a song, changing the volume, and so forth—through a third-party app.

The direct-control and zone-scene technologies complement each other. For example, with direct control, a user can select a saved group through her third-party music app and play music to all of her

"Downstairs" speakers in sync, without needing to open the separate Sonos app. Appx20293-20294. Third-party streaming apps typically lack the capability to select multiple speakers at a time for playback, so Sonos's inventions provide a crucial bridge for users to have a seamless streaming experience. Appx20293-20294.

Google Launches A Music-Streaming Service And Then Releases A "Sonos Clone" Speaker

From its inception, Sonos "kept in touch" with companies that were developing online music services "with an eye towards making the[ir] content … available for playback on Sonos." Appx20299. So, when Google launched its streaming service, Google Play Music, in 2013, Sonos welcomed the opportunity to collaborate toward integrating Google Play Music with Sonos. Appx20299-20302; Appx1605. At the time, Google and Sonos did not compete: Google offered no speaker hardware, and Sonos did not offer its own streaming content. Appx20307.

From 2013 to 2015, Sonos and Google discussed a potential collaboration to make Google's music service compatible with Sonos's speakers. In the summer of 2013, Sonos gave Google a "detailed explanation" of how its products functioned. Appx20302-20304. Sonos

also shared physical Sonos devices and the "Sonos music API" that enabled third-party services to work with Sonos. Appx20304-20305; *see* Appx1613-1615 (emails between Sonos and Google). The parties met again in 2014 to explore integrating Sonos with Google's "Cast for Audio" technology, which lets users send and control content such as songs and videos from smaller computing devices (phones and tablets) to larger devices like speakers or TVs. Appx9651 (played at Appx20650); Appx34432-34456 (Cast for Audio presentation).

What Google did not share was that it was plotting to release hardware that competed directly with Sonos. Google released its first competing products in December 2015—six years after Sonos released its first smart speaker—and has continued launching more ever since. Appx20307-20311. The press called Google's speakers "Sonos [c]lone[s]." Appx1370. Google also released apps for controlling the hardware—including creating and saving speaker groups. Appx4551-4552.

Sonos repeatedly warned Google that it infringed Sonos's patents, including patents in the zone-scene and direct-control families. *See* Appx7579. Sonos spent years trying to persuade Google to take a

license. Appx7489-7491. But Google's infringement continued unabated, and with the press reporting that Google's new products brought Google "one step closer to replacing your Sonos system," Sonos had no choice but to sue. Appx15454-15460.

Sonos Sues Google, And The District Court Conducts A "Patent Showdown"

Sonos sued Google in the Western District of Texas in 2020. But Google beat Sonos to the courthouse, filing a declaratory-judgment action one day earlier in the Northern District of California. Appx247-259. After this Court found venue in California more convenient, Sonos's case ended up before the Northern District judge responsible for Google's declaratory-judgment action. Appx15430-15431.

In 2021, the district court ordered the parties to participate in its unique "patent showdown procedure," which the court described as "the way to get this whole thing settled." Appx492-494. The showdown requires the "patent owner and alleged infringer [to] each select and exchange one asserted claim" and then "file cross motions for summary judgment on the two claims." Appx485-487. If any claim survived summary judgment, the parties had to "prepare[] for a prompt

[showdown] trial," Appx487, while the rest of the case proceeded at a standard pace, Appx502-503.

Sonos chose claim 1 of the '885 patent. Appx4549. Broadly speaking, claim 1 covers Sonos's zone-scene technology from the perspective of a player (e.g., a smart speaker). Appx4551. Sonos accused Google's media players—speakers, Chromecast dongles, and Nest Hub displays—of infringement. Appx4549.

The parties cross-moved for summary judgment on claim 1. As relevant here, Google moved for summary judgment of noninfringement and contended that claim 1 was invalid as lacking written-description support for zone scenes where one speaker belongs to multiple saved groups. Appx4896-4897.

The district court held that Google infringed claim 1. Appx5410-5411. (Several months after the showdown, Google released a redesign that it claimed was noninfringing. Appx49.)

The court rejected Google's written-description argument, holding that the specification's "disclosures adequately convey that a zone player can be added to multiple zone scenes." Appx5417. The court pointed to Figure 5B in the '885 patent's specification, which shows a

"user interface to allow a user to form a scene." Appx5416-5417 (quoting Appx2093 10:12-19).

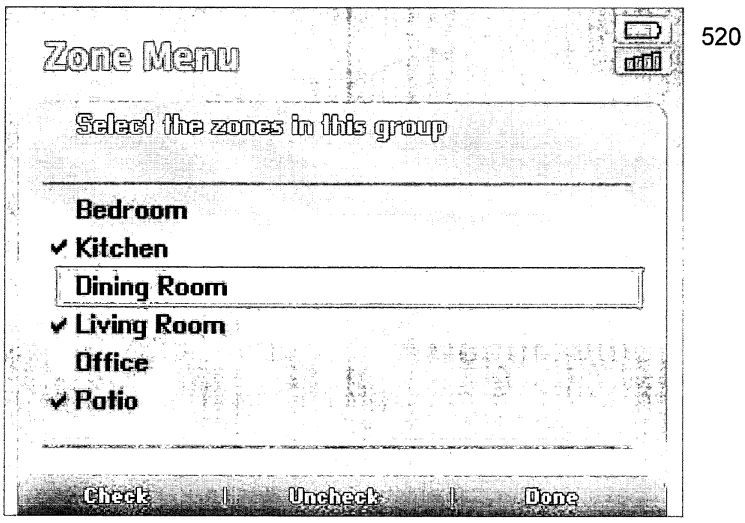


FIG. 5B

Appx2086. The specification explains that the list of zones (or speakers) above "includes ALL the zones in the system, including the zones that are already grouped." Appx5416-5417 (quoting Appx2093 10:12-19). The court also noted that the specification discloses that "*various scenes* may be saved in any of the members in a group." Appx5417 (quoting Appx2089 2:56-59).

Google chose claim 13 of the '615 patent, which covers direct-control technology. The claim recites a computer-readable storage medium with instructions that enable a "control device" (such as a

smartphone) to transfer media playback to a "playback device" (such as a smart speaker). Appx5067-5068.

Here, the crucial limitation for transferring playback is "causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device." Appx291 20:7-15. The district court construed "playback queue" to mean "[a] list of multimedia content selected for playback." Appx5; Appx7-8.

Google moved for summary judgment of noninfringement and invalidity, Appx4857-4888, which the district court granted, Appx1-17. The court credited Google's expert testimony that it would have been obvious to combine Google's YouTube Remote, which used a local playback queue, with teachings from Google's U.S. Patent No. 9,490,998 to allow selecting a particular "paired" device from among multiple devices available for playback. Appx4878-4881. The court elevated that testimony above Sonos's expert testimony explaining that the '998 patent is at best ambiguous as to whether it teaches selecting a particular paired device from among multiple devices, or merely selecting any and all paired devices. Appx5150.

The District Court Invalidates The '033 Patent Before Trial

As the case moved toward trial on the remaining patents, both sides again moved for summary judgment. As relevant here, Google sought summary judgment of invalidity for the '033 patent. Appx19. The obviousness analysis again revolved around YouTube Remote and the '998 patent, although this time Google relied on what it called the "party mode" feature of YouTube Remote. Appx25. And while the '615 patent claims a *local* playback queue, the '033 patent claims a *remote* playback queue. Appx25.

The district court disregarded Sonos's expert's opinion that a copy of the party playlist stored on a cloud server did not qualify as a remote playback queue, as required by the '033 patent's claims. Appx30; *see* Appx6330-6331. Thus, here, again, the district court found that the combination of YouTube Remote and the '998 patent rendered Sonos's claims obvious. Appx37.

The Jury Finds Infringement But The District Court Overrides The Jury's Verdict

The following issues remained for trial: (1) whether Google's post-showdown redesign infringes claim 1 of the '885 patent; (2) whether any version of the accused products infringes the '966 patent; (3) whether

Google willfully infringes the '966 patent; (4) whether any asserted claims were obvious; and (5) damages. Appx10347-10350.

The jury found that Google failed to prove any of the asserted claims invalid. Appx10347-10348. It also found that Google's redesign still infringes claim 1 of the '885 patent but that no accused products infringe the '966 patent. Appx10347-10349. The jury awarded Sonos just over $32.5 million for past infringement. Appx10350.

The parties filed post-trial motions, with each party challenging aspects of the verdict and Sonos seeking additional remedies. Appx11069-11098; Appx11099-11135. The district court never decided those motions.[2] Instead, it overrode the jury's verdict based on an inapplicable affirmative defense and an invalidity theory that Google forfeited.

The court planted the seeds of its ruling early in the case when it pronounced that patentees should not be allowed to "monkey[] around with … [their] claims" to "read on somebody else's product." Appx528-530. Then, in the middle of trial, the court declared that a "gimmick …

[2] Because the district court denied these motions as moot, Appx105, it will have to address their merits in the event of a remand.

was going on at Sonos to cover the Google product." Appx20978. The court interrogated Sonos about "what the written description is of how you go about achieving the overlapping zone scenes." Appx20658. Sonos repeatedly reminded the court that it had already determined that the specification had written-description support and that Google had previously agreed not to challenge the written description at trial, Appx6992-6998, but the court remained undeterred: "I'm bringing it up myself." Appx20661.

The court fixated on one sentence that Sonos imported from the 2006 provisional into the zone-scene specification by amendment in 2019, ordering multiple rounds of briefing on the issue (starting after the court raised that issue mid-trial and continuing post-trial). Appx20949-20950.[3] The court expressed a suspicion that Sonos improperly "snuck [new matter] in there" because the specification had "inadequate written description prior to that date." Appx20976. Sonos reminded the court that the examiner allowed the 2019 amendment,

[3] *See also* Appx7610-7616; Appx7617-7623; Appx8182-8237; Appx7943-7954; Appx9214-9230; Appx9319-9326; Appx9407-9415; Appx10484-10504; Appx10505-10525; Appx10526-10538; Appx10539-10550; Appx10937-10941; Appx11001-11018; Appx10942-10959; Appx11064-11068.

thereby determining that Sonos did not add new matter. Appx20974; Appx9326. But the court announced that the zone-scene patents likely lacked an earlier priority date and were thus invalid as anticipated by Google's products, and expressed "great concern … that I was bamboozled by Sonos." Appx20978; Appx21410. And, returning to the concept of amending claims to cover a competitor's product, the court declared: "That, to me, is not the way the patent system should work," so "we're going to [re]visit that" after the verdict. Appx21412-21413.

The court made good on its promise and vacated the verdict on two grounds. First, the court invoked prosecution laches, rendering the zone-scene patents unenforceable. Appx51. The court held that Sonos had unreasonably and inexcusably delayed by waiting until 2019 to add a claim specifically covering overlapping zone scenes after originally filing the provisional application for that patent family in 2006. Appx79-82. The court agreed "[t]hat Sonos diligently prosecuted patent applications in the interim." Appx81. But it held that Sonos's diligence made the delay in crafting the narrower claim for overlapping zone scenes "*all the more* unreasonable," because Sonos could have "fil[ed]

parallel applications with new claims covering the invention" earlier. Appx81.

The court also held that Google suffered prejudice. It found that Google would have struggled to investigate the priority chain for the zone-scene patents, and that earlier applications in the chain did not claim or disclose overlapping zone scenes. Appx82-84. The court acknowledged that Sonos did not extend the terms of its patents through any prosecution delay (and could not have done so). Appx84-86. But it found prejudice on the basis that Sonos "let the industry develop and only then sought to extract an invention from a much earlier application that would read on an industry trend." Appx84-86.

The court based the latter position on the view that Sonos had not disclosed overlapping zone scenes until 2019, by improperly amending the zone-scene specification to add new matter. Because of the purported new matter, the court held that Sonos was entitled only to a 2019 priority date, making Google's accused products prior art. Appx99. Google forfeited any priority-date challenge, including by not making one in its Rule 50 motions. But the court held the zone-scene

patents invalid, because "[t]hat which infringes if later anticipates if before." Appx99.

Lastly, the district court contradicted, and vacated, its earlier order concluding that the zone-scene patents had adequate written description for overlapping zone scenes. Now, informed by trial evidence about how Google implemented overlapping zone scenes, the court found that the zone-scene specification disclosed overlapping groups only by inference, which "would not allow a person of skill in the art to recognize that the inventor invented what is claimed." Appx99-105. Sonos appealed.

SUMMARY OF ARGUMENT

I. Prosecution laches reaches only egregious abuses of the statutory patent system where a patentee artificially extends the duration of their monopoly. Prosecution laches does not apply to Sonos's zone-scene patents because the animating feature for that defense—an unfair timewise extension beyond the period Congress prescribed—is absent here. This Court should not break new ground by endorsing the doctrine's application in this case.

Even if prosecution laches could apply here, the district court abused its discretion. The court recognized that Sonos "diligently" prosecuted the family of zone-scene patents for 13 years. Nothing in the record suggests that it was unreasonable for Sonos to prioritize other claims over the narrowed claims asserted here, particularly where Sonos submitted the new claims just before releasing its own commercial embodiment practicing them. Moreover, Google could not have been prejudiced by any prosecution delays because Sonos had patent claims covering all zone scenes (overlapping or not) long before Google's infringing products.

II. The district court improperly decided as a matter of law that the zone-scene patents were entitled to only a 2019 priority date because of new matter, and lacked written description in any event. None of these issues went to the jury. Instead, the court stepped into the role of factfinder and impermissibly weighed the evidence in the light *least* favorable to Sonos. Moreover, the court ignored the presumption of validity and the even heavier presumption of correctness for an examiner's entry of an amendment to the specification.

Had it applied the proper standards, the court would have found that Sonos disclosed overlapping zone scenes long before 2019—no later than its 2007 non-provisional—and that Sonos did not add new matter to the zone-scene specification in 2019. The 2007 application explained that conventional systems struggled to accommodate overlapping speaker groups, and proceeded to disclose through multiple figures and text how zone scenes allowed users to create and save groups with shared members. The one sentence that the district court found to be new matter appeared in the 2006 provisional that was incorporated by reference into every application from 2007 on, describing a figure that was also in the 2006 provisional and has appeared in every application in exactly the same form since 2007. This Court should reverse even if it finds there were disputed issues of fact because Google forfeited these issues multiple times over—including by not raising them in time for Sonos to develop and present relevant evidence to the jury, and by not raising them in its Rule 50 motions.

III. At summary judgment, the district court usurped the jury's role by resolving material factual disputes over the validity of the direct-control patents. The parties presented competing expert

testimony about the scope of the prior art, and the court had no authority to decide which expert's reading was better.

STANDARD OF REVIEW

This Court reviews de novo the district court's grant of summary judgment, *Adasa Inc. v. Avery Dennison Corp.*, 55 F.4th 900, 907 (Fed. Cir. 2022) (applying Ninth Circuit law), and of judgment as a matter of law (JMOL), *Geo. M. Martin Co. v. Alliance Machine Sys. Int'l LLC*, 618 F.3d 1294, 1300 (Fed. Cir. 2010) (applying Ninth Circuit law). JMOL is improper unless "the evidence, construed in the light most favorable to the nonmoving party, permits only one reasonable conclusion." *Id.* (citation omitted).

This Court reviews for abuse of discretion the district court's determination of prosecution laches. *Personalized Media Commc'ns, LLC v. Apple Inc.*, 57 F.4th 1346, 1353 (Fed. Cir. 2023) (*PMC*). The district court abused its discretion if it made "an error of law or clearly erroneous factual findings." *Id.* (citation omitted).

ARGUMENT

I. The District Court Abused Its Discretion In Holding The Zone-Scene Patents Unenforceable Because Of Prosecution Laches.

The district court's laches ruling was a blatant exercise in judicial legislation. The court minced no words about its disapproval of using continuation applications to tailor claims to commercial embodiments. Undeterred by this Court's emphatic holding that Congress had condoned that practice, the district court declared that this is "not the way the patent system should work." Appx21412. So the court distorted an equitable doctrine that has never been applied to this circumstance, and that simply does not fit, to reshape the patent system more to its liking. And in support of that extraordinary result, the court recast an entirely unremarkable prosecution into a narrative of Sonos "enrich[ing]" itself through "delay and sleight of hand." Appx105.

This Court has two options for reversal. The first is holding that the doctrine is categorically unavailable here because everyone agrees that nothing Sonos did extended the duration of its patent monopoly. The second is holding that Google failed to prove either element of laches.

A. Prosecution laches does not apply because Sonos did not extend the duration of its monopoly.

1. Prosecution laches should be used "sparingly." *Symbol Techs., Inc. v. Lemelson Med., Educ. & Rsch. Found.*, 422 F.3d 1378, 1385 (Fed. Cir. 2005). It addresses only "egregious cases of misuse of the statutory patent system," *id.*, where a patentee artificially extends its monopoly period through bad-faith prosecution conduct that delays a patent's issuance "and thus puts off the free public enjoyment of the useful invention," *Woodbridge v. United States*, 263 U.S. 50, 56 (1923). Before this case, no court has ever found a patent unenforceable under prosecution laches unless the patentee's prosecution delay extended its monopoly period, which everyone agrees Sonos did not do.

The Supreme Court's early cases on prosecution laches punished a patentee who secured an "undue extension of the patent monopoly," thereby "subvert[ing] [the] limitations" of patent law. *Webster Elec. Co. v. Splitdorf Elec. Co.*, 264 U.S. 463, 466 (1924). For example, the Court applied prosecution laches to a patentee who "postpone[d]" "the beginning of the term of his monopoly" to a time when he could profit most from the patent. *Woodbridge*, 263 U.S. at 56. That "designed delay" was "an evasion of the [patent] statute" because it "put[] off the

free public enjoyment of the useful invention." *Id.*; *see also Crown Cork & Seal Co. v. Ferdinand Gutmann Co.*, 304 U.S. 159, 168 (1938) (recognizing prosecution laches as punishing the "enlarge[ment] [of] the patent monopoly beyond that contemplated by the [patent] statute").

This Court has adopted the same rule, and its cases fit the same pattern. Its first prosecution laches opinion rebuked a patentee who "deliberately postponed the free public enjoyment" of the claimed invention through a "deliberate and consistent course of conduct" that caused "exceptional delay in advancing the prosecution and the issuance of a patent." *In re Bogese*, 303 F.3d 1362, 1363-65 (Fed. Cir. 2002). Specifically, the Patent Office rejected claims in a patent application, yet the applicant included the same rejected claims in a dozen successive continuation applications without amending or addressing the reasons for the rejection. *Id.* Worse, the applicant also abandoned each previous application. *Id.* By the time the Patent Office denied the latest continuation application based on prosecution laches, nearly 20 years had passed since the original application. *Id.* at 1365.

In every prosecution laches case since, patentees delayed prosecution in bad faith to extend their monopolies beyond the statutory

period by *decades*—typically through tactics like drowning the Patent Office in thousands of identical claims. *Infra* § I.B.1. In one case, the patentee "bulk-filed" 381 applications that claimed priority to more than 40 applications filed between 1969 and 1983, and then managed to delay prosecution for 44 years from the first application. *Hyatt v. Hirshfeld*, 998 F.3d 1347, 1353-56 (Fed. Cir. 2021). In another, the patentee bulk-filed 328 applications that claimed priority to a 1987 application, and then finagled delays so the relevant patent did not issue for another 25 years. *PMC*, 57 F.4th at 1350-53; *see Symbol Techs.*, 422 F.3d at 1380, 1386 (patentee delayed issuance up to 39 years for applications initially filed in the 1950s). The defining feature of each case was a patentee who abused the patent system by manipulating continuations to extend their patent monopoly far beyond the then-applicable 17-years-from-issuance term Congress had prescribed.

Prosecution laches provided an important safeguard against these sorts of abuses back when the patent term ran from the date of issuance. Under that regime, patentees could "abandon[] applications and fil[e] continuing applications in their place" almost "indefinitely,"

thereby exploiting both the original application's priority date and the continuing application's later issuance date. *Hyatt*, 998 F.3d at 1351-52 (citation omitted).

Congress largely eliminated that problem with its 1995 amendment that changed the patent term to run from the application's filing date, rather than the issuance date. *Id.* Under today's regime, a delay in prosecution normally *erodes* the monopoly period, because the clock starts ticking as soon as the inventor files a non-provisional priority application.

Sonos filed its applications after 1995, so whether Sonos prosecuted the zone-scene patents at a snail's pace or at lightning speed, its patents will expire in 2027. Appx84. Any delay in prosecution reduced Sonos's zone-scene monopoly period by over a decade, to under eight years. Appx7608. The crucial factor that drove every previous prosecution laches case is thus missing here.

2. The district court did not suggest that Sonos secured an improper timewise extension of its patents. Instead, it found that the delay was otherwise inequitable, relying on false premises—factual and legal.

The first faulty premise was that Sonos had "*never claimed … [or] disclosed*" overlapping zone scenes until years after competitors developed products practicing that invention. Appx83. If the premise about disclosure were correct, then the claims would be invalid. Courts do not need prosecution laches to address such concerns. *See Symbol Techs.*, 422 F.3d at 1385 (noting that filing continuations is permissible, and that concerns over "subject matter" added to support new "claims as the development of an invention progresses" should be addressed via validity doctrines). Regardless, the specification *did* teach overlapping zone scenes; and Sonos *did* obtain broad claims covering *all* zone scenes (overlapping or not) long before any competitors offered products with overlapping zone scenes. *Infra* §§ I.B.2, II.A. And while attributing a nefarious motive to Sonos, the court failed to acknowledge that Sonos had good reason to add those narrowed claims limited to overlapping zone scenes in 2019: to cover *its own* imminent commercial embodiment, released in 2020. Appx20287.

A second faulty premise was that the prior art disclosed "zone scenes." Appx90-91. That premise led the court to conclude Sonos could validly claim nothing but "niche variations [on zone scenes] of

little consequence." Appx72. Whether the prior art disclosed zone scenes was a central factual dispute at trial, Appx21846-21850 (Google's closing argument), which Google lost, Appx10347-10348. *See Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc.*, 344 F.3d 1186, 1192 (Fed. Cir. 2003) (courts "must presume that the jury resolved all factual disputes in favor of the prevailing party … as long as they are supported by substantial evidence"). The clearest explanation for the jury's validity finding is that it agreed with Sonos that the prior art did not teach zone scenes (overlapping or not). Appx21810-21821. The district court thus had no basis for these fact-findings (and indeed cited none).

Underlying all this was an incorrect legal premise: that it is inequitable to use continuation applications to add claims that cover a competitor's products. This Court has held that it is not "in any manner improper" to "amend [to] insert claims intended to cover a competitor's product the applicant's attorney has learned about during … prosecution," including through continuations. *Kingsdown*, 863 F.2d at 874; *see Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 909 n.2 (Fed. Cir. 2004). That becomes improper only when paired with some

abuse that extends the term of a patent's monopoly—which is concededly missing here.

B. The district court erred in applying prosecution laches to standard continuation practice yielding no prejudice.

Even assuming prosecution laches could apply here, the district court erred. Google had to prove, by clear and convincing evidence, that: (1) Sonos's "delay in prosecution [was] unreasonable and inexcusable under the totality of circumstances"; and (2) Google "suffered prejudice attributable to the delay." *PMC*, 57 F.4th at 1354, 1357; *see Cancer Rsch. Tech. Ltd. v. Barr Lab'ys, Inc.*, 625 F.3d 724, 732 (Fed. Cir. 2010) (applying clear-and-convincing standard for the defense of inequitable conduct); *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1287 (Fed. Cir. 2011) (en banc) (same); *cf. Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 95 (2011) (35 U.S.C. "§ 282 requires an invalidity defense to be proved by clear and convincing evidence"). Google failed to prove either element.

1. Sonos did not unreasonably delay prosecution.

a. Google presented literally no evidence of unreasonable or inexcusable delay. Google (and the court) relied solely on the time that

elapsed between the filing date of the provisional and the filing date of the claims asserted here. The district court's opinion contained the seeds of its destruction in agreeing that Sonos "diligently prosecuted [its] patent[s]" in the priority chain between 2006 and 2019, when Sonos first expressly limited some claims to zone scenes that overlap. Appx80-81. It did not (and could not) fault Sonos for the seven years that the Patent Office took to issue the first patent. And it had no legitimate complaint about anything Sonos did during prosecution in the next six years.

The prosecution up to that point was not only diligent, but also unremarkable. After Sonos filed the 2006 provisional and 2007 non-provisional applications, its sequential continuations claimed different aspects of its zone-scene invention disclosed in the specification. Sonos never abandoned any applications in the priority chain for the zone-scene patents. Contrary to the district court's insinuations, Appx98, nothing in the record suggests that those applications buried the Patent Office in an inordinate volume of materials, or that any aspect of Sonos's prosecution strategy troubled the Patent Office in any way or caused any prosecution delay. All Sonos did was keep the trains

moving on each of its applications from start to finish, through normal continuation practice that this Court has stressed is "legitimate" and can trigger prosecution laches only "sparingly lest statutory provisions be unjustifiably vitiated." *Symbol Techs.*, 422 F.3d at 1385.

Unlike the patentees in *PMC* and *Hyatt*, Sonos did not overwhelm the Patent Office with "hundreds of burdensome" applications with hundreds of claims each. *PMC*, 57 F.4th at 1354; *Hyatt*, 998 F.3d at 1353. Hyatt, for example, pursued about 45,000 independent claims in total, which the Patent Office estimated would take "532 years of examiner time" to process. *Hyatt*, 998 F.3d at 1353-55; *see PMC*, 57 F.4th at 1350-51 (applications had as many as 20,000 total claims). Here, nothing in the record even hints that the Patent Office struggled to process the zone-scene applications.

Nor did Sonos "intentionally create[]" any delay by, for example, "engaging in a pattern of rewriting claims entirely … midway through prosecution [to] restart[] examination," or by filing applications with unamended, previously examined claims simply to keep the priority chain alive rather than "substantively advance prosecution." *Hyatt*, 998 F.3d at 1368; *PMC*, 57 F.4th at 1355; *Bogese*, 303 F.3d at 1363-65, 1369.

Rather, Sonos properly amended its claims over time and never abandoned any applications in the patents' priority chain.

In short, Sonos's conventional prosecution conduct is not even in the same universe as the pattern of bad-faith conduct that has previously triggered prosecution laches.

b. The district court discounted the diligent prosecution history through 2019 by zeroing in on the time it took Sonos—"*over thirteen years,*" Appx79-80—to narrow its claims to *overlapping* zone scenes. The court ignored that more than half of that period (seven years) was time it took the Patent Office to issue the first ancestor patent. Notably, the Patent Office granted Sonos a term adjustment of almost four additional years precisely because Sonos was not to blame. Appx8463 (granting 1443-day adjustment for U.S. Patent No. 8,483,853). But the court declared that Sonos should have acted earlier to take the "small step" of "filing parallel applications with new claims covering" the overlap element more specifically. Appx81. That was wrong on multiple levels.

To start, a delay in prosecuting particular claims, on its own, is not enough to trigger prosecution laches. Any delay must be

"unreasonable," which depends on "the specific circumstances" surrounding the prosecution history. *Hyatt*, 998 F.3d at 1366. Google presented no evidence that Sonos's sequencing decision was at all unreasonable. And the district court cited none. Instead, it faulted Sonos for "never provid[ing] any sworn explanation for why it waited until April 2019 to claim overlapping zone scenes." Appx80. But the burden was on Google; Sonos had no obligation to explain its sequencing decisions and reveal its prosecution strategies. And as the court knew, Sonos did not introduce overlapping zone scenes into its own products until 2020. Appx20287. It is perfectly reasonable for a patentee to wait to spend the resources to claim a particular feature until the patentee is ready to practice it in a commercial product.

More generally, no laches case has ever suggested that a court can isolate one prosecution decision just because that is what ended up "matter[ing]" in a particular litigation. Appx81. The question "of unreasonable delay is not limited to the circumstances surrounding the *particular* application at issue," but encompasses more broadly "the prosecution history of *all* of a series of related patents." *Hyatt*, 998 F.3d at 1362 (latter part quoting *Symbol Techs.*, 422 F.3d at 1386) (emphases

added). That focus is inherent in the rule that the doctrine focuses on the "totality of the circumstances," *Hyatt*, 998 F.3d at 1363—not on any isolated decision on when to claim a particular aspect of the invention.

The court's focus on that one decision presents a frontal assault on the continuation practice Congress codified, the Patent Office implements, and this Court has blessed. 35 U.S.C. § 120; *Kingsdown*, 863 F.2d at 874. Continuation applications are a standard feature of patent prosecution. They are how "the patent examiner and the applicant, in the give and take of rejection and response, work toward defining the metes and bounds of the invention to be patented." *In re Buszard*, 504 F.3d 1364, 1366-67 (Fed. Cir. 2007).

Moreover, the court was wrong to suggest that adding a set of claims is a "small step." Prosecution is expensive and time-consuming. To force a patentee to prosecute all its claims at once would squander one of the most important benefits of continuation applications: easing the burden on applicants who lack the resources to prosecute applications concurrently and would otherwise "be forced to accept protection on less than [they] had [the] right to protect." The Comments of the Biotechnology Industry Organization on the USPTO's

Proposed Rule Changes, 25 Biotech. L. Report 473, 475 (2006). It is not for a court to change the law, particularly where Congress has considered, and rejected, amendments aimed at modifying continuation practice.[4]

The district court's approach would discourage the early and complete disclosure of new innovations and imperil innumerable patents with long priority chains. There are many thousands of patents with spans of more than ten years from the earliest priority date to filing date. *See* PatentsView, USPTO, Annualized Data Tables, http://tinyurl.com/3a32yrxp. Google itself owns such patents—including some with 14-year gaps that it asserted against *Sonos* in other litigation. *See Google LLC v. Sonos, Inc.*, No. 20-cv-03845-EMC (N.D. Cal.) (Patent Nos. 10,229,586 and 10,140,375). They are all vulnerable to challenge if courts can just deem them unreasonably late.

[4] *Compare* Patent Reform Act of 2005, H.R. 2795, 109th Cong. § 8 (2005) (proposing granting the USPTO Director authority to limit continuation practice so long as the limitations do not deny "applicants an adequate opportunity to obtain claims for any invention disclosed in an application for patent"), *with* Patent Reform Act of 2005: Hearing Before the Subcomm. on Courts, the Internet, and Intellectual Property, 109 Cong. (2005), p. 21 (statement of Robert B. Chess) (applauding the rejection of the proposal to permit limitations on continuation practice).

c. The district court mentioned two other points in support of its ruling—both meritless. The first was a remark from a Sonos lawyer that the priority chain was "confusing." Appx82 (quoting Appx20969). But any confusion in the priority chain was merely a function of standard continuation practice. Google submitted *no evidence* that Sonos engineered the confusion—much less that it did so for inequitable purposes or that any purported confusion was at all relevant to the delay in prosecuting the zone-scene patents.

The second was that Sonos submitted thousands of pages of material to the Patent Office (via Information Disclosure Statements) during prosecution. Appx98. Many of those pages were litigation filings that post-date the applications; far from being "superfluous," Appx98, Sonos submitted them to comply with Patent Office regulations. *See* 37 C.F.R. § 1.56 (duty of candor). More important, Google offered *no evidence* that the materials submitted were excessive or that they in any way impeded the Patent Office's examination.

* * *

In sum, nothing in the district court's opinion came close to showing that Sonos perpetrated the sort of unreasonable and

inexcusable delay that amounts to "egregious … misuse of the statutory patent system" and can trigger prosecution laches. *Symbol Techs.*, 422 F.3d at 1385.

2. Google suffered no prejudice.

The district court had no basis for finding prejudice. Google had to show by clear and convincing evidence that Sonos's invention remained out of public view while Google invested in its infringing products during the purported delay. *See Cancer Rsch.*, 625 F.3d at 729-30; *Woodbridge*, 263 U.S. at 56 (recognizing that delay prejudices those "without knowledge" of the invention). The record negates any such conclusion.

Google claims to have "beg[u]n investing in its products" in 2015. Appx11053 (Google motion). By then, Sonos had long since disclosed overlapping zone scenes *and* secured patent claims that covered multiple zone scenes (overlapping or not).

Sonos first disclosed overlapping zone scenes nearly a decade earlier—in 2006—via its provisional application, which became public in 2013. Appx8187; Appx8191. Sonos's 2007 non-provisional application likewise disclosed overlapping zone scenes. *See infra* § II.A.

And the applications for the zone-scene patents incorporated by reference the 2006 provisional application and the 2007 non-provisional application that issued in 2013. *See* Appx8194-8195; Appx8186 (priority chain for both patents).

Sonos also secured broad claims that covered products with overlapping zone scenes. Sonos's U.S. Patent No. 8,843,228, a direct ancestor to the '885 and '966 patents, issued in September 2014, and claims a controller programmed to "invoke a zone scene of the one or more zone scenes," each zone scene containing "two or more of the plurality of independent playback devices." Appx8527-8545, claim 6; *see also id.* (claim 10); Appx7493-7575 (2018 presentation to Google showing overlapping groups as an implementation that infringes the '228 patent). In other words, the '228 patent claimed a controller that displayed multiple zone scenes and allowed a user to choose from among the zone scenes. Nothing in the claims of the '228 patent prohibits overlapping zone scenes. So Google's overlapping zone scenes would have infringed the '228 patent from the start. Yet Google continued to pursue the release of its infringing products. Google's decision to launch a product that infringed already-issued claims

precludes showing prejudice. *See i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 863 (Fed. Cir. 2010) (recognizing that an infringer cannot complain about the costs it incurred because of its infringing activities).

This case is thus nothing like the cases finding prejudice based on an infringer's investments in infringing products. In *PMC*, for example, the patentee had a strategy of "hiding its technologies, quietly monitoring infringement, and rolling out patents over time" to bring infringement suits. *PMC*, 57 F.4th at 1352 (cleaned up). Because the patentee "conceal[ed] its inventions," unsuspecting inventors unwittingly invested in infringing products, only to be ambushed with patent claims. *Id.* at 1353.

The district court nonetheless concluded that Google could not have been expected to figure out that Sonos claimed overlapping zone scenes because "unearthing the layers of file histories would have resembled an exercise in archeology." Appx82. No archeology was necessary to read the 2006 provisional application, the 2007 non-provisional application, or the '228 patent, which disclosed, and then claimed, the invention well before Google invested in its infringing products in 2015.

The district court's prejudice analysis also overlooked that Sonos and Google met in 2013 and 2014 to discuss the possibility of integrating Google's streaming service with Sonos's products. *Supra* 11-12. That meeting gave Google ample notice to investigate Sonos's patents, which would have revealed Sonos's zone-scene patent family. In fact, Sonos specifically gave Google notice in 2016 that Google was infringing the '228 patent. Appx7601-7602.

Moreover, the district court discounted the specifications and support in the 2006 and 2007 applications, saying that claims (not specifications) "define the scope of a patented invention." Appx83. It took the startling position that anything not claimed in the first application is "dedicated to the public." Appx81 (quoting *Eli Lilly & Co. v. Hospira, Inc.*, 933 F.3d 1320, 1334 (Fed. Cir. 2019) (citations omitted)). But *Eli Lilly* has nothing to do with finding prejudice for purposes of prosecution laches. That case involved the "disclosure-dedication" limitation on the doctrine of equivalents—that a patentee cannot use the doctrine of equivalents to expand claims to capture subject matter expressly disclosed but not claimed. *Eli Lilly*, 933 F.3d at 1329-34. Moreover, the very next sentence of *Eli Lilly* recognizes

that material "claimed in a continuation or other application based on the disclosure" is not dedicated to the public—exactly what happened here. *Id.* at 1334*; see Gen. Talking Pictures Corp. v. W. Elec. Co.*, 304 U.S. 175, 182-83 (1938) (rejecting argument that inventor filing "an application for patent showing and describing, but not claiming, certain inventions cannot obtain a valid patent for said inventions" through a continuation application because the original application disclosed inventions before their public use). Otherwise, continuation applications—which by definition include claims omitted from the ancestor applications—would be useless.

In sum, any "prejudice" Google suffered by investing in and releasing infringing products was entirely its own making.

II. The District Court Erred In Granting JMOL On The Priority Date And Written Description Of The Zone-Scene Patents.

In the same opinion that found Sonos's zone-scene patents unenforceable for prosecution laches, the district court entered a contradictory judgment that the patents are also invalid. The district court found the patents anticipated in two steps: (1) finding that Sonos's zone-scene patents lacked adequate written-description support without

the benefit of one sentence that Sonos added to the specification from the provisional by way of a 2019 amendment; and (2) concluding that this delayed the patents' priority date to 2019, which meant that Google's accused products anticipated them. The court then vacated its summary judgment ruling on written description, finding that the specification lacked adequate support for overlapping zone scenes even after the 2019 amendment. Here is the contradiction: If Sonos did not disclose the invention before 2019, there was no 13-year delay in claiming it and no basis for finding prosecution laches. The district court's rulings thus cannot stand together. Regardless, the invalidity finding independently merits reversal.

Before explaining why, it is important to appreciate the unorthodox—and highly unfair—procedural posture in which this issue arose. Google raised a written-description argument at summary judgment (with an undeveloped allegation that Sonos added unspecified new matter), focusing primarily on the same element that drove the district court's JMOL ruling—"overlapping" groups. Appx4913-4917. Separately, Google's expert explicitly noted the 2019 amendment to the specification that the district court later seized upon. Appx10985. Yet,

Google did not advance either a new-matter or priority-date challenge based on the 2019 amendment before trial. *See* Appx4913-4914. The district court denied Google's summary judgment motion. Appx5416-5419.

Google never presented either a written-description or new-matter challenge at trial through its expert or jury instructions. Quite the opposite: Google agreed before trial (and reaffirmed mid-trial) that it would not try written description to the jury, Appx6993; Appx6995; Appx21407; conceded a 2005 conception date of the zone-scene invention, Appx59; Appx20447; Appx20451; Appx20643; and effectively conceded a 2006 priority date, Appx11010-11016.

In the face of Google's forfeiture, the district court, in the middle of trial, seized upon a single sentence in the 2019 amendment—the very same sentence Google's expert had noted nearly a year earlier. Based on that sentence, the court came to believe that Sonos lacked written-description support for overlapping zone scenes before the amendment, and that Sonos had tricked the Patent Office into issuing the zone-scene patents with a 2006 priority date.

The court never presented these issues to the jury or allowed Sonos to develop and present evidence refuting that position. And Google did not pursue them in its Rule 50(a) or 50(b) motions—both of which Google filed *after* the district court repeatedly raised its concerns. Nevertheless, the court granted post-verdict JMOL to Google based on a trial record built around different issues. Appx86-99. But each step of the court's analysis depended on factual assertions that were either wrong, or at a minimum disputed. *See Commonwealth Sci. & Indus. Rsch. Org. v. Buffalo Tech. (USA), Inc.*, 542 F.3d 1363, 1380 (Fed. Cir. 2008) (new matter is a question of fact); *Koito Mfg. Co. v. Turn-Key-Tech, LLC*, 381 F.3d 1142, 1149 (Fed. Cir. 2004) (written description and anticipation are questions of fact); *supra* 25 (JMOL standard). The court left no doubt that it was finding facts: It explicitly announced that any "declarative statements" in its opinion constituted "findings of fact," Appx52, and even found Sonos's inventor "not credible," Appx91. And the court did not acknowledge, let alone apply, Google's burden of proof to invalidate an issued patent or the further presumption of correctness that applies to the examiner's entry of an amendment to the specification. *See infra* 50, 60.

When these standards are properly applied, the evidence permits only one reasonable conclusion as a matter of law: Sonos disclosed overlapping zone scenes by 2007 at the latest, *infra* § II.A, and thus, Sonos did not add new matter to the specification in 2019, *infra* § II.B. At a minimum, Sonos created a dispute of fact as to each. Regardless, reversal is required, because the issues were forfeited multiple times, including when no one—neither Google nor the district court—raised them in time to afford Sonos the opportunity to develop relevant expert opinions and try them to a jury, and again when Google failed to raise them in Rule 50 motions. *Infra* § II.C.

A. Sonos disclosed overlapping zone scenes no later than 2007, even without the 2019 amendment.

"The priority date for later-added patent claims depends on when the claimed subject matter first appeared in the chain of patent applications from which the claims arose." *Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 906 (Fed. Cir. 2018). "For claims to be entitled to a priority date of an earlier-filed application, the application must provide adequate written description support for the later-claimed limitations." *Id.*; *see* 35 U.S.C. § 120. That means that Sonos's earlier-filed application must "describe[] the invention in such a way that it is

understandable to a person of ordinary skill in the art." *Pozen Inc. v. Par Pharm., Inc.*, 696 F.3d 1151, 1167 (Fed. Cir. 2012). And to overcome the presumption of a patent's validity, Google had to "show a lack of written description by clear and convincing evidence." *Rivera v. ITC*, 857 F.3d 1315, 1319 (Fed. Cir. 2017).

Sonos disclosed overlapping zone scenes long before the 2019 amendment. The 2006 provisional application, or, at the latest, the 2007 non-provisional application provided adequate written-description support. *See* Appx8238-8365. Sonos incorporated both applications by reference into all the subsequent continuation applications in the patent family, including the '885 and '966 patents. And the 2007 non-provisional specification contained adequate written-description support by itself. The zone-scene patents are thus entitled to a priority date that safely predates Google's 2015 release of its infringing products (and Google did not offer any purported prior art in the 2006-2007 timeframe).

The 2007 application explains that Sonos's invention addresses a problem with conventional audio systems: the need for overlapping speaker groups. It observes that "traditional system[s]" proved

cumbersome for users who wanted to listen to different audio sources on different combinations of players at different points in the day. Appx8332-8333. It offers as an example, listening "in a bedroom, a bathroom and a *den*" at one point; later, "in the *den* and the living room"; and yet later "in the *den*, the living room, and a kitchen." Appx8332 (emphases added). It continues: "Because the [three groups] contain the den"—i.e., because the groups overlap—it is "difficult for the traditional system to accommodate the requirement of dynamically managing the ad hoc creation and deletion of groups." Appx8332-8333.

The specification then explains how Sonos's invention solves that problem by allowing the user to predefine and save multiple groups of speakers—including groups that contain overlapping members like the den—and then later invoke any group for synchronous playback. Figures 3A and 3B of the 2007 application, for instance, illustrate two zone scenes with overlapping members:

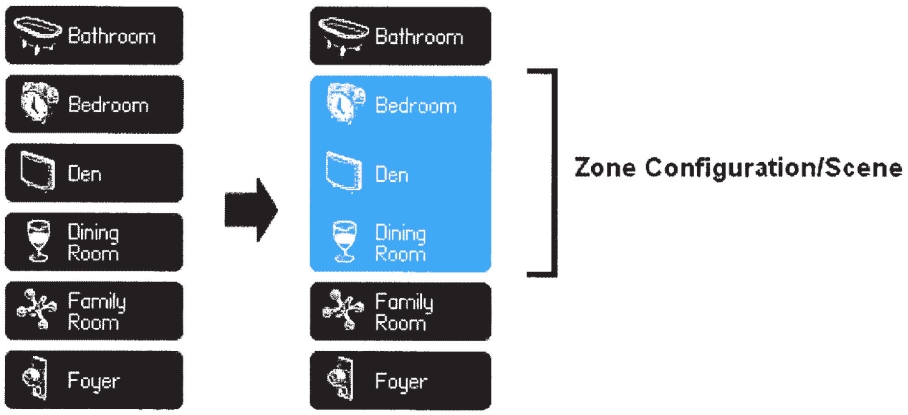


FIG. 3A

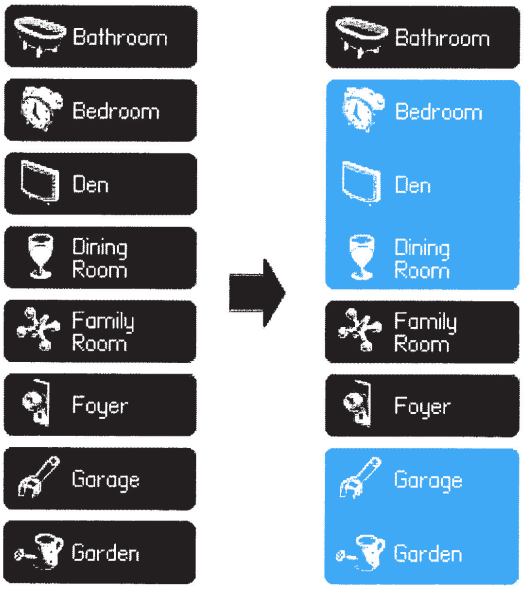


FIG. 3B

Appx8359-8360 (colorization added); *see* Appx8251, Appx8260-8261 (same images and descriptions in the 2006 provisional). The corresponding descriptions explain that the "Morning" zone scene "link[s] the Bedroom, Den and Dining Room," Appx8345 (referring to Figure 3A), while the "Evening" zone scene overlaps with the same

three—"Bedroom, Den, [and] Dining Room"—and *adds* the "Garage [and] Garden," Appx8346 (referring to Figure 3B).

These figures and corresponding descriptions tell a person of ordinary skill that the Morning and Evening scenes overlap. That is precisely what Sonos's expert said when opining on the same disclosures in the '885 specification at summary judgment. Appx5210-5211. Yet the district court disregarded these disclosures and the expert's opinion about what they mean to one skilled in the art. The court said Sonos was "picking and choosing claim elements from different embodiments that are never linked together in the specification." Appx92 (citation omitted). But these embodiments and corresponding descriptions not only appear together, but are presented as complementary components of the same Figure 3. Especially in light of the problem that Sonos described earlier in the specification, *supra* 50-51, a person of ordinary skill would understand that the Morning and Evening zone scenes share overlapping members. At the very least, a reasonable juror could so find. *See supra* 25.

Sonos's expert also opined at summary judgment that a skilled artisan would understand Figure 6, which remains unchanged from the

2007 specification, as disclosing multiple, coexisting zone scenes that can share overlapping members. Appx5209-5211.

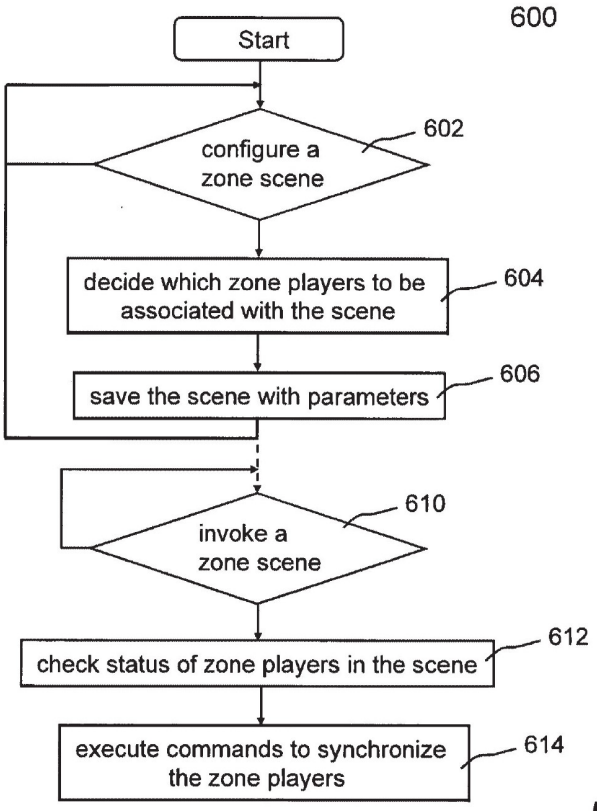


FIG. 6

Appx8365.

The specification explains that, at step 604, "a [controller] is provided to facilitate a user to select *any* of the players in the system to form respective groups each of which is set up per a scene." Appx8334 (emphasis added). Then, when a user saves a zone scene to invoke later (step 606), the specification explains that "*various scenes* may be saved in *any of the members* [i.e., players]…." Appx8334 (emphases added). If

two zone scenes could not share the same speaker, there would be no reason for any speaker to save "various scenes" to invoke later, because a speaker would only save, at most, one scene. *See* Appx5210-5211. The district court itself invoked this various-scenes sentence when denying Google's written-description challenge before trial. Appx5417.

As yet further evidence of Sonos's early disclosure of overlapping zone scenes, both the 2006 and 2007 applications also describe a zone scene comprised of *all the players in a system* alongside a zone scene made up of a *subset* of players. Specifically, after describing a Morning zone scene, the 2006 provisional explains that "[o]ptionally, a system may be supplied with a command that *links all zones* in one step" as "a simple form of a zone scene." Appx8252 (emphasis added); Appx8345-8346 (2007 non-provisional). By disclosing two zone scenes that necessarily share players, these descriptions show that Sonos's invention encompassed overlapping zone scenes. *See* Appx5210.

Google's own expert acknowledged this when testifying on obviousness. He testified that Figure 7 showed two zone scenes: "One is the morning wake-up zone scene … that is the den, the bedroom, et cetera; and then another one which is Party Mode, which is all of the

zones in the house, *all of the speakers in the house*." Appx21338 (emphasis added). In other words, he agreed that this image alone discloses overlapping zone scenes. As illustrated below, Sonos first disclosed this same figure in the 2006 provisional:

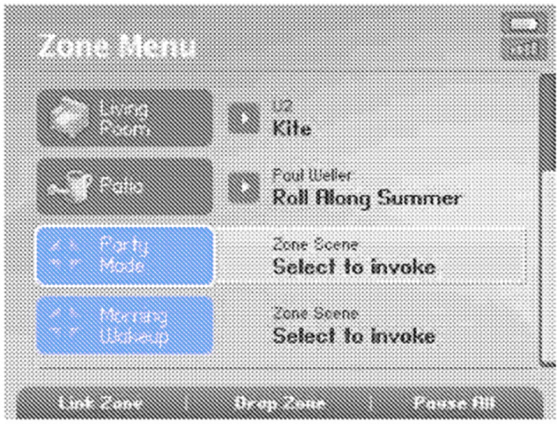
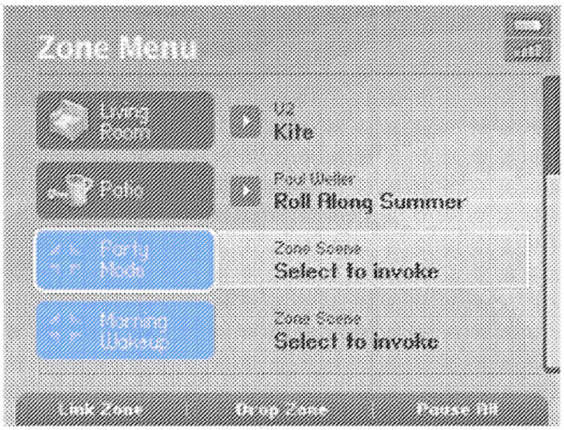
Appendix A of 2006 provisional	'885 and '966 specification
	

FIG. 7

Appx8196-8197 (colorization added); Appx8263.

Without acknowledging the testimony of Google's own expert, the district court rejected the import of Figure 7 by insisting that at the time of the 2006 provisional, a skilled artisan would not "have … understood that the 'Party Mode' zone scene would group all of the zone players in a system." Appx90. That was at least a disputed question of

fact. Even Google itself conceded at one point that the conception documents, referred to as the "UI [user interface] documents," "disclose a user-configurable zone scene such as a morning scene that includes fewer than all zone players, as well as a party mode zone scene that includes all zone players, thereby necessarily disclosing an overlap between those zone scenes." Appx10954. The district court simply failed to review all this evidence in the light most favorable to Sonos, or against the presumption of validity.

To make matters worse, the court based its conclusion on a credibility determination. The court found Sonos's inventor's testimony about differences between the conception documents and the provisional application "not credible." Appx91. That flouted the axiom that "credibility determinations, the weighing of the evidence, and the drawing of legitimate inferences from the facts are jury functions, not those of a judge." *Hangarter v. Provident Life & Acc. Ins. Co.*, 373 F.3d 998, 1005 (9th Cir. 2004) (citation omitted).[5]

[5] The district court later veered into an irrelevant discussion of the "dynamic leader rating" in Google's system, finding that "nothing in the specification of the patents in suit explained such a solution." Appx103-104. But the claims do not recite a "dynamic leader rating"—that is just

This Court should reverse the invalidity findings. Contrary to the district court's view, this was not "a case of the industry leading with something new and, only then, an inventor coming out of the woodwork to say that he had come up with the idea first." Appx52. And the invention was not "lurking beneath the surface." Appx86. Google stipulated—and the court agreed—that Sonos "conceived of the claimed invention in 2005," the year before it filed its provisional application. Appx85. And every version of the application from then on described the invention, in multiple ways, for anyone to see.

B. Sonos did not add new matter to the zone-scene specification in 2019.

The basis of the district court's conclusion that the claims lacked written description was a finding that Sonos's 2019 amendment added new matter to the specification by adding a single sentence: "The list of zones in the user interface 520 includes ALL the zones in the system, including the zones that are already grouped." Appx94-99. The

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how Google allegedly implemented overlapping zone scenes—so Sonos was not required to provide such support. *See Crown Packaging Tech., Inc. v. Ball Metal Beverage Container Corp.*, 635 F.3d 1373, 1383 (Fed. Cir. 2011).

addition of this sentence cannot be a basis for invalidating the patent because the rest of the disclosures discussed above—the problem to be solved, the solution described in Figures 3A and 3B, the description of an all-players zone scene, and Figures 6 and 7—supported the claims on their own.[6] Nor does that added sentence justify the district court's narrative that Sonos engaged in an underhanded tactic to shore up the written description: Before ever adding the offending sentence, Sonos presented claims requiring overlapping zone scenes to the Patent Office, and the Patent Office did not issue a written-description rejection in response. *Infra* 66-67. Regardless, the district court's new-matter finding was wrong—both legally and factually—and, at a minimum, sufficiently disputed to preclude JMOL.

Sonos's amendment to the specification complied with the Patent Office's regulations that "material incorporated by reference into the specification or drawings of an application" may be inserted "by way of an amendment to the specification or drawings" as long as the

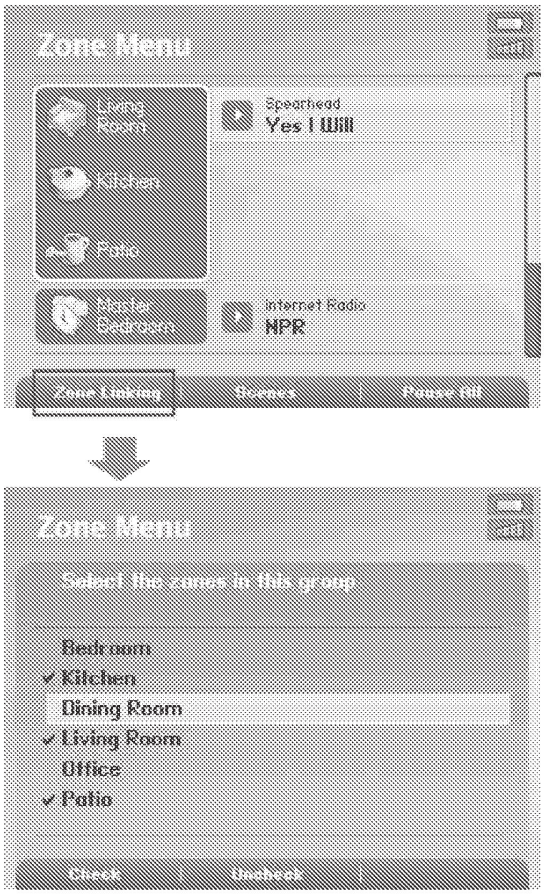
[6] The 2019 amendment also added Figures 7 and 8 and their corresponding descriptions. Appx23005-23006; Appx23010; Appx32432-32433; Appx32437. Neither Google nor the district court ever suggested Figures 7 and 8 constituted new matter. *See* Appx100-101.

amendment "contains no new matter." 37 C.F.R. § 1.57(g); *see also* 35 U.S.C. § 132(a).

That is precisely what Sonos did. Before 2019, the zone-scene specification incorporated by reference the 2006 provisional and 2007 non-provisional applications, making them "effectively part of the" specification as though "explicitly contained therein." *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000). Then, in 2019, Sonos formally amended the zone-scene specification to bring certain parts of the 2006 provisional—including that one sentence—into the four corners of the document.

Sonos accurately represented to the examiner that all the inserted material "was previously incorporated by reference in this application, and the amendment contains no new matter." Appx8701. The examiner had to independently verify that fact before approving the amendment. *See* Appx23023; Appx31846. The examiner's approval is "entitled to an especially weighty presumption of correctness" in addition to the clear-and-convincing burden that already applies to any validity challenge. *Commonwealth*, 542 F.3d at 1380; *see supra* 50. The district court did not even acknowledge these heightened standards.

As Sonos explained to the examiner, the inserted sentence could "be found at least at pp. … 17 of Appendix A" to the 2006 provisional application. Appx8724; Appx8736. That was true. Here is page 17 of Appendix A with the key sentence highlighted in blue:



– The list of zones in the screen above includes ALL the zones in the system, including the Zones that are already grouped.

Appx8275. Compare that sentence with the one sentence Sonos added by amendment in 2019, shown in context, highlighted in blue:

> **[0062]** FIG. 5B shows another user interface 520 to allow a user to form a scene. The user interface 520 that may be displayed on a controller or a computing device, lists available zones in a system. The list of zones in the user interface 520 includes ALL the zones in the system, including the zones that are already grouped. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

Appx8711. The only difference between the two sentences appears in the following redline: "The list of zones in the ~~screen~~ ~~above~~ ***user interface 520*** includes ALL the zones in the system, including the zones that are already grouped." That trivial change in wording had no substantive effect. It was merely a function of moving the image to the "Figures" section, where it became Figure 5B, which required referents (like "user interface 520").

The court concluded that the 2019 amendment changed the meaning of the "ALL the zones" sentence because of its placement: Specifically, the court said it made a difference that Figure 5B (which appeared in the same form since the 2007 non-provisional) was "a truncated version" of the images in the 2006 provisional. Appx97. As shown above, the provisional displayed two images arranged vertically. But Figure 5B showed only the bottom half:

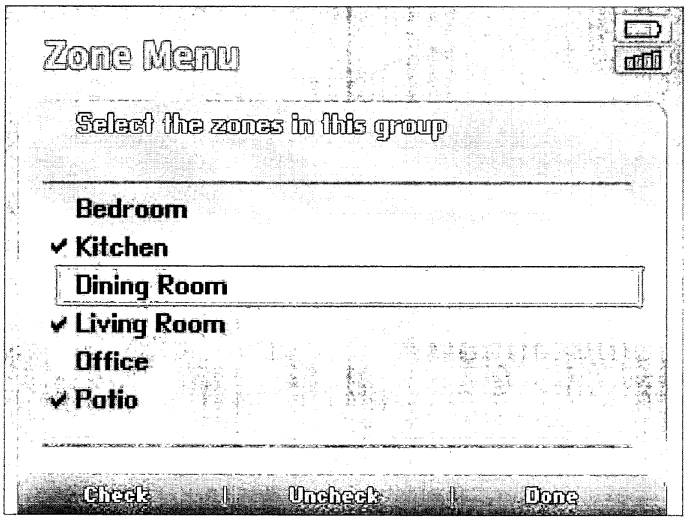


FIG. 5B

E.g., Appx2086. The district court held that depicting the two images together in the provisional illustrated a user interface that allowed for the creation of a dynamic, ad-hoc group of zone players, which is destroyed when the players are grouped differently or one of the players is used for individual playback. *See* Appx97-98. The court insisted (and improperly found as fact) that the two images together "had *nothing to do with zone scenes*." Appx98. In contrast, the court found that Sonos "reappropriated" the "ALL the zones" sentence to "refer to zone scenes" by presenting it with only Figure 5B in the amendment. Appx98.

The court was wrong about both what the 2006 provisional showed and the effect of isolating the bottom image. As to the 2006 provisional, the appendix that includes the contested image is titled

"Sonos UI [User Interface] Specification: *Zone Scenes*." Appx8275 (emphasis added). The court's only basis for ignoring the title was that the image looks like the handheld controller for creating dynamic groups in Sonos's 2005 system, and the appendix says elsewhere that "it [is] 'not expected that the Zone Scenes should be set up using the Handheld Controller.'" Appx98 (quoting Appx8267). The court's logic was wrong at every level. First, that sentence about what was "expected" appears nearly 10 pages earlier in a different subsection of the appendix. *Compare* Appx8267 (sentence in section 3) *with* Appx8275 (image in section 4). Second, just because it was "not expected that the Zone Scenes should be set up using the Handheld Controller" does not preclude embodiments where zone scenes are created that way. At a minimum, all these inferences are jury questions of how a skilled artisan would understand the provisional.

As to the purportedly truncated image, the district court erred in fixating on the 2006 provisional. The 2007 non-provisional application plainly supplies all the information that the district court found missing in 2006: It presented Figure 5B *in the exact same* (purportedly "truncated") *form* as the zone-scene specification, and without any

ambiguity at all. And it explicitly described the figure, twice, as a user interface "to allow a user to form a [zone] scene" with a handheld controller—not as an interface for dynamically grouping zone players ad hoc:

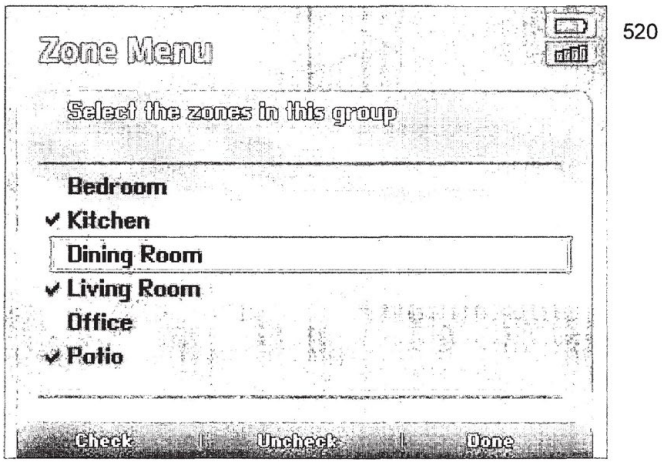


FIG. 5B

"Brief Description of the Drawings"

[0025] FIG. 5B shows another user interface **520** to allow a user to form a scene;

"Detailed Description of the Preferred Embodiments"

[0060] FIG. 5B shows another user interface **520** to allow a user to form a scene. The user interface **520** that may be displayed on a controller or a computing device, lists available zones in a system. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

Appx8363; Appx8336; Appx8348.

In short, the 2007 non-provisional application long ago disclosed that Figure 5B reflected zone scenes, not dynamic zone grouping. Each subsequent application in the patent family, including those for the '885 and '966 patents, incorporated the 2007 non-provisional by reference and included the disclosures above. Thus, the 2019 amendment did not change the meaning of this figure.

All of this preexisting support for overlapping zone scenes refutes the court's narrative that Sonos had to sneak in the "ALL the zones" sentence to shore up an otherwise inadequate written description. It thus reinforces the point, already evident from the prosecution history, that Sonos had no such motive. As noted above (at 59), Sonos filed claims to overlapping zone scenes *before* Sonos offered the amendment to the specification. Appx8682-8706; Appx8708-8729. The examiner was required to assess written-description support for overlapping zone scenes, *see* U.S. Patent & Trademark Office, Manual of Patent Examining Procedure § 2163 (9th ed. 2023), and found no inadequacy on that dimension. Appx27573-27583; Appx31521-31532 (obviousness rejections). In response to the obviousness rejection, Sonos amended its claims and distinguished the prior art. Simultaneously, Sonos

requested that the "ALL the zones" sentence be moved from the provisional into the specification itself. Appx8685-8686; Appx8701; Appx8711-8712; Appx8724. Since the examiner had already blessed the written description, Sonos had no reason to "strategically and deceptively add[] to the specification," as the district court found. Appx99.

Why, then, did Sonos amend the specification? Sonos did so to conform the '885 and '966 specification with that of a parallel pending application in the same family (eventually yielding U.S. Patent No. 10,897,679), which had a different claim scope and for which Sonos had already amended the specification in the same way. *See* Appx8196-8199; Appx8232-8233; Appx8734-8736 ('679 application amendment). Sonos was following its general practice of maintaining maximum uniformity across specifications of co-pending applications within the same patent family. *See* Appx21194; Appx8663-8664 (Sonos contemporaneously making the same amendment to the specification of another pending application). This common strategy minimizes the human error that can arise when the specifications from the prior

generation of applications differ. There was nothing "deceptive[]" about this routine step in Sonos's global prosecution practice.

If the court had properly applied the law, it would have reached the only possible conclusion: Google failed to overcome the "especially weighty presumption of correctness" that applies to an approved amendment, *Commonwealth*, 542 F.3d at 1380, and failed to prove invalidity by clear and convincing evidence, *Rivera*, 857 F.3d at 1319. At a minimum, it was improper for the court to draw factual inferences against Sonos.

C. This Court should reverse outright, or at a minimum order a limited retrial based on a full evidentiary record.

Reversal is required if this Court is persuaded that no reasonable factfinder could conclude that the priority date was later than 2007. But even if the Court concludes that Sonos merely created a dispute of fact as to these issues, reversal is still required. In fact, this Court may reverse on procedural grounds without even plodding through the written-description and priority-date issues, because the court violated at least two rules that are meant to ensure orderly and fair proceedings. These procedural errors, by themselves, require outright reversal.

In certain circumstances, a court is free to inject issues that no party has raised. But a court cannot inject an ultimately dispositive issue partway through trial *without* affording the parties an opportunity to develop and present evidence bearing on that issue. Rule 50(a)(1) protects litigants from precisely this kind of ambush. It prohibits the grant of JMOL against a party who has not "been fully heard on [the] issue during a jury trial." Sonos was *not* fully heard on the written-description and priority-date issues; Sonos never had notice that the court would inject these issues midway through trial, let alone resolve them as a matter of law based on an undeveloped record. Had Sonos been on notice, it would have presented expert testimony showing, for example, how "one of skill in the art would understand" the prosecution history. *Commonwealth,* 542 F.3d at 1382; *see* Appx8227; Appx10518 (describing expert opinions and reports needed to defend against priority challenge).

Separately, under Rule 50, the district court did not have authority to enter JMOL on these issues. Even after the court alerted Google to its concerns—and ordered multiple rounds of briefing on them during the trial, *see supra* 19 n.3—Google never moved for JMOL under

Rules 50(a) and 50(b) on anticipation, priority date, or written description. Appx9727-9762; Appx9763-9785; Appx11099-11135. That constituted a complete forfeiture that not even the court could cure. *See Ortiz v. Jordan*, 562 U.S. 180, 189 (2011). "For the same reasons a party may not seek a JNOV [now JMOL] on grounds not alleged in their motion for directed verdict, a district court may not enter a JNOV on grounds not asserted in a party's motion for directed verdict." *Murphy v. City of Long Beach*, 914 F.2d 183, 186 (9th Cir. 1990); *see Santos-Arrieta v. Hosp. Del Maestro*, 14 F.4th 1, 9 (1st Cir. 2021) (collecting cases from multiple circuits holding the same).

Now is too late to fix these errors. Google failed to present these issues to the jury and thus forfeited them. Google failed to pursue the priority-date issue despite many opportunities, including: when its expert expressly noted the material added via the 2019 amendment, Appx10985; when it alleged "new matter" at the showdown without identifying any new matter, Appx4913-4914; when it offered no jury instructions on the priority date, Appx7000-7024; and when it sought JMOL only on other grounds, *supra* 69. Had the district court never raised the issue, Google would obviously not be entitled to a new trial

based on a defense that it first thought up during trial and never pressed until after an unfavorable verdict. The ordinary rules do not change just because the district court raised the issue on Google's behalf.

If, notwithstanding these fatal errors, this Court is inclined to let the parties address the disputed facts, and even if it believes that the district court's ruling is justified on the present record, it should remand for a retrial limited to the issues of priority date and written description. Sonos is entitled to an opportunity to develop relevant evidence and try the issues to a jury. If the jury reaches a verdict in Sonos's favor on those limited issues, the original verdict should be reinstated.

III. The District Court Improperly Resolved Disputed Facts In Invalidating The '615 And '033 Patents.

The district court followed the same pattern of usurping the jury's role when it invalidated the direct-control patents at summary judgment. Google argued that the asserted claims of the direct-control patents were obvious based on the combination of two prior art references: YouTube Remote and Google's '998 patent. The parties' experts offered dueling opinions on the validity of the direct-control

patents. Instead of presenting those issues to the jury, the court anointed itself fact-finder and resolved disputes in Google's favor. This Court should vacate the judgments of invalidity so Sonos can try its case to a jury.

A. The district court improperly resolved a factual dispute over whether the prior art discloses a "device-picker."

Both direct-control patents require what the parties call a "device-picker": the ability to select a particular device from among the speakers connected to the smartphone and to transfer playback to that speaker. Claim 13 of the '615 patent describes the device-picker as allowing "a selection of the particular playback device from the identified playback devices connected to the local area network." Appx291 19:61-67. Claim 1 of the '033 patent requires "displaying a representation of one or more playback devices" and "receiving user input indicating a selection of at least one given playback device from the one or more playback devices." Appx322 17:43-52. Each claim further specifies that after the user makes her selection, playback transfers to the selected speaker(s).

No prior-art version of YouTube Remote contained a device-picker. The district court held, however, that "it would have been obvious to combine the YouTube Remote app system with disclosures in [the '998 patent] to allow the selection of individual devices." Appx14-17; Appx35-37. But the '998 patent's purported disclosure of a device-picker is ambiguous, so the district court improperly resolved a factual dispute over the scope of the prior art that should have gone to the jury.

The claims detail the computer-processing steps that allow the device-picker to display multiple available playback devices, receive a selection from a user of a particular playback device or devices from any that are available, and transfer playback to the selected device(s). *Supra* 72. Google pointed to a single paragraph in the '998 patent as disclosing all of this functionality. Appx4881-4882; Appx6337-6338. In full, Google's paragraph says:

> A user may use the remote control application of remote control 75, for example, to initiate contact with a server, such as server 24, for pairing remote control 75 to one or more controlled devices, such as controlled device 18 shown in FIG. 1. In some examples, the user may also utilize the remote control application of remote control 75 to *select one or more previously paired* controlled devices, and to send control messages to one or more paired controlled devices. For example, the user may interact with user interface 84

> and/or display 88 to interact with and control any available controlled devices.

Appx34478-34479 10:62-11:6 (emphasis added).

Sonos argued that this passage "does not teach the selection of a particular 'controlled device' to transfer playback to." Appx5085 (emphasis omitted). Instead, it "refer[s] to the ability to control any and all 'controlled devices' that have been 'previously paired' with a 'remote control' in a session, with no ability to choose from among[] those 'controlled devices.'" Appx5085. In support, Sonos's expert, Dr. Douglas Schmidt, testified that the passage is "ambiguous" and "not clear" as to whether it teaches the selection of a particular paired device from among multiple devices. Appx5149-5151. And even the '998 patent's inventor could not offer an opinion on what the passage discloses. Appx5190.

The district court recognized during the showdown hearing that it is unclear whether the paragraph discloses: (a) the ability to select a particular device from a set; or (b) only the ability to select any and all paired devices, no matter how many happen to be paired at the time. As the district court noted: "Now, that's ambiguous." Appx5317. "It says 'select,' but it doesn't say select between the two." Appx5320; *see*

Appx5318-5320. Google also conceded that the '998 patent does not mention any embodiments where the user selects or plays to only one device from a set of multiple paired devices. Appx5319.

Nonetheless, the district court found that the '998 patent "disclosed that a 'user interface' of a 'remote control' (*e.g.*, a smart phone) can display 'previously paired controlled devices' (*e.g.*, a television) so that a user may select and control 'one or more paired controlled devices.'" Appx16. But aside from repeating the ambiguous phrase "one or more," the court did not explain its finding. Instead, it called Dr. Schmidt's interpretation "contorted" and declared: "The most straightforward reading of the passage is that it disclosed the ability to 'select one or more' devices among the 'previously-paired devices.'" Appx16.

"Among" is the key word there, and it appears nowhere in the relevant part of the '998 patent. More importantly, it was inappropriate for the district court to decide which of two possible readings is "most straightforward." Where dueling experts offered conflicting opinions on whether the '998 patent discloses the claimed device-picker, a reasonable jury could find that it does not. "[W]hat a reference teaches"

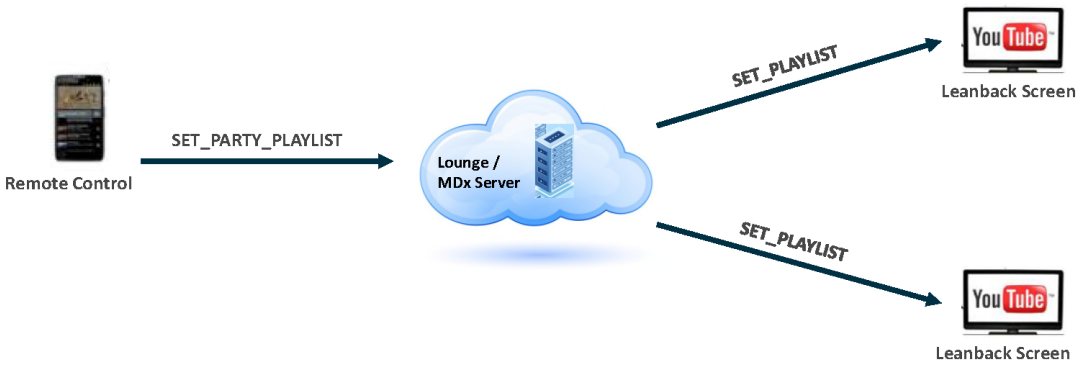
is a "question for the finder of fact," so the court "improperly usurped the role of the jury" in choosing Google's reading over Sonos's. *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1221 (Fed. Cir. 2003); *see also TriMed, Inc. v. Stryker Corp.*, 608 F.3d 1333, 1340-41 (Fed. Cir. 2010).

B. The district court improperly resolved a factual dispute over whether the playlist stored on a server in the prior art is a "remote playback queue."

The '033 patent's asserted claims require "playback of a remote playback *queue provided by a cloud-based computing system* associated with a cloud-based media service." *E.g.*, Appx322 17:39-42 (emphasis added). The invention proceeds in steps: (1) content is queued for playback; (2) a computing device (such as a phone) can handle playback of the remote queue at first; and (3) then the phone can transfer playback of the queue to a playback device (such as a smart speaker). Appx322 17:66-18:2. The district court construed "remote playback queue" as "a list of multimedia content selected for playback that is not local to the claimed computing device or playback device." Appx26. And it held that YouTube Remote's "party mode" functionality disclosed playback from such a queue because a cloud server "stored the list of

identifiers for the queue of videos selected for playback." Appx30. But here, again, Sonos raised a factual dispute with testimony that party mode never involved playback from the cloud server; the cloud server merely stored a *copy* of the playlist, but a playback device or "screen" played only from its *local* playback queue. *See* Appx6425-6429.

Sonos's expert explained that in party mode a "host [phone]" "sen[t] a copy of its entire local playback queue" in a "Set_Party_Playlist" message to the Lounge Server (Google's name for the cloud server), which then sent a "Set_Playlist" message containing a copy of the playlist to any paired screen. Appx6463-6464. This Set_Playlist message contained videoIDs for the videos in the playlist. *See* Appx6458; Appx6464-6465. Each screen "save[d] a copy of the entire playlist into its local playback queue" and used that local queue "to playback the media items sent from the" phone. Appx6459; Appx6465.



Appx6862.

In this arrangement, the Lounge Server had only a copy of the party playlist, and the screens never "play[ed] back" any items from that copy. Appx322 17:64-65. Instead, they played back from their own local queues. By way of proof, Sonos's expert explained that when a video ended, the screens automatically moved to the next video in the local queue instead of receiving more information from the Lounge Server about what to play next. Appx6465. Moreover, if the Lounge Server went offline, each screen continued playing from its local queue until it cycled through every item. Appx6465-6466.

Party mode thus did not involve playback of a "remote playback queue." Even Google's expert described this arrangement as using a local playback queue because "the playback device … stores a list of videoIDs for the playlist and is thus capable of playing back the playlist

even if the [Lounge] server were not available." Appx4718. He took that position for YouTube Remote's non-party mode, Appx4717-4718, but his description of playback of a local queue applies equally to party mode.

The district court itself followed this exact logic in connection with the '615 patent. The '615 patent requires a *local* playback queue rather than a remote one, and the court invalidated the '615 patent's claim 13 as obvious partly because non-party mode played from a *local* playback queue (and because of the device-picker issue). Appx21; Appx11-17.

On the '033 patent and party mode, the district court acknowledged that screens in party mode "all had and relied on their own local playback queues." Appx29. But it disregarded Sonos's expert's opinion that screens in party mode never played content from the Lounge Server, as would be required to invalidate the '033 patent. *See* Appx29-31. And it did not explain how it could conclude that party mode differed enough from non-party mode to warrant a finding of invalidity as a matter of law.

At bottom, the district court improperly resolved a factual dispute over whether the Lounge Server's copy of the playlist was merely a

coordinating list that served to sync the local queue on a phone with the local queue on the screens, or whether the screens played from that list instead of their local queues. *See TriMed*, 608 F.3d at 1340-41.

CONCLUSION

This Court should reverse or vacate the judgment below and remand for further proceedings, including deciding the merits of the post-trial motions previously denied as moot.

February 12, 2024

Respectfully submitted,

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ADDENDUM

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

GOOGLE LLC,

Plaintiff,

v.

SONOS, INC.,

Defendant.

No. C 20-06754 WHA

ORDER GRANTING MOTION FOR PARTIAL SUMMARY JUDGMENT AS TO '615 PATENT

INTRODUCTION

In this patent infringement action, the accused infringer moves for summary judgment of non-infringement and invalidity of claim 13 of U.S. Patent No. 9,967,615. To the extent stated below, the motion is **GRANTED**.

STATEMENT

Patent owner Sonos, Inc. alleges that Google LLC's products infringe its patents, including United States Patent Nos. 10,848,885 and 9,967,615. Pursuant to our "patent showdown" procedure (Dkt. Nos. 68, 206), each side moves for summary judgment on one particular claim-in-suit. A separate order granted Sonos's motion for summary judgment of infringement as to claim 1 of the '885 patent and denied Google's corresponding motion of non-infringement (Dkt. No. 309). This order considers Google's motion for summary judgment of non-infringement and invalidity as to claim 13 of the '615 patent.

The technology at issue in this case generally concerns multi-room "smart" speaker technology. Whereas the '885 patent covers technology related to managing groups of smart speakers, the '615 patent relates to the act of transferring playback of music or other media content from one device (*e.g.*, a smart phone) to another (*e.g.*, a smart speaker). In particular, claim 13 of the '615 patent is directed towards transferring playback of a *queue* of media content (*e.g.*, a song playlist) from one device to another.

Some knowledge of pertinent terminology is helpful. Sonos accuses Google of infringing by equipping "control devices" with certain apps that are capable of transferring media playback to a "playback device." Control devices are devices such as smart phones or tablets that can install and control apps. Playback devices are devices such a smart speakers or televisions that can play content. Google refers to the act of transferring playback from the control device to the playback device as "casting." The accused apps employ "cast" technology that enables control devices to transfer media playback to a "cast-enabled" playback device (Opp. 2).

The ability to transfer playback is useful because control devices are not necessarily ideal for media playback. Smart phones, for example, have small screens and produce unexceptional audio. Cast technology solves this problem by allowing users to transfer video to external, larger screens and audio to external, higher-quality speakers.

Google Play Music, one of the accused apps, is illustrative. The app offers users a library of songs to play. The details are disputed, but, generally, the app has access to information about a song track currently being played, the tracks that were played previously, and the tracks that are scheduled to play in the future. Such an arrangement of songs (or other content) is commonly referred to as a "queue." Among other purposes, the app's access to the queue allows users to skip forward to the next song or skip backward to the previous song.

If a Google Play Music user is disgruntled by the smart phone's speaker and wants to transfer audio playback to a smart speaker, the user can activate a feature on the app to cast from the former to the latter. In addition to transferring playback of the current song, the smart phone also transfers access to the *queue* of songs. Then, once playback has been transferred,

our user can control playback through the smart phone. Our user can, for example, skip to the next song in the queue, go back to the previous song in the queue, or shuffle the music in the queue, all while the music is playing on the smart speaker.

Sonos also accuses various of Google's YouTube apps of infringing, including YouTube, YouTube Music, YouTube Kids, and YouTube TV. The YouTube apps work similarly to Google Play Music, except those apps allow *videos* (and accompanying audio) to be cast to another device such as a smart television. A user can, for example, install the YouTube app on a smart phone, play a YouTube video on the phone, and then cast the video, even midstream, to a cast-enabled television. The video would then play on the television, the television would have access to the queue of videos, and the user would be able to control playback through the phone.

Claim 13 of the '615 patent is directed toward "systems, methods, apparatus, and articles of manufacture" to facilitate the transfer of playback from a "control device" to a "playback device" ('615 patent at Abstract). Using Google's paragraph numbering, claim 13 of the '615 patent recites:

> **13[pre]**. A tangible, non-transitory computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause a control device to implement a method comprising:
>
> **13.1** causing a graphical interface to display a control interface including one or more transport controls to control playback by the control device;
>
> **13.2** after connecting to a local area network via a network interface, *identifying playback devices connected to the local area network*;
>
> **13.3** causing the graphical interface to display a selectable option for transferring playback from the control device;
>
> **13.4** detecting *a set of inputs* to *transfer* playback from the control device to a *particular* playback device, wherein the set of inputs comprises: (i) *a selection of the selectable option for transferring playback from the control device* and (ii) *a selection of the particular playback device from the identified playback devices connected to the local area network*:
>
> **13.5** after detecting the set of inputs to *transfer playback* from the control device to the *particular* playback device, causing playback to be transferred from the control device to the particular playback

> device, wherein transferring playback from the control device to the particular playback device comprises:
>
> > (a) causing one or more first cloud servers to add multimedia content to a *local playback queue* on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;
> >
> > (b) causing playback at the control device to be *stopped*; and
> >
> > (c) modifying the one or more transport controls of the control interface to control playback by the playback device; and
>
> **13.6** causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

The most contested terms are italicized. Sonos filed the application that led to the '615 patent in 2018, but the patent application claims priority through a chain of applications dating back to December 30, 2011. As detailed further below, the parties dispute the date of conception. Sonos asserts July 15, 2011, as the invention date.

Google argues that its products do not infringe element 13.5(a) because the accused apps employ a *remote* playback queue as opposed to a *local* playback queue. Google further contends that a 2010 version of the YouTube Remote app either anticipated claim 13 or, when combined with other references, rendered it obvious. This order follows full briefing and oral argument.

ANALYSIS

Summary judgment is proper when there is no genuine dispute of material fact and the moving party is entitled to judgment as a matter of law. FRCP 56(a). A genuine dispute of material fact is one that "might affect the outcome of the suit under the governing law." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 247–48 (1986). In deciding a motion for summary judgment, the court must accept the non-movant's non-conclusory evidence and draw all justifiable inferences in its favor. *Id.* at 255.

1. NON-INFRINGEMENT.

This order starts with Google's non-infringement arguments. Analysis of patent infringement requires a claim to be properly construed to determine its scope and meaning, which is then compared to the accused device or process. *See Tessera, Inc. v. Int'l Trade Comm'n*, 646 F.3d 1357, 1364 (Fed. Cir. 2011); *Carroll Touch, Inc. v. Electro Mech. Sys., Inc.*, 15 F.3d 1573, 1576 (Fed. Cir. 1993). Accordingly, this order will first construe the disputed term to determine claim 13's scope and then proceed to assess whether the properly construed claim reads on Google's accused products.

A. CONSTRUCTION OF "PLAYBACK QUEUE"

Sonos's Proposed Construction	Google's Proposed Construction	Court's Construction
Plain and ordinary meaning	"An ordered list of multimedia items that is selected by the user for playback"	"A list of multimedia content selected for playback"

Claim terms generally take "their ordinary and customary meaning," that is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). Although construction begins with the claim language itself, "*the specification is the single best*" — and usually dispositive — "guide to the meaning of a disputed term." *Network-1 Techs., Inc. v. Hewlett-Packard Co.*, 981 F.3d 1015, 1022 (Fed. Cir. 2020) (quoting *Phillips*, 415 F.3d at 1314–15) (emphasis added).

Here, the only pertinent term in dispute is "playback queue."[1] As explained above, part of claim 13 relates to transferring a queue of content from one device to another. The relevant portion of limitation 13.5 recites:

> after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the

[1] The parties' dispute over the term "resource locator" does not bear on this order's infringement and invalidity analysis.

particular playback device comprises:

> (a) causing one or more first cloud servers to add multimedia content to a *local playback queue* on the particular playback device. . .

(emphasis added). The parties fiercely dispute whether the accused products use a "local playback queue." As detailed further below, Google's cast technology currently manages content queues, broadly speaking, by storing such a queue on a *remote* cloud server on the internet. The parties refer to this remote queue as a cloud queue (*see, e.g.*, Br. 1). The parties agree that the cloud queue is not a "local playback queue," as required by limitation 13.5(a), because it's stored remotely on the internet as opposed to being stored locally on the playback device.

In order to play music or other content, however, a Google cast-enabled playback device receives some information from a cloud queue, which it subsequently stores locally. The details are disputed, but, as an example, a cast-enabled smart speaker might receive information from the cloud queue about the current song being played, the next song scheduled to play (in case the user wants to skip the next song), and the song that was played before (in case the user wants to go back to the previous song). This is the extent of what the smart speaker knows. The smart speaker won't, for example, know about the next ten songs scheduled to play, or the ten songs that played before. That more extensive information is only stored in the cloud queue.

At stake here is whether the locally-stored information about the previous, current, and next song might *also* be a playback queue. If it is, then it could be the kind of "local playback queue" necessary to infringe. Sonos accordingly advocates against associating the term "playback queue" with any specific requirements, while Google wants a more definite construction to serve as the foundation for its non-infringement arguments. In particular, the parties dispute whether the term "playback queue" requires: (1) an "ordered list"; (2) plural "multimedia items"; and (3) user-selected media.

First, Sonos asserts that a "playback queue" need not be a list, but this argument does not conform with the intrinsic evidence. The patent repeatedly associates a queue with a "list" or

"playlist." *See, e.g.*, '615 patent at 15:57–67 (playback device may have information about "a current play position *within a list* to enable near-seamless 'handoff' of music from a portable device to a local playback system" (emphasis added)); 16:32–35 (devices may share "a current point of playback (e.g., now playing a third song in a playlist, fourth song in the playlist, and so on)").

Sonos objects that "the '615 Patent teaches embodiments where a 'playback device' queues a *single* resource locator, such as a URL. . . ." (Claim Constr. Br. 12). But a list of one is still a list. The patent cites a publication that states, for instance, that a "media *listing* can include . . . *one or more* additional items of media content." *See* U.S. Patent App. Publ. 2012/0089910 A1 at ¶ 52 (emphasis added); *see also FitBit Inc. v. AliphCom*, 2017 WL 386257, at *14 (N.D. Cal. Jan. 27, 2017) (Judge Edward J. Davila) ("The ordinary meaning of 'list' also supports the idea that the 'list' at issue can contain one . . . item[]. Lists often . . . contain only one item.").

Second, Sonos argues that nothing requires a "playback queue" to contain plural multimedia items. This order agrees on that point. The plain language of the claim recites: "adding the multimedia content to the local playback queue comprises . . . adding, to the local playback queue, *one or more resource locators*" (*see* limitation 13.5(a) (emphasis added)). Google objects that a queue must include a "next" media item in case the user wants to skip forward, and accordingly argues that a queue logically must include at least two items (Br. 9 (citing Bhattacharjee Decl. ¶¶ 71–73)). But the patent does not have such a restrictive view of a queue. In addition to the claim language cited above, the specification repeatedly describes embodiments where a queue only contains a single audio track. *See, e.g.*, '615 patent at 11:62–12:3 (a smart speaker "may contain a uniform resource locator . . . that specifies an address to *a particular audio track* in the cloud" (emphasis added)); *see also id.* at 10:42–46; 12:49–63; 13:36–40. These citations suggest that the list must contain at least one item, but not necessarily more than one.

Third, Sonos asserts that the content in the queue need not be selected directly by a user. Google's position, by contrast, is that a user must directly populate and manage the queue (CC

Opp. 11). Google's argument does not persuade. True, the specification discusses scenarios where a user adds or deletes content from the queue and suggests that a user *can* edit a queue (*see, e.g.*, '615 patent at 16:25–31 (describing a "queue that the user is editing/managing. . . ."). However, the specification also repeatedly describes embodiments in which the third-party application (such as Google Play Music) dictates what media content is in the queue. *See, e.g.*, '615 patent at 13:1–10; 15:59–62. Moreover, as Sonos points out, nothing in the claim itself refers to a user.

In sum, this order agrees with Google that a "playback queue" requires a "list" of content selected for playback, but agrees with Sonos that the list does not necessarily require more than one item of content or require users to select content directly. This order further rejects Google's proposal to include the term "multimedia item" in the construction. The claim uses the term "multimedia content," and there is no need to introduce additional ambiguity by importing a new term. Accordingly, this order construes the term "playback queue" as "a list of multimedia content selected for playback."

B. THE ACCUSED APPS DO NOT USE A "LOCAL PLAYBACK QUEUE"

Having construed "playback queue," we now turn to Google's non-infringement arguments. To prove infringement, Sonos must show that Google's accused products meet each properly construed limitation of claim 13 either literally or under the doctrine of equivalents. *See Deering Precision Instruments, LLC v. Vector Distribution Sys., Inc.*, 347 F.3d 1314, 1324 (Fed. Cir. 2003). Here, Sonos asserts both. To establish literal infringement, all of the elements of the claim, as correctly construed, must be present in the accused products. *TechSearch, LLC v. Intel Corp.*, 286 F.3d 1360, 1371 (Fed. Cir. 2002). Sonos may also establish infringement under the doctrine of equivalents by "showing that the difference between the claimed invention and the accused product [is] insubstantial," including "by showing on a limitation by limitation basis that the accused product performs substantially the same function in substantially the same way with substantially the same result as each claim limitation of the patented product." *Crown Packaging Tech., Inc. v. Rexam Beverage Can Co.*, 559 F.3d 1308, 1312 (Fed. Cir. 2009).

As stated above, Google's primary non-infringement theory is that both its Google Play Music app and YouTube app products do not use a "local playback queue" (*see* limitation 13.5). The two categories of accused apps operate in slightly different ways. In plain Greek, Sonos asserts that using the cast feature on the YouTube apps on a control device causes a "WatchNext" server to transmit a "WatchNextResponse" to a cast-enabled playback device. The WatchNextResponse is then stored by the playback device. According to Sonos, the WatchNextResponse "often" includes a string of characters called a "videoId" that corresponds to the item set to currently playback, the item set to playback next, and the item that came before the current item (Opp. 3–5). Similarly, casting from the Google Play Music app on the control device creates an ItemWindowResponse that stores a link to the previous, current, and next media items set for playback (Opp. 7-8). The apps receive this information from a cloud queue, and neither of the apps store any additional media content beyond those three items.

Google quibbles about some of the details. Google asserts, for example, that a playback device only "request[s] cloud queue items one-by-one" (Br. 7). Google further states that the "upNextVideoID" variable (*i.e.*, the variable corresponding to the item set to play next) only appears when "the cloud queue has been exhausted," and that this variable "only exists for a few milliseconds" (Br. 9).

At bottom, though, neither side appears to dispute that Google's products operate by "retrieving" information from the cloud queue about the current, next, and previous media item (Br. 9; Opp. 3). Nor do the parties dispute that these three items are only a subset of a separate cloud queue. *The focus of the dispute is instead on whether this information stored locally in the playback device is a playback queue at all.*

The parties dedicated the bulk of their briefing and their time at oral argument to this issue. Upon review, this order concludes that neither the information stored by the WatchNextResponse (in the YouTube apps) nor the information stored by the ItemWindowResponse (in the Google Play Music app) qualify as a playback queue. The groups of three items stored by the respective apps are not lists of multimedia content selected for playback. In each app, the cloud queue stores the list, and the locally-stored information is

merely a mirror reflecting a subset of what is happening in the cloud queue. The songs set to play on Google Play Music, for example, are all dictated by the cloud queue. If the user adds or edits a playlist, the cloud queue changes. If the app creates a playlist, the cloud queue adapts. It is only *after* the cloud queue changes that anything can happen to the information stored locally on the playback device (*see* Bhattarcharjee Decl. ¶¶ 81–84). This demonstrates that the groups of three items stored in each app are not lists of content selected for playback, but rather merely provide the means to *process* the lists for playback. In short, the cloud queue runs the show.

Sonos objects that multiple playback queues can exist simultaneously (Opp. 8). In support, Sonos points out that the specification teaches that there can be "two-way communication" between the local playback queue and a separate queue, "such as keeping a local playback queue synchronized with a queue that the user is editing/managing in the third party application" ('615 patent at 16:22–31). But there is no such "two-way communication" here. Rather, the cloud queue delivers information to the playback device on a one-way street. The cloud queue provides information about the queue to the WatchNextResponse and ItemWindowResponse, and never vice-versa, because there is no locally-stored queue that would allow "two-way" synchronization.

Sonos further objects that the specification teaches that "the local playback system" can "periodically fetch[] a short list of tracks to play list" from a "third-party application" (*id*. at 16:63–66). This passage, however, explains that the third-party application can "*override* a local playback queue" with the "short list of tracks to play next" (*ibid.*). The passage thus distinguishes a local playback queue from the "short list of tracks." Moreover, the passage suggests that there must be something to override, and, here, the locally-stored information can never be populated by anything other than the "short list of tracks." Instead, WatchNextResponse and ItemWindowResponse can never store additional or different items, and never more than three total items (*see* Bhatarcharjee Decl. ¶¶ 21, 73, 119).

Sonos has accordingly failed to raise a genuine dispute that Google's products employ a "local playback queue" as contemplated by claim 13 of the '615 patent. Thus, Google's

products do not infringe the claim, and this order need not address Google's additional non-infringement arguments.

2. ANTICIPATION AND OBVIOUSNESS.

This order now turns to Google's invalidity arguments. Before we move forward, however, a procedural note. After Google filed its motion, Sonos moved to strike some of the motion for improperly asserting new invalidity theories and prior art references. A prior order granted Sonos's motion in part, striking paragraphs 133 and 138–41 of Dr. Bhattacharjee's expert report in their entirety (Dkt. No. 315). That material is accordingly not considered here.

With this in mind, we now turn to Google's surviving arguments. Google asserts that one of its previous apps, the YouTube Remote app, anticipated claim 13 of the '615 patent. Alternatively, Google argues that it would have been obvious to combine the YouTube Remote app with other prior art references to achieve Sonos's claimed invention.

The YouTube Remote app was released in November 2010 (*see* Bobohalma Decl. ¶ 3). The purpose of the app was to allow a smart phone to connect to another device, such as a television or computer, so that a YouTube video being played on the smart phone would appear on a larger screen (Br. 16). For example, a user could mirror a YouTube video onto a television and control playback of the video through the app. In short, the app functioned similarly to what Google now calls casting, as described above. The old process was more cumbersome, however, because it involved an intermediary website to which both devices separately had to connect to enable pairing. Specifically, each device needed to separately navigate to the intermediary website and log in to the same YouTube account. Once the devices were logged in to the same account, they could then pair with each other through the YouTube Remote app (*see* Opp. 14–15).

Google now asserts that the app disclosed each and every limitation of claim 13. "Anticipation requires that a single prior art reference disclose each and every limitation of the claimed invention, either expressly or inherently." *SRI Int'l Inc. v. Cisco Sys., Inc.*, 930 F.3d 1295, 1306 (Fed. Cir. 2019). "Anticipation is a question of fact." *Atlas Powder Co. v. Ireco, Inc.*, 190 F.3d 1342, 1346 (Fed. Cir. 1999). Because a patent is presumed valid, the party

asserting invalidity has the burden of proof to show anticipation by clear and convincing evidence. *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1364 (Fed. Cir. 2018).

Sonos replies that the YouTube remote app did not disclose claim limitations 13.2, 13.4, 13.5, and 13.6.[2] This order will first consider Sonos's arguments as to 13.2, 13.5, and 13.6, and then circle back to 13.4. For the reasons that follow, this order concludes that the app did not disclose limitation 13.4, but that modifying the app the satisfy the limitation would have been obvious in light of the prior art.

A. LIMITATION 13.2

Claim limitation 13.2 recites "after connecting to a local area network via a network interface, identifying playback devices connected to the local area network." For our purposes, a "local area network," or LAN, refers to a "local" home Wi-Fi network. This is in contrast to a "wide area network," or WAN, which refers to network that can be accessed more widely, *e.g.*, a 3G cellular network. The important point is that a LAN and a WAN provide different means to connect a device to the internet.

Sonos reads limitation 13.2 to require that the control device affirmatively identify that the playback device is *connected to the same LAN* as the control device, as opposed to a WAN or a different LAN (Opp. 15). Google admits that its system did not do this. Instead, the system allowed the control device and the playback device to separately log in to the intermediary website. As such, it didn't matter whether the smart phone and television were connected to the internet in different ways. For example, the smart phone could have used a 3G network (a WAN) to navigate to the intermediary website, while the television could have used a home Wi-Fi network (a LAN) to navigate to the intermediary website. Thus, the YouTube Remote system did not require the control device to know whether the television was connected to a LAN at all. Sonos insists that this precludes anticipation.

[2] Sonos briefly argues that Google has not met its burden to show anticipation as to limitations 13.1 and 13.3 (Opp. 14). But Google stated in its motion that, according to Sonos's validity contentions, there was no dispute as those limitations (*see* Br. 17–18). Sonos said nothing to the contrary in its opposition brief.

Google objects that the plain language of the claim does not require any such identifying of the LAN. This order agrees. The claim only requires the control device to "identify[] playback devices connected to the local area network" (*see* limitation 13.2). The phrase "connected to the local area network" modifies "playback devices." Accordingly, the claim does not require affirmatively identifying the LAN. Nor does it require identifying *that* the television is connected to the LAN. All that is required is that the system allowed (i) playback devices to be identified and (ii) such identified devices to be connected to the same LAN as the control device.

The YouTube Remote system allowed both. It is undisputed that a television, for example, could have been connected to the same home Wi-Fi network as the smart phone, and that the smart phone could have transferred playback to that television. Indeed, Google has provided a 2010 video demonstrating just that (*see* Reply Br. 10).[3] In such circumstances, the control device is "identifying playback devices connected to the [LAN]" (*see* limitation 13.2). True, as Google acknowledges, the phone and the television could have been connected to the internet in different ways, but that Google's system could identify devices connected to the LAN in some circumstances *and* devices not connected to the LAN in others does not preclude anticipation. Rather, it shows that Google's system was flexible and had capabilities in addition to those recited by the claim. *See Vulcan Eng'g Co. v. Fata Aluminium, Inc.*, 278 F.3d 1366, 1375 (Fed. Cir. 2002) ("It is irrelevant whether an element has capabilities in addition to that stated in the claim."). Accordingly, the YouTube Remote app system tracked limitation 13.2.

B. LIMITATIONS 13.5–13.6

Next, Sonos briefly argues that the YouTube Remote system did not disclose limitation 13.5 because the app did not "caus[e] the playback at the control device to be *stopped*" (Opp. 18). Instead, Sonos contends, the smart phone in the 2010 video proffered by Google "appears to still be in a playback state (albeit paused). . . ." (*ibid.*). Sonos, however, does not elaborate

[3] Citing *How to Control Google TV or YouTube Leanback with YouTube Remote*, YouTube (Nov. 14, 2010), available at https://youtu.be/EGdsOslqG2s?t=56 (last visited July 29, 2022).

as to the distinction between playback being "paused" and "stopped," and presents no evidence that there is any difference between the two. Absent such, this order concludes that they mean the same thing. Thus, the YouTube Remote app tracked limitation 13.5 to that extent.

Sonos goes on to argue that Google has failed to show disclosure as to both limitations 13.5 and 13.6 because Google's arguments as to those limitations rely on an "'API' document and/or source code" that is dated July 12, 2010. The version of the YouTube Remote system that Google asserts as anticipating prior art is dated November 9, 2010. To link the API document with the later version of the YouTube Remote app, Google provided a declaration from an engineer who did not work at Google until July 2011, a year after the date ascribed to the API document (Reply Br. 18; Levai Decl. ¶¶ 2, 9). Sonos asserts that such "an uncorroborated 2022 declaration of an interested witness . . . who did not even work at Google" at the time "is insufficient corroboration" (Opp. 18). Not so. The engineer, Janos Levai, worked on the prior art product shortly after the relevant time period and then worked on subsequent iterations of the product for five years (*see* Levai Decl. ¶¶ 2, 9). He can testify about how the app worked. Consequently, Sonos has failed to show a genuine dispute as to limitations 13.5 and 13.6.

C. LIMITATION 13.4

We now circle back to limitation 13.4, which is our only remaining disputed limitation. That limitation recites a "set of inputs" that comprise "(i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network." The YouTube Remote app offered the user the option to select a "Connect" button to transfer playback from the smart phone to the playback devices available for pairing (Br. 19; Opp. 16–17). Sonos does not dispute that a selection of "Connect" was "a selection of the selectable option for transferring playback from the control device" (Opp. 17). Sonos contends, however, that the app did not allow the selection of a "*particular* playback device from the identified playback devices connected to the local area network" (*ibid.*). In other words, Sonos asserts that, in the event multiple devices were available for playback (*e.g.*, multiple televisions), the

user had no ability to select a subset of those devices for playback. The user was instead forced to transfer playback to *all* available devices (Schmidt Decl. ¶ 154).

In reply, Google points to YouTube Remote source code dated December 1, 2011 — which pre-dates the '615 patent's claimed priority date of December 30, 2011 — that it asserts allowed users to select particular devices (Reply Br. 11–12 (citing Bhattarcharjee Decl. ¶ 170)). Sonos does not dispute the substance of the code, but contends that it is not prior art because its own asserted priority date is July 15, 2011 (*see, e.g.*, Opp. 18 n.8). Sonos further asserts that Google never contested this earlier invention date in its motion. Google replies that it stated in its invalidity contentions that it was Sonos's burden to show the earlier priority date, and that it was only using the July 15 date to frame its arguments (Reply Br. 12).

This order sides with Sonos here. Google acknowledged the July 15 date in its opening motion (*see* Br. 19 n.8). Further, Google's motion only discusses the December 1, 2011, source code in the context of its obviousness argument (*see* Bhattacharjee Decl. ¶ 170). Taken together, this shows that Google treated July 15 as the applicable priority date. If Google wanted to rely on the December 1 source code for its anticipation argument, it should have made that clear in its opening motion. Instead, Google engaged in a bait-and-switch in its reply brief (*compare* Br. 19–20, *with* Reply Br. 11-12). Thus, Google cannot now rely on the December 1, 2011, source code for its anticipation case. The YouTube Remote system, consequently, did not disclose limitation 13.4 because Google has failed to show that it allowed users to select a "particular playback device."

Nevertheless, this order concludes that it would have been obvious to combine the YouTube Remote app system with disclosures in United States Patent No. 9,490,998 to allow the selection of individual devices.

A claimed invention is obvious if "the differences between the subject matter sought to be patented 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." 35 U.S.C. § 103(a) (pre-AIA). Unlike anticipation, which "requires all elements of a claim to be disclosed within a single reference," "[o]bviousness can be proven by combining existing prior

art references" to disclose all the elements of a claim. *Cohesive Techs. Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008).

The '998 patent is prior art. It was filed on March 7, 2011, and claims priority to an earlier provision application filed in November 2010. The patent's inventors were involved with the development of the YouTube Remote system, and the patent relates to controlling playback on a playback device through a control device. The '998 patent disclosed that

> [i]n some examples, the user may also utilize the remote control application of remote control 75 to *select one or more previously paired controlled devices*, and to send control messages to one or more paired controlled devices. For example, the user may interact with user interface 84 and/or display 88 to interact with and control any available controlled devices.

(*see* '998 patent at 10:62–11:6 (emphasis added)). Thus, the patent disclosed that a "user interface" of a "remote control" (*e.g.*, a smart phone) can display "previously paired controlled devices" (*e.g.*, a television) so that a user may select and control "one or more paired controlled devices" (*ibid*.) The patent, therefore, taught the "selection of the particular playback device from the identified playback devices" as contemplated by the '615 patent.

Sonos raises three objections to this conclusion. *First*, Sonos argues that the passage is ambiguous insofar as it could be read to refer to

> the ability to control one "controlled device," if that is the only "previously paired" "controlled device," or the ability to control all "controlled devices" collectively, if multiple "controlled devices" have been "previously paired" with a "remote control" in a session

(*see* Schmidt Decl. ¶ 173). Put differently, Sonos does not read the passage to teach the selection of a particular device when multiple devices are connected in a session. This contorted interpretation does not convince. The most straightforward reading of the passage is that it disclosed the ability to "select one or more" devices among the "previously-paired devices."

Second, Sonos argues that the passage does not "mention or even suggest[] *transferring* playback from a 'remote control' to a 'controlled device'" and "[c]onsequently . . . does not teach the selection of a particular 'controlled device' to *transfer* playback to" (Opp. 19). This is missing the forest for the trees. As described above, the YouTube Remote app system,

which is prior art, disclosed the transfer of playback. The passage from the '998 patent disclosed the selection of a particular device. They achieve the claim together.

Third, Sonos argues that it would not have been obvious to combine the '998 patent's disclosure with the YouTube Remote system. Specifically, Sonos argues that the YouTube Remote "system architecture" both "teaches away from Google's proposed modifications and also renders such modifications more complicated than Google posits" (Opp. 21–22). Sonos further argues that there would have been no motivation to integrate the modification because it "was not even a prominent feature" of the YouTube Remote app (*id.* at 22). The problem with these assertions is that Google produced source code achieving the proposed modification just a few months after Sonos's asserted priority date, and Google then released the functionality to the public a year later (*see* Reply Br. 14). This adequately demonstrates that a person of skill in art would have been motivated to add the feature.

Sonos's remaining snippets of argument are conclusory and without merit. In sum, this order finds that it would have been obvious to combine the teachings of the '998 patent with the YouTube Remote system to achieve the claimed invention. Google's motion for summary judgment of invalidity of claim 13 of the '615 patent is accordingly **GRANTED**.

CONCLUSION

To the foregoing extent, Google's motion for summary judgment is **GRANTED**.

IT IS SO ORDERED.

Dated: August 2, 2022.

WILLIAM ALSUP
UNITED STATES DISTRICT JUDGE

United States District Court
Northern District of California

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SONOS, INC.,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

No. C 20-06754 WHA

ORDER RE MOTIONS FOR SUMMARY JUDGMENT

INTRODUCTION

With trial looming in this patent infringement action, both sides again move for summary judgment. Alleged infringer now moves for summary judgment of invalidity and no willful or indirect infringement of the three remaining patents, as well as non-infringement of two of those patents based on a purported design-around. Meanwhile, patent owner now moves for summary judgment on alleged infringer's contract-based claims. For the following reasons, alleged infringer's motion is **GRANTED IN PART**, **DENIED IN PART**, and **DEFERRED IN PART**, whereas patent owner's motion is **DENIED AS MOOT**.

STATEMENT

The relevant facts are described at length elsewhere. *See Sonos, Inc. v. Google LLC*, 591 F. Supp. 3d 638, 641 (N.D. Cal. 2022), *leave to appeal denied*, 2022 WL 1486359 (Fed. Cir. May 11, 2022). In brief, we have two related civil actions involving Sonos, Inc.'s patents and Google LLC's alleged infringement: Google's declaratory judgment action filed in the

Northern District of California, and Sonos's affirmative infringement action filed (one day before) in the Western District of Texas and transferred (one year later) at the direction of the Federal Circuit (No. C 21-07559 WHA).

The operative pleadings focus on U.S. Patent Nos. 9,967,615; 10,779,033; 10,848,885; and 10,469,966. These patents generally concern multi-room "smart" speaker technology. Whereas the '615 and '033 patents cover technology related to transferring playback between devices, *i.e.*, "casting," the '885 and '966 patents cover technology related to managing groups of smart speakers.

Pursuant to "patent showdown" procedure, each side has already moved for summary judgment on a single claim. Separate orders granted summary judgment in favor of Google on invalidity of claim 13 of the '615 patent and in favor of Sonos on infringement of claim 1 of the '885 patent. Sonos has since withdrawn its remaining claims based on the '615 patent, and Google has since begun developing and deploying a purported design-around for the '885 and '966 patents. Claims and defenses related to the '033, '885, and '966 patents are now set for trial starting May 8, 2023 (SAC ¶¶ 49–84; *see also* No. C 21-07559 WHA, TAC ¶¶ 134–233). So are Google's claims for breach of contract and conversion, which are based on prior collaborations with Sonos (SAC ¶¶ 85–97).

In the lead-up to trial, both parties have filed motions to strike portions of each other's expert reports (Dkt. Nos. 464, 469), as well as new motions for summary judgment (Dkt. Nos. 478, 483). Sonos also filed a renewed motion to realign the parties (Dkt. No. 477), which the undersigned granted at the hearing after Google withdrew its opposition (Dkt. No. 557). A companion order considered the motions to strike (Dkt. No. 565). This order considers the motions for summary judgment.

Google moves for summary judgment of invalidity of the asserted claims of the '033, '885, and '966 patents; no willful or indirect infringement of the asserted claims of the '033, '885, and '966 patents; and non-infringement of the asserted claims of the '885 and '966 patents based on a purported design-around. Sonos moves for summary judgment on Google's breach of contract and conversion claims. This order follows full briefing and oral argument.

ANALYSIS

Under Rule 56 of the Federal Rules of Civil Procedure, summary judgment is proper when there is no genuine dispute of material fact and the movant is entitled to judgment as a matter of law. A dispute of material fact is genuine "if the evidence is such that a reasonable jury could return a verdict for the nonmoving party." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986). In deciding a motion for summary judgment, the district court must accept the non-movant's non-conclusory evidence and draw all justifiable inferences in the non-movant's favor. *Id*. at 255.

1. GOOGLE'S MOTION: INVALIDITY OF THE '033 PATENT.

Let's begin with the '033 patent. Our analysis of the '033 patent ("Systems and Methods for Networked Music Playback") starts with our earlier analysis of the '615 patent ("Networked Music Playback") during the patent showdown. *Google LLC v. Sonos, Inc.*, 2022 WL 3046752 (N.D. Cal. Aug. 2, 2022). They have identical specifications. Like the '615 patent, the '033 patent is directed toward the act of transferring playback of media content from one device (*e.g.*, a phone) to another (*e.g.*, a television), an act Google calls "casting." And, like claim 13 of the '615 patent covered in the prior order, the asserted claims of the '033 patent covered here are directed toward transferring playback of a queue of media content (*e.g.*, a video playlist).

This order refers the reader to the prior order for a more in-depth introduction to cast technology and the accused applications, which include YouTube, YouTube Kids, YouTube TV, YouTube Music, and Google Play Music. Suffice to say, YouTube was and remains owned by Google, and the accused applications employ technology that enables a "control device" to transfer playback of a queue of media content to a Google cast-enabled "playback device," wherein the control device controls the application and the playback device plays the content. By way of example, a user can activate a feature on the accused YouTube application to cast a video playlist (queue of media content) from a phone (control device) to a television (playback device). The analysis of the '615 patent in the prior order, and the analysis of the '033 patent in this order, hinge on the queue of media content that is cast. Because both parties

find support in the prior order's analysis of non-infringement and invalidity, this order will provide a summary.

First, the prior order found Google's accused products did not infringe claim 13 of the '615 patent because they did not employ a "local playback queue on the particular playback device," as required by limitation 13.5 ('615 patent 20:8–9). That order construed "playback queue" as "a list of multimedia content selected for playback." It then determined that the information in the accused applications that was stored locally on Google cast-enabled playback devices to play casted content (*i.e.*, last, current, and next media item) was *not* a playback queue. Rather, that information was a subset of the list of multimedia content selected for playback and merely provided the local means to process it. For the accused products, the list of multimedia content selected for playback was stored on a remote cloud server. The parties and the prior order referred to it as a "cloud queue," and all agreed that it was not a local playback queue because it was not stored locally on a playback device in the accused applications. The parties only disputed whether the information received by a Google cast-enabled playback device *from* the cloud queue was *itself* a local playback queue. The prior order found it was not. "In short, the cloud queue r[an] the show." *Google*, 2022 WL 3046752, at *6; *see generally id*. at *3–6.

Second, that order found claim 13 of the '615 patent invalid over prior art. Specifically, it determined that Google's YouTube Remote application anticipated claim 13 of the '615 patent for all but one limitation. This was limitation 13.4, which required "selection of [a] particular playback device" ('615 patent 19:61–67). But the prior order nevertheless concluded it would have been obvious to combine the YouTube Remote application with disclosures in a Google patent to allow for such selection (U.S. Patent No. 9,490,998). Note that the order did not discuss the local playback queue from limitation 13.5 in the context of invalidity; it only discussed it in the context of non-infringement, as set out above. By implication, however, the prior order found the YouTube Remote application employed a local playback queue because it found the YouTube Remote application disclosed limitation 13.5. *Google*, 2022 WL 3046752, at *6–10.

Whereas claim 13 of the '615 patent recited a "local playback queue on the particular playback device," the corresponding claims of the '033 patent recite a "remote playback queue provided by a cloud-based computing system." The parties agree that this is the central distinction between the two patents, but they disagree on the significance of this distinction.

A. NO JUDICIAL ESTOPPEL.

As a threshold matter, this order will consider (and reject) Sonos's argument that Google is judicially estopped from asserting the YouTube Remote prior art disclosed the '033 patent's remote playback queue. According to Sonos, Google previously represented that the YouTube Remote system "used a *local* playback queue, and further argued that there can only be one playback queue in a system" (Sonos Opp. 2) (emphasis in original). It insists that the undersigned relied on these representations in finding claim 13 of the '615 patent invalid. According to Google, however, neither it nor the undersigned ever suggested that there could only be one playback queue in the YouTube Remote system (Google Reply Br. 1–3). This order agrees with Google.

"[W]here a party assumes a certain position in a legal proceeding, and succeeds in maintaining that position, he may not thereafter, simply because his interests have changed, assume a contrary position, especially if it be to prejudice the party who has acquiesced in the position formerly taken by him." *New Hampshire v. Maine*, 532 U.S. 742, 749 (2001) (citation omitted). Google has not assumed a contrary position here. The language Sonos seizes upon from Google's prior motion for summary judgment stated:

> [T]he YouTube Remote prior art product is a direct ancestor of the YouTube product Sonos accuses of infringement . . . . The key difference is that where the accused YouTube applications use . . . a cloud queue, the prior art YouTube Remote used . . . a local queue.

(Sonos Opp. 2 (quoting Google Showdown Br. 2)) (emphasis omitted). Just because the accused applications use a cloud queue where the YouTube Remote prior art used a local queue does not mean that the YouTube Remote prior art could not also use a remote playback queue. Google's expert expressly rejected that position in his patent showdown rebuttal report, observing "[a] system might store the playback queue both at the local playback device and

remotely," but "[t]his [was] not the case with *the accused products*" (Bhattacharjee Showdown Rebuttal Rpt. ¶ 320) (emphasis added). Google's expert did not rule out this possibility for the prior art.

Neither did the prior order, which stated:

> Sonos objects that multiple playback queues can exist simultaneously (Opp. 8). In support, Sonos points out that the specification teaches that there can be "two-way communication" between the local playback queue and a separate queue, "such as keeping a local playback queue synchronized with a queue that the user is editing/managing in the third party application" ('615 patent at 16:22–31). But there is no such "two-way communication" here. Rather, the cloud queue delivers information to the playback device on a one-way street. The cloud queue provides information about the queue . . . and never vice-versa, because there is no locally-stored queue that would allow "two-way" synchronization.

Google, 2022 WL 3046752, at *6. In other words, that order only found the "two-way" playback queue of one embodiment did not exist in the accused products. It never concluded that multiple playback queues could not exist simultaneously or could not have existed simultaneously in the prior art.

Moreover, Google now argues that a feature in YouTube Remote *version 2* ("YTR2") disclosed a remote playback queue, whereas it was YouTube Remote *version 1* ("YTR1") that disclosed a local playback queue previously. This alone suggests that the prior order should not foreclose an invalidity analysis here. Whereas YTR1 was released on November 9, 2010, YTR2.03 and YTR2.07 were released on July 29, 2011, and August 10, 2011, respectively. The '033 patent application claims priority through a chain of applications dating back to December 30, 2011. Because the YTR2 system was released prior to the '033 patent priority date and could invalidate the asserted claims, this order proceeds to analysis of those claims.

B. OVERVIEW OF ASSERTED CLAIMS.

Sonos asserts claims 1–2, 4, 9, 11–13, and 16 of the '033 patent. Claims 1 and 12 are independent claims, and claims 2, 4, 9, 11, 13, and 16 are dependent claims. Whereas claim 1 is directed to a "computing device" (corresponding to a control device discussed above), claim

12 is directed to a "computer-readable medium" (with instructions for that control device). Both parties focus their analysis on claim 1.

Using Google's paragraph numbering, claim 1 of the '033 patent recites:

> **[1.0]** A computing device comprising:
>
> **[1.1]** at least one processor;
>
> **[1.2]** a non-transitory computer-readable medium; and
>
> **[1.3]** program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:
>
> > **[1.4]** operating in a first mode in which the computing device is configured for playback of a *remote playback queue* provided by a cloud-based computing system associated with a cloud-based media service;
> >
> > **[1.5]** while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the *remote playback queue*;
> >
> > **[1.6]** while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;
> >
> > **[1.7]** based on receiving the user input,
> >
> > > **[1.7(a)]** transmitting an instruction for the at least one given playback device to take over responsibility for playback of the *remote playback queue* from the computing device,
> > >
> > > **[1.7(b)]** wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the *remote playback queue* from the cloud-based media service; and (iii) play back the retrieved at least one media item;
> >
> > **[1.8]** detecting an indication that playback responsibility for the *remote playback queue* has been successfully transferred from the computing device to the at least one given playback device; and

> **[1.9]** after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the *remote playback queue* to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the *remote playback queue* and the computing device is no longer configured for playback of the *remote playback queue*.

('033 patent 17:32–18:10). Recall the parties agree that the primary difference between invalid claim 13 of the '615 patent and the asserted claims of the '033 patent is that the former recited a local playback queue and the latter recite a remote playback queue, italicized above.

Google now argues that claim 1 of the '033 patent and the other asserted claims are invalid as obvious over two prior art references: (1) Google's YTR2 system, which disclosed a remote playback queue on account of its "party mode" feature; and (2) Google's '998 patent, which (again) taught the selection of playback devices (Google Br. 5–15). Sonos contends that these prior art references did not satisfy limitations 1.4–1.9 of the '033 patent (Sonos Opp. 3–10). According to Sonos, the YTR2 system did not disclose a remote playback queue, as required by limitations 1.4, 1.7, 1.8, and 1.9, whereas the '998 patent did not teach the selection of playback devices, as required by limitations 1.5 and 1.6.[1]

A claimed invention is obvious if "the differences between the subject matter sought to be patented 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." 35 U.S.C. § 103(a) (pre-AIA). Obviousness is a question of law based on underlying questions of fact. *ABT Sys., LLC v. Emerson Elec. Co.*, 797 F.3d 1350, 1354 (Fed. Cir. 2015). Unlike anticipation, which "requires all elements of a claim to be disclosed within a single reference," "[o]bviousness can be proven by combining existing prior art references." *Cohesive Techs. Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008). "A party seeking to invalidate a patent based on obviousness must demonstrate by clear and convincing evidence that a skilled artisan would have been motivated to combine the teachings of the prior art references to

[1] Google also argues that the YouTube Remote prior art disclosed a remote playback queue when a YTR1 or YTR2 user selected a list of service-recommended videos for playback (Google Br. 9–11). Because this order finds that YTR2 party mode disclosed a remote playback queue, however, it does not reach this argument.

achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so." *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009) (internal quotation marks and citation omitted). The first step in an obviousness analysis is proper construction of the claim to determine its scope and meaning, and the second step is comparison of the properly construed claim to the prior art. *Medichem, S.A. v. Rolabo, S.L.*, 353 F.3d 928, 933 (Fed. Cir. 2003).

Here, the parties agree on the construction of the central claim term: a "remote playback queue" is a "playback queue," as construed in the prior order, that is also "remote" (Dkt. Nos. 560–61). And, they interpret "remote" almost identically. Sonos explains that "the term 'remote' refers to a location different from (*i.e.*, not local to) the 'computing device' or the 'playback device,'" whereas Google proposes it means "geographically distant from the claimed computing and playback devices" (*compare* Dkt. No. 560 at 2, *with* Dkt. No. 561 at 1). For the purpose of evaluating movant Google's invalidity arguments, this order adopts non-movant Sonos's phrasing and construes "remote" as "not local to the claimed computing device or playback device." As such, a "remote playback queue" is a "playback queue" that is "not local to the claimed computing device or playback device." Applying the construction of "playback queue" from the prior order, a "remote playback queue" is "a list of multimedia content selected for playback that is not local to the claimed computing device or playback device."

With this agreed-upon construction, does claim 1 of the '033 patent read on the prior art? For the reasons that follow, this order concludes that it does.

C. Overview of Prior Art.

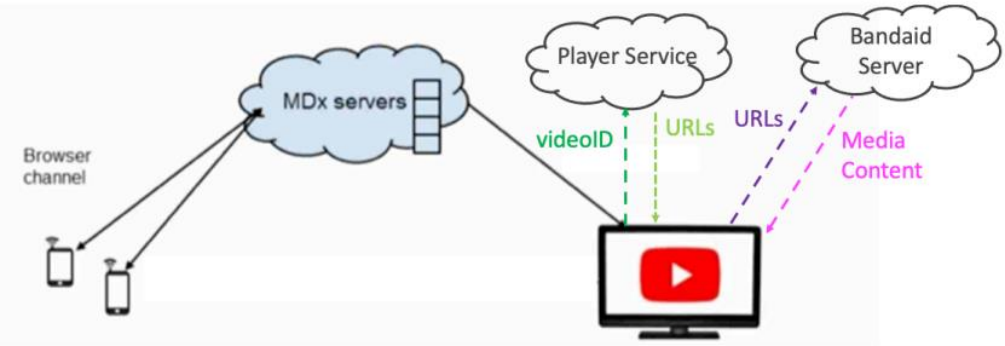
Let's start with the prior art. The YouTube Remote application allowed a user to display YouTube videos on one or more screens (*e.g.*, televisions) and control playback of those YouTube videos from one or more mobile devices (*e.g.*, phone and tablet). First released in November 2010 and later discontinued, it functioned like casting, but the YouTube Remote application required a user to separately navigate to an intermediary website on each of the devices and log in to the same YouTube account to pair them.

Party mode was a feature that Google developed after releasing YTR1, reducing it to practice on July 12, 2011, and releasing it in YTR2. Whereas YTR1 allowed for *one user* to manage a queue of YouTube videos and transfer playback from one or more mobile devices to one or more screens, YTR2 party mode allowed for *two or more users* to manage a queue of YouTube videos and transfer playback from two or more mobile devices to one or more screens. To reiterate, YTR2 predated the '033 patent priority date of December 30, 2011, with YTR2.03 and YTR2.07 released on July 29, 2011, and August 10, 2011, respectively.

To initiate party mode, a host user would select a queue of YouTube videos for playback on a mobile device running YTR2 and invite one or more guest users with a mobile device running YTR2. If the guest user(s) accepted the host user's invitation, the host user's mobile device would send a message to a cloud server (called the "MDx server") with the list of identifiers for the queue of videos selected for playback (called "videoIds"). The cloud server would store this list of identifiers in the "party queue" and then send a message with the list of identifiers to the mobile device(s) of the guest user(s), where it would be stored locally (Bhattacharjee Rpt. ¶¶ 171–75; Schmidt Rebuttal Rpt. ¶¶ 207–08).

In party mode, the host user and guest user(s) managed the same queue of videos, which was stored in the party queue on the cloud server and on each of their mobile devices. If the host user or guest user(s) made a change to the queue of videos (*e.g.*, removing the last video), her mobile device would send an update message to the cloud server, which would store the updated list of identifiers in the party queue. The cloud server would then send a message with the updated list of identifiers to the mobile devices of the host user and guest user(s), which was again stored locally. If playback was transferred to one or more of the host user's screens, the queue of videos was stored on the screen(s) as well, and the message with the updated list of identifiers would also go to the screen(s) to be stored locally (Bhattacharjee Rpt. ¶¶ 176–77; Schmidt Rebuttal Rpt. ¶¶ 213–14).

To transfer playback to a screen in party mode, the host or guest user(s) would press a "Connect" button in the application and the cloud server would send a message to the screen identifying one or more videos for playback. For each video, that screen would send a corresponding identifier it had stored locally to another cloud server (called "Player Service") to obtain a URL (called a "Bandaid URL"). That URL would enable the screen to retrieve the media content (audio and video content) corresponding to the identifier from yet another cloud server in Google's Content Delivery Network (called "Bandaid"), which would then be played back (Bhattacharjee Rpt. ¶¶ 327–29, 340; Schmidt Rpt. ¶¶ 162–66; Schmidt Rebuttal Rpt. ¶¶ 174–76). Sonos's expert provides a helpful diagram of this process, which is based on a Google diagram produced in discovery:



Transferring Playback in YTR2 Party Mode.

(Schmidt Rpt. ¶ 166).

As for the '998 patent, the prior order stated, in pertinent part:

> The '998 patent is prior art. It was filed on March 7, 2011, and claims priority to an earlier provision[al] application filed in November 2010. The patent's inventors were involved with the development of the YouTube Remote system, and the patent relates to controlling playback on a playback device through a control device . . . .
>
> [T]he patent disclosed that a "user interface" of a "remote control" (*e.g.*, a smart phone) can display "previously paired controlled devices" (*e.g.*, a television) so that a user may select and control "one or more paired controlled devices."

Google, 2022 WL 3046752, at *9. This user interface was called the "device-picker," which was added to source code for the YouTube Remote application dated December 1, 2011 — again, before the priority date of the '033 patent, December 30, 2011. The device-picker was released with YouTube Remote version 3 ("YTR3") in January 2012.

This order will first consider Google's arguments as to the "remote playback queue" limitations allegedly disclosed by the YTR2 system (1.4, 1.7, 1.8, and 1.9), and then circle back to the "selection of playback devices" limitations allegedly taught by the '998 patent (1.5 and 1.6).

D. LIMITATION 1.4.

Limitation 1.4 requires a "computing device" that is "configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service" ('033 patent 17:40–42). The "computing device" corresponds to the control device discussed above, which is itself configured for playback at this stage. In other words, the playback captured by limitation 1.4 is taking place on a control device (*e.g.*, a phone) and has not yet been transferred to a playback device (*e.g.*, a television).

According to Google, YTR2 party mode disclosed limitation 1.4. Because the party queue was a playback queue, and the cloud server provided the party queue to the geographically distant mobile devices of the host and guest user(s), those mobile devices were ostensibly configured for playback of a remote playback queue provided by a cloud-based computing system (Google Br. 6–7). According to Sonos, however, party mode was "simply a mode that allow[ed] multiple YouTube accounts to add songs to the same queue" and that "d[id] not change anything about the location of the playback queue" (Sonos Opp. 3). Sonos emphasizes that in party mode and non-party mode alike, the mobile devices of host and guest user(s) and the host user's screen(s) all had and relied on their own local playback queues (Sonos Opp. 7).

True, the mobile devices of host and guest user(s) and the host user's screen(s) all had and relied on their own local playback queues. Google expressly acknowledges that the party queue was "copied to a device for the purposes of facilitating local playback" and that it did

not "eliminate[] the playback queue on the playback device in favor of a cloud queue" until 2014 (Dkt. No. 561 at 1; Google Reply Br. 1). In other words, it is undisputed that the mobile devices of the host and guest user(s) stored the list of identifiers for the queue of videos selected for playback locally. But it is also undisputed that the cloud server stored the list of identifiers for the queue of videos selected for playback in the party queue (Google Br. 3 (citing Bhattacharjee Rpt. ¶¶ 171–73); Sonos Opp. 5 (citing Schmidt Rebuttal Rpt. ¶ 207); *see also* Schmidt Rebuttal Rpt. ¶ 204). That list was a playback queue ("a list of multimedia content selected for playback") and that server was remote ("not local to the claimed computing device or playback device"). Putting it all together, the party queue was a list of multimedia content selected for playback that was not local to the claimed computing or playback device. The party queue was a remote playback queue. And, when playback had not yet been transferred to a screen, the mobile device in YTR2 party mode was configured for playback of a remote playback queue.

That mobile devices and screens *also* had *local* playback queues did not mean that the party queue was not a remote playback queue. The reader will recall that Google did not rule out the possibility that the YouTube Remote prior art could have employed both, which YTR2 party mode did. What we have here is the situation described by the Google expert in which "the system might store the playback queue both at the local playback device and remotely" (Bhattacharjee Showdown Rebuttal Rpt. ¶ 320). Indeed, the YouTube Remote prior art was strikingly similar to the embodiment that the prior order distinguished ('033 patent 16:16–27). This "third party application not only t[old] the local playback system what to play, but also maintain[ed] two-way communication with the local playback . . . system" (*id.* at 16:18–21). And "[t]wo way communication help[ed] enable features such as keeping a local playback queue synchronized with a queue that the user [was] editing/managing in the third party application" (*id.* at 16:21–24).

In YTR1 and YTR2 non-party mode, the queue that the user was editing/managing to which the local playback queue was synchronized was the local playback queue on the user's mobile device. There were no other users, and there was no queue saved on a cloud server. In

YTR2 party mode, however, the queue that the user was editing/managing to which the local playback queue was synchronized was the remote playback queue. Only this queue, the party queue saved on the cloud server, reflected changes made by both this user and other user(s) in the party. "In short, the cloud queue r[an] the show" in YTR2 party mode as well. *Google*, 2022 WL 3046752, at *6.

Because YTR2 party mode disclosed a computing device that was configured for playback of a remote playback queue provided by a cloud-based computing system, the YTR2 system satisfied limitation 1.4.

E. LIMITATION 1.7.

The parties take up limitation 1.7 in parts, so this order will do the same.

Limitation 1.7(a) requires that the computing device, "based on receiving [] user input," "transmit[] an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device" ('033 patent 17:53–56). Both sides agree that a mobile device running YTR2 party mode (computing device) transmitted a message (instruction) for a screen (playback device) to take over responsibility for playback once a user pressed (user input) the Connect button (Google Reply Br. 5; Sonos Opp. 9; *see also* Bhattacharjee Rpt. ¶ 332; Schmidt Rpt. ¶ 164). According to Google, because this computing device was configured for playback of a remote playback queue, this instruction was for taking over playback responsibility of a remote playback queue (Google Reply Br. 5). According to Sonos, however, the instruction was for taking over playback of a local playback queue, not a remote playback queue, because the playback devices were only configured for playback of a local playback queue (Sonos Opp. 8). This order has already explained why that is not the case. As such, it is apparent that a computing device running YTR2 party mode transmitted an instruction for a playback device to take over playback responsibility of a remote playback queue from a computing device.

Limitation 1.7(b) provides that the instruction to take over responsibility for playback configures the playback device to "(i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback

queue, (ii) use the obtained data to retrieve at least one media item in the remote playback queue from the cloud-based media service; and (iii) play back the retrieved at least one media item ('033 patent 17:58–65). The specification teaches that the data identifying a next one or more media items can take different forms, including "song identifier" or "URL" (*id*. at 12:37, 56). What's more, it specifically teaches that a URL "can be passed to a playback device to fetch content from a cloud," and "[s]ongs and/or other multi-media can be retrieved from the Internet rather than a local device" (*id*. at 12:52–53, 57–58).

Recall once playback was transferred to a screen in YTR2 party mode, that screen would receive a message from the cloud server identifying one or more videos for playback. For each video, the screen would send a corresponding identifier it had stored locally to another cloud server (Player Service) to obtain a URL (Bandaid URL), which would enable it to retrieve the media content (audio and video content) corresponding to the identifier from yet another cloud server in Google's Content Delivery Network (Bandaid) for playback. YTR2 party mode disclosed limitation 7(b) because once the screen received an instruction to take over responsibility for playback, it sent a message to the Player Service to obtain a Bandaid URL that was used to retrieve media content from the Bandaid server and play back that retrieved content. As such, the playback device running YTR2 party mode was configured to "communicate with [the] cloud-based computing system" (Player Service) to "obtain data identifying a next one or more media items" (Bandaid URLs) and "use the obtained data to retrieve at least one media item in the remote playback queue" (audio and video content) to "playback the retrieved at least one media item," as required (Google Br. 11).

Sonos disagrees that YTR2 party mode disclosed this limitation for three reasons (Sonos Opp. 8–10). None is availing.

First, Sonos argues that the identifiers (videoIds), not the URLs (Bandaid URLs), constituted "*data identifying* a next one or more *media items* that are in the remote playback queue" (Sonos Opp. 8) (emphasis in original). According to Sonos, because those identifiers were stored locally on the screen in a local playback queue in YTR2 party mode, they were not "in the remote playback queue," as required by limitation 1.7(b). Although Sonos suggests

that "the parties dispute whether 'data identifying a next one or more media items' has to be a URL or could be another type of identifier," both sides acknowledge that such data could be identifiers or URLs, consistent with the language in the specification (Sonos Opp. 8; Google Reply Br. 6 n.5; *see* '033 patent 12:37, 56). And, as discussed, devices configured for playback in YTR2 party mode had identifiers and URLs. Irrespective of whether the identifiers constituted "data identifying a next one or more media items," the URLs clearly did.

The playback device in limitation 1.7(b) "obtain[s] data identifying a next one or more media items that are in the remote playback queue" *as well as* "use[s] the obtained data to retrieve at least one media item" and "play back the retrieved at least one media item." It is undisputed that screens used URLs to retrieve and play back media content in YTR2 party mode (Schmidt Rpt. ¶ 164 (recognizing playback device "use[d] the one or more [Bandaid] URLs to retrieve the media item from one or more 'Bandaid' servers . . . and then render[ed] [*i.e.*, played back] the retrieved media item"); *see also* Schmidt Dep. 147:6–148:10; Bhattacharjee Rpt. ¶¶ 328–29).

Second, Sonos argues that limitation 1.7(b) requires that the "data identify[] a *next* one or more media items," whereas "[t]he Bandaid URLs Google points to only identif[ied] the *current* media item for playback, not the *next* media item" (Sonos Opp. 9 (citing Schmidt Rebuttal Rpt. ¶¶ 176, 212)) (emphasis in original). In other words, "Google's argument thus equates the claim term 'next' with 'current'" when the patent specification distinguishes those terms elsewhere (Sonos Opp. 9 (citing '033 patent 16:49–67)).

Not so. The parties do not dispute that the screen in YTR2 party mode carried out the process of: (i) receiving a message from the (MDx) cloud server identifying a video for playback; (ii) sending a corresponding (videoId) identifier to another (Player Service) cloud server to receive a (Bandaid) URL; (iii) sending that (Bandaid) URL to yet another (Bandaid) cloud server to retrieve media (audio and video) content; (iv) and playing back that media content (Google Br. 11; Sonos Opp. 9). Nor do they dispute that this happened for each video in the party queue (*ibid.*; *see also* Schmidt Rpt. ¶ 164; Bhattacharjee Rpt. ¶ 328). Thus, the screen clearly "communicate[d] with the cloud-based computing system in order to obtain data

identifying a *next one or more* media items that are in the remote playback queue." That there might have only been one video in that queue is accounted for when the limitation describes "us[ing] the obtained data to retrieve *at least one* media item" and "play[ing] back the retrieved *at least one* media item." Read in context, "next" must include — but is not limited to — "current" here.

Third, Sonos argues that in YTR2 party mode, the screen did not "obtain data identifying a next one or more items that are in the *remote playback queue*" because it played items from its local playback queue (Sonos Opp. 9–10) (emphasis in original). After all, according to Sonos, "[s]creens in YTR[2] party mode d[id] not 'ask[] the MDx [cloud] server for which video to play next when the current [video] ended'" and they instead "simply play[ed] the next video in their local playback queue" (*ibid*.).

But, as Google notes, limitation 1.7(b) does not require the playback device to "fetch 'data identifying . . . media items' directly 'from [the] remote playback queue'" (Google Reply Br. 7 (quoting Sonos Opp. 9–10)). Rather, it requires that the playback device "obtain[] data identifying a next one or more media items *that are in the* remote playback queue," and "use[] the obtained data to retrieve" and "play back the retrieved at least one media item." That is what the screen in YTR2 party mode did. It received a message from the (MDx) cloud server identifying a video for playback *before* it sent the corresponding identifier to the Player Service and the corresponding URL to the Bandaid server. In sum, YTR2 party mode tracked limitation 1.7.

F. LIMITATIONS 1.8–1.9.

Limitation 1.8 requires that the computing device "detect[] an indication that playback responsibility for the remote playback queue has been successfully transferred from the computing device to the at least one given playback device" ('033 patent 17:66–18:2). Limitation 1.9 requires that, after detecting this indication, the computing device "control the at least one given playback device's playback of the remote playback queue" and is itself "no longer configured for playback of the remote playback queue" (*id*. at 18:3–10). According to Google, the YTR2 system disclosed these limitations because the application displayed a

"Connected to [] screen" dialogue box once a host or guest user transferred playback to a screen, as demonstrated in the video from Google's invalidity contentions showing how the YouTube Remote application worked (Google Br. 13).[2] Sonos does not address these limitations in its opposition and did not address them at the hearing, so this order incorporates its general argument that the YTR2 system used a local playback queue, not a remote playback queue, which it already rejected.

This order observes that the video discussed by Google was uploaded on November 14, 2010 — shortly after the release of YTR1 on November 9, 2010, and well-before the release of YTR2.03 on July 29, 2011. Even so, there is no evidence on this record that this dialogue box was removed or changed in YTR2. To the contrary, Google's arguments at the patent showdown appear to have relied on both YTR1 and YTR2 systems, just without discussing party mode (Bhattacharjee Showdown Rpt. ¶¶ 169–71). This order therefore agrees with Google that the dialogue box demonstrated that the mobile device in the YTR2 system detected an indication playback responsibility had been successfully transferred, that it was configured to control a screen's playback of a remote playback queue, and that it was itself no longer configured for playback of a remote playback queue. As such, the YTR2 system satisfied limitations 1.8 and 1.9.

G. LIMITATIONS 1.5–1.6.

Having found that the YTR2 system disclosed all of the "remote playback queue" limitations, this order turns to the "selection of playback devices" limitations allegedly taught by the '998 patent.

Limitation 1.5 requires that the computing device "display[] a representation of one or more playback devices in a media playback system" available to accept playback responsibility for the remote playback queue ('033 patent 17:43–48). Limitation 1.6 requires that the computing device "receiv[e] user input indicating a selection of at least one given playback device from the one or more playback devices" (*id*. at 17:49–52). As Google observes, the

[2] Citing https://www.youtube.com/watch?v=EGdsOslqG2s (last visited April 11, 2023).

prior order addressed a very similar limitation in claim 13 of the '615 patent, which required the computing device to "display[] . . . playback devices connected to the local area network" and receive user input indicating "a selection of [a] particular playback device from the identified playback devices" (Google Br. 14). *Google*, 2022 WL 3046752, at *9–10 (citing '998 patent 10:62–11:6). It found the YouTube Remote prior art's Connect button did not allow a user to select a subset of available playback devices, but the '998 patent disclosed the device-picker and taught the selection of playback devices, as contemplated by the '615 patent. Absent countervailing evidence, that Google produced YouTube Remote application source code incorporating the device-picker (December 1, 2011,) mere months after Sonos's claimed priority date for the '615 patent (July 15, 2011,) and released the functionality to the public with YTR3 (January 2012) clearly and convincingly demonstrated that a person of ordinary skill in the art would have been motivated to incorporate the teachings of the '998 patent. Her reasonable expectation of success was also self-evident. Accordingly, the prior order concluded that it would have been obvious to combine the prior art references and invalidated the asserted claim of the '615 patent.

Sonos raises no new evidence that demands a different outcome here. It did not address these limitations in its opposition, but it included language from its expert's rebuttal report on this point in its slides for the hearing. The only new argument is that "there would be no need to use a device-picker to select a particular [screen] for playback" in YTR2 party mode "when the desire [was] to have multiple [screens] for playback" (Schmidt Rebuttal Rpt. ¶ 351). It does not persuade. Even in party mode, a user might have considered it desirable to play back media on some screens (*e.g.*, in the living room and kitchen) and not others (*e.g.*, in the den). No evidence on this record suggests otherwise.

The '998 patent taught the selection of playback devices, as contemplated by limitations 1.5 and 1.6. That Google produced YouTube Remote application source code achieving the proposed modification *roughly one month before* Sonos's claimed priority date for the '033 patent (December 30, 2011,) clearly and convincingly demonstrates that a person of ordinary skill in art would have been motivated to incorporate the teachings of the '998 patent and

would have had a reasonable expectation of success in doing so. Indeed, as Google observes, motivation and reasonable expectation of success are *even stronger* for the '033 patent, with Sonos having claimed an earlier priority date (July 15, 2011,) for the '615 patent (Google Br. 14 n.3).

Accordingly, this order finds the YTR2 system, combined with the '998 patent, rendered claim 1 of the '033 patent obvious.

H. Remaining Independent and Dependent Claims.

Having found claim 1 invalid as obvious, this order considers the remaining asserted claims of the '033 patent. Because claim 12 of the '033 patent is nearly identical to claim 1, just directed to a computer-readable medium instead of a computing device, this order finds that independent claim obvious over the YTR2 system and the '998 patent as well. The same logic applies to dependent claims 2, 9, 11, 13, and 16, for which Sonos simply incorporates its validity arguments for the independent claims (Bhattacharjee Rpt. ¶¶ 338–61).

As Google observes, the only dependent claim for which Sonos raises additional argument is claim 4, though this argument was not briefed by Sonos in its opposition (Google Br. 14). Claim 4 of the '033 patent recites that the representation of one or more playback devices in limitation 1.5 is for a "group of playback devices . . . that are to be configured for synchronous playback" ('033 patent 18:23–32). But this order agrees with Google's expert that "[b]ecause the YTR system already disclosed the ability to detect, display and transfer playback to multiple devices, allowing multiple devices to be represented by a single icon (rather than two separate icons) would have been an obvious design choice requiring only minor modification to the user interface display" based on the device-picker disclosed in the '998 patent and absent evidence to the contrary (Bhattacharjee Rpt. ¶ 646).

In sum, this order concludes that YTR2 party mode disclosed a remote playback queue, and it would have been obvious to combine the YTR2 system and the '998 patent to achieve the claimed invention. Google's motion as to the invalidity of the asserted claims of the '033 patent is **Granted**.

2. GOOGLE'S MOTION: INVALIDITY OF THE '885 AND '966 PATENTS.

Now we turn from casting to "zone scene management" and the '885 and '966 patents. Once more, our analysis starts with our analysis of the '885 patent at the patent showdown. *Google LLC v. Sonos, Inc.*, 2022 WL 2870527 (N.D. Cal. July 21, 2022). The '885 and '966 patents have identical specifications. Both are directed toward a "method and apparatus for controlling or manipulating a plurality of multimedia players in a multi-zone system" ('885 and '966 patents 1:32–34). The asserted claims teach a user to customize and save multiple groups of smart speakers or other players, each according to a "theme or scene," and then "activate" a customized group, called a "zone scene," on demand (*id*. at 2:46–51).

Once more, this order refers the reader to the prior order for an in-depth introduction to the underlying technology and the accused products. By way of review, in a multi-zone system, a "player" is a speaker, television, or similar device that can play content. The patents refer to the player's location, such as a bedroom, as a "zone," and the player therein as a "zone player" (*see, e.g.*, *id*. at 2:36–41; 3:13–23). According to the specifications, prior to 2006, it was difficult for users to dynamically control speaker groups. Audio sources were "hard-wired" or "controlled by a pre-configured and pre-programmed controller," which ostensibly made it cumbersome to "dynamically manag[e] the ad hoc creation and deletion of groups," particularly when desired groups overlapped (*id*. at 1:62–2:2:25). Put another way, someone who enjoyed "listen[ing] to broadcast news from his/her favorite radio station in a bedroom, a bathroom, and a den while preparing to go to work in the morning" but also preferred to "listen in the den and the living room to music . . . in the evening" would not have been able to easily configure a traditional audio system to accommodate those preferences on account of then-existing technological and physical hurdles (*ibid*.).

The '885 and '966 patents ostensibly solved this problem by providing a "mechanism" to "allow a user to group" multimedia players "according to a theme or scene, where each of the players is located in a zone" (*id*. at 2:36–41). Then, "[w]hen the scene [was] activated, the players in the scene react[ed] in a synchronized manner" (*id*. at 2:41–42). This allowed a user

to customize and save multiple groups of speakers or other players, each according to a "theme or scene," and then later "activate" a customized group, called a "zone scene," on demand (*id.* at 2:46–51). Thus, the person who enjoyed listening to broadcast news in the morning could form a "zone scene" called "Morning" that consisted of speakers in the bedroom, bathroom, and den, and activate that group on demand using an application on the controller device (*e.g.*, a phone). And, that same person, who also enjoyed listening to music in the evening, could form and activate on demand another "zone scene" called "Evening" that consisted of speakers in the den and living room.

The prior order ruled that Google infringed claim 1 of the '885 patent. Specifically, assuming *arguendo* that Google's definition of zone scene as "a previously saved grouping of zone players according to a common theme" was correct, that order found Google's accused products infringed claim 1 because a user's ability to name speaker groups meant a user could group speakers according to a common theme. *Google*, 2022 WL 2870527, at *4. It also rejected two invalidity arguments: that claim 1 of the '885 patent was directed toward unpatentable subject matter, and that the '885 patent lacked written description support. *Id.* at *6–9. This order evaluates a different invalidity argument: that the asserted claim of the '885 patent (and, by extension, the asserted claims of the '966 patent,) are invalid as obvious over prior art.[3]

A. OVERVIEW OF ASSERTED CLAIMS.

Sonos asserts claim 1 of the '885 patent and claims 1–2, 4, 6, 8–10, 12, 14, and 16 of the '966 patent. Claim 1 of the '885 patent and claims 1 and 9 of the '966 patent are independent claims, whereas claims 2, 4, 6, 8, 10, 12, 14, and 16 of the '966 patent are dependent claims.

[3] After rejecting Google's invalidity arguments, the undersigned ordered Google to show cause as to why summary judgment in favor of Sonos on validity should not be entered (Dkt. No. 339). Another order declined to consider the new invalidity argument Google raised in response and entered summary judgment in favor of Sonos on validity of claim 1 of the '885 patent (Dkt. No. 382). Google then moved for reconsideration based on *Mikkelsen Graphic Engineering, Inc. v. Zund America, Inc.*, 541 F. App'x 964 (Fed. Cir. 2013). Upon reconsideration, a subsequent order agreed that *Mikkelsen* "caution[ed] against entering summary judgment against non-movants in like circumstances" and withdrew the ruling on validity (Dkt. No. 539). Google now raises that new argument as a movant.

Note the '966 patent is drafted from the perspective of the controller device that controls zone players and makes groups (*e.g.*, a phone), whereas the '885 patent is drafted from the perspective of a zone player itself (*e.g.*, a speaker). Sonos filed the applications that led to the '885 and '966 patents on April 12, 2019, but the applications claim priority through a long chain of continuation applications dating back to a provisional application filed on September 12, 2006. Sonos claims an earlier conception date of December 2005.

Like the briefing and the parties at the hearing, this order focuses on claim 1 of the '885 patent. Using Google's paragraph numbering, claim 1 of the '885 patent recites:

> **[1.0]** A first zone player comprising:
>
> **[1.1]** a network interface that is configured to communicatively couple the first zone player to at least one data network;
>
> **[1.2]** one or more processors;
>
> **[1.3]** a non-transitory computer-readable medium; and
>
> **[1.4]** program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:
>
> **[1.5]** while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:
>
> **[1.6]** (i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first *zone scene* comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first *zone scene* is invoked; and
>
> **[1.7]** (ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second *zone scene* comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second *zone scene* is invoked, wherein the second zone player is different than the third zone player;
>
> **[1.8]** after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second *zone scenes* has been selected for invocation;

> **[1.9]** after the given one of the first and second *zone scenes* has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second *zone scenes* respectively comprising a given one of the first and second predefined groupings of zone players; and
>
> **[1.10]** based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

('885 patent 11:37–12:23). "Zone scene," in play here, is italicized above. Google asserts that claim 1 of the '885 patent and all asserted claims of the '966 patent are invalid as obvious over two prior art references: Sonos's prior art speaker system from 2005 and "modifications suggested to Sonos by users of that system" in customer posts on Sonos online forums (Google Br. 15). Sonos disagrees and contends that the prior art did not disclose zone scene technology as required by limitations 1.5–1.10 and the corresponding limitations of the '966 patent (Sonos Opp. 10–19; Dkt. No. 468-7 at 41–43, 85–88).

B. Overview of Prior Art.

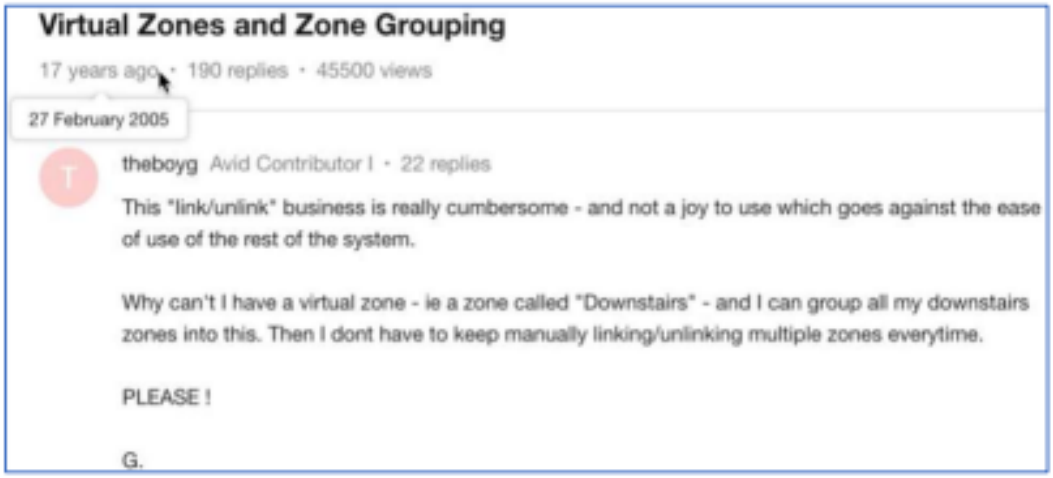
As for prior art, the Sonos 2005 system was the initial version of Sonos's wireless multi-zone system. It launched no later than January 2005, well before both Sonos's claimed conception date of December 2005 and the provisional filing date of September 12, 2006 (*see* Almeroth Rebuttal Rpt. ¶ 265). The parties agree that the Sonos 2005 system disclosed "smart" speakers that could be grouped for synchronous playback, and they generally agree on how that grouping worked (Google Br. 16 (citing Almeroth Rebuttal Rpt. ¶ 266); Sonos Opp. 11 (citing Millington Decl. ¶ 5)). In essence, speakers in the Sonos 2005 system could be added to a temporary group individually, and that temporary group would be activated for playback immediately. Once a user no longer wished to use that temporary group for playback, it ceased to exist. The only saved group was (yet another) "party mode," which allowed a user to immediately commence synchronous playback of a group of all speakers in her system (Schonfeld Rpt. ¶¶ 107, 114; Millington Decl. ¶ 7).

Although the parties dispute the extent to which the Sonos 2005 system disclosed the zone scene requirements of the asserted limitations, they generally agree that this system did not allow for speaker groups that could be named, saved, and later activated on-demand (Google Br. 15–16 (citing Schonfeld Reply Br. 1 ¶ 18; Dkt. No. 484-8 (Lambourn Emails)); Sonos Opp. 11–12 (citing Lambourn Decl. ¶¶ 8–11)).

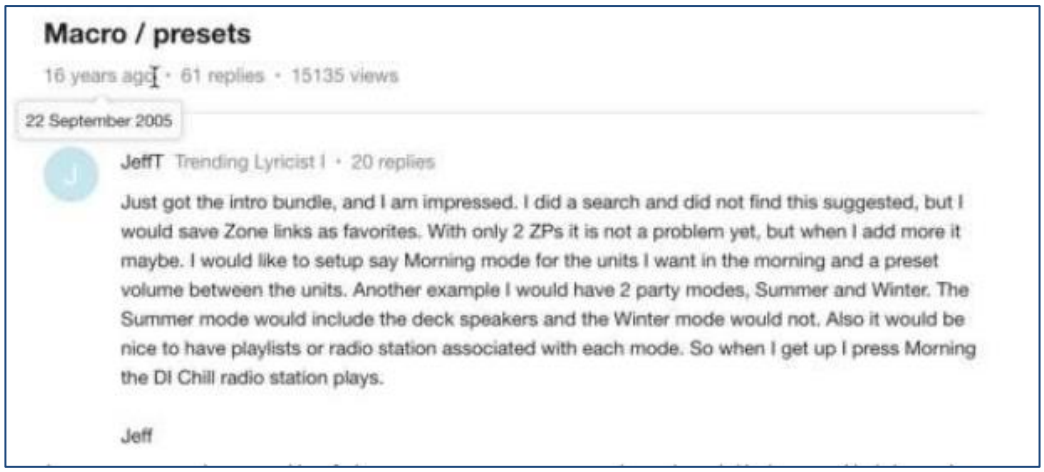
This is where the forum posts come in. According to Google, "[t]o the extent not disclosed in the Sonos 2005 prior art system itself, customer comments on the Sonos forums disclose[d] the 'zone scene' elements of claim 1 of the '885 patent" (Google Br. 18). It focuses on two illustrative posts from two threads on those forums:

> In the first [thread], "Virtual Zones and Zone Grouping," "theboyg" stated that the way the Sonos 2005 system permitted users to create groups — by linking and unlinking speakers in real time — was "cumbersome." He suggested adding to the prior art system "a virtual zone – ie a zone called 'Downstairs' that would allow a user to 'group all [his] downstairs zones' and avoid the necessity to 'keep manually linking and unlinking multiple zones everytime'" . . . .
>
> The second relevant Sonos forum thread is titled "Macro/Presets." In that thread, "JeffT" suggested that the Sonos 2005 system "save Zone links [i.e., speakers linked into a group] as favorites" so that, for example, he could set up "2 party modes, Summer and Winter," where the "Summer mode" would include "the deck speakers and the Winter mode would not."

(Google Br. 16–17). Again, the forum posts of "theboyg" and "JeffT" were created and publicly available prior to both Sonos's claimed conception date, December 2005, and the provisional filing date, September 12, 2006. For reference, this order reproduces the posts below:



Forum Post of "theboyg."



Forum Post of "JeffT."

(Google Br. 16–17). Did the Sonos 2005 system and the forum posts together render obvious the "zone scene" limitations? This order finds that genuine disputes of material fact preclude summary judgment of invalidity for obviousness over these two references.

C. LIMITATION 1.7.

By way of example, consider limitation 1.7. It recites a "zone player" that "receiv[es] . . . an indication that [it] has been added to a second zone scene comprising a second predefined grouping of zone players" ('885 patent 11:59–67). Note this second zone scene is different than the first zone scene to which the zone player is added in limitation 1.6 because it does not include at least one zone player in that first zone scene (*id*. at 11:53–58, 61–67).

Clearly limitation 1.7 was not satisfied by the Sonos 2005 system. A speaker in that system could not be added to two different predefined groupings of zone players. Even assuming *arguendo* that the party mode grouping of all speakers was a zone scene, a speaker could not be added to a second zone scene because no other groupings could be predefined. In other words, the Sonos 2005 system did not provide for saving additional, overlapping groups.

Google argues that the forum posts fill this gap. It emphasizes that "JeffT" expressly suggested adding functionality to include, *inter alia*, "2 party modes, Summer and Winter," where the Summer mode "would include the deck speakers and the Winter mode would not" (Google. Br. 19 (citing Almeroth Rebuttal Rpt. ¶ 192)). Mapping the forum post onto the language of limitation 1.7, it discloses a "zone player" that is "added to a second zone scene [Winter mode] comprising a second predefined grouping of zone players" (that is different than the first zone scene because Summer mode does not include the deck speakers). Although Sonos does not directly dispute that this forum post disclosed saving additional, overlapping groups, it takes issue with the fact that the forum post did not disclose the "indication," the "claimed communications between the zone players and controllers necessary for setting up and invoking zone scenes," among other specific terms in other specific limitations (Sonos Opp. 13–14). Yet such rigid adherence to the language of the claims is not required to show obviousness. Indeed, the Supreme Court has expressly cautioned against a "narrow conception of the obviousness inquiry" in favor of "an expansive and flexible approach." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 402, 415 (2007).

But Google is not out of the woods yet. After all, "[a] party seeking to invalidate a patent based on obviousness must demonstrate by clear and convincing evidence that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so." *Procter & Gamble*, 566 F.3d at 994. The Federal Circuit has recently emphasized the "clear distinction in [its] case law between a patent challenger's burden to prove that a skilled artisan would have been motivated to combine prior art references and the additional requirement that the patent challenger also prove that the skilled artisan would have

had a reasonable expectation of successfully achieving the claimed invention from the combination." *Eli Lilly & Co. v. Teva Pharms. Int'l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021). In other words, these are separate requirements. A finding that an alleged infringer has demonstrated a motivation to combine prior art references does not necessarily mean that the alleged infringer has also demonstrated a reasonable expectation of success in achieving the claimed invention by doing so. *Ibid.*

According to Google, "[b]ecause the Sonos forum posts expressly discuss modifying the Sonos 2005 system, there is a clear motivation to combine the prior art system and the users' suggested modifications to that system" (Google Br. 18). As Sonos observes, however, Google makes an analytical leap here, assuming that the existence of forum posts expressing motivation to combine prior art references means that a person of ordinary skill in the art would have had motivation to combine prior art references (Sonos Opp. 15). Worse, Google fails to address whether that person of ordinary skill in the art would have had a reasonable expectation of success in achieving the claimed invention. Indeed, it does not speak to reasonable expectation of success *at all*, even after Sonos pointed this out in its opposition (*ibid.*). Google has failed to meet its burden.

Recall, Sonos filed its provisional patent application directed to zone scene technology on September 12, 2006, and claims an earlier conception date of December 2005. The Sonos 2005 system was launched no later than January 2005 (Google Br. 16 (citing Almeroth Rebuttal Rpt. ¶ 265)). Users "theboyg" and "JeffT" weighed in later that year, on February 27, 2005, and September 22, 2005, respectively (Google Br. 16–17 (citing Almeroth Rebuttal Rpt. ¶ 193)). So did Sonos engineer Robert Lambourn, inventor of the '885 and '966 patents and Sonos's director of user experience design at the time. He sent an email to a colleague on April 11, 2005, suggesting two new approaches to grouping speakers, one of which "would allow a user with one click to put their Zones into predefined groups," like "downstairs," "upstairs," and "morning" (Lambourn Emails at 1). Lambourn then "began to design and develop [the] new technology" (Lambourn Decl. ¶ 13). But Sonos did not file the application that led to the '885 and '966 patents until April 12, 2019, and it did not release the zone scenes

feature (as "room groups") until 2020. What's more, Sonos points to a dozen articles from the likes of *CNN* and *Engadget* praising the introduction of this feature upon release (Sonos Opp. 19 (citing Almeroth Rebuttal Rpt. ¶¶ 1613–40)).

The Federal Circuit has "consistently pronounced that all evidence pertaining to the objective indicia of nonobviousness must be considered before reaching an obviousness conclusion." *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1355 (Fed. Cir. 2013). And "[s]econdary considerations evidence can establish that an invention appearing to have been obvious in light of the prior art was not and may be the most probative and cogent evidence in the record." *Apple Inc. v. Int'l Trade Comm'n*, 725 F.3d 1356, 1366 (Fed. Cir. 2013). Here, a reasonable jury could find that the gap in time and substantial praise demonstrate a person of ordinary skill in the art would not have had a reasonable expectation of success in achieving the claimed invention — even assuming that person would have been motivated to combine the teachings of the Sonos 2005 system with those of "theboyg" and "JeffT." Google will have to make its best case in front of a jury. A genuine dispute of material fact remains that precludes finding the asserted claim of the '885 patent invalid.

Google focuses its analysis on the '885 patent but attaches a "comprehensive chart identifying how the prior art that renders obvious the asserted claim of the '885 patent also renders obvious the asserted claims of the '966 patent" (Google Br. 20). Because this order has not found that prior art renders obvious the asserted claim of the '885 patent, it declines to reach the asserted claims of the '966 patent (or the acceptability of this chart). Google's motion as to the invalidity of the asserted claims of the '885 and '966 patents is **DENIED**.

3. GOOGLE'S MOTION: NO WILLFUL OR INDIRECT INFRINGEMENT.

Next, this order considers willful and indirect infringement. Google moves for summary judgment of no willful or indirect infringement of the '033, '885, and '966 patents. Because this order finds the asserted claims of the '033 patent invalid, it only considers this motion as to the '885 and '966 patents. Google's motion as to the '033 patent is **DENIED AS MOOT**.

According to Google, Sonos is no closer to providing evidence that Google had the required "knowledge of the patent," "knowledge of infringement," and "specific intent to

infringe at the time of the challenged conduct" than it was when an order dismissed Sonos's claims for willful and indirect infringement last March (Google Br. 24). *See Sonos*, 591 F. Supp. 3d at 643. As Google recognizes, however, a subsequent order allowed Sonos amend its pleadings in light of the "special twist" in this case: Google had commenced its own declaratory judgment action *before* Sonos filed its affirmative infringement action (Google Br. 24 (quoting *Sonos*, 591 F. Supp. 3d at 647)). Sonos argues that there remains a genuine dispute of material fact as to whether Google was at least willfully blind to its infringement.

Upon review, this order agrees with Sonos with respect to the '966 patent, which was asserted in Sonos's original complaint. Knowledge of infringement and specific intent may be inferred from circumstantial evidence. *Warsaw Orthopedic, Inc. v. NuVasive, Inc.*, 824 F.3d 1344, 1347 (Fed. Cir. 2016) (citing *Glob.-Tech Appliances, Inc. v. SEB S.A.*, 563 U.S. 754, 770–71 (2011)). Google had enough notice of this patent to file its own complaint for declaratory relief based on non-infringement and invalidity, and that would go a long way in supplying the knowledge and intent necessary for willful and indirect infringement — or so a jury could reasonably find based on the evidence in this record.

Such reasoning, however, has no bearing on the '885 patent, which issued roughly two months *after* all of this litigation began and was subsequently added. The undersigned previously allowed Sonos to amend its complaint to plead willful and indirect infringement of this patent as well based in large part on the "forty-day notice" between when Sonos allegedly provided Google a draft of its amended complaint during a meet-and-confer and when Sonos allegedly filed that amended complaint. *Sonos, Inc. v. Google LLC*, 2022 WL 2046828, at *3 (N.D. Cal. June 7, 2022). As pointed out by Google in its present motion, however, Sonos actually filed that amended complaint with its motion to amend a mere three days after the meet-and-confer (Google Reply Br. 15 (citing No. C 21-07559 WHA, Dkt. No. 39-1)). With that in mind — and without a showing of countervailing support drawing upon the more complete record — it can no longer be said that Google had a meaningful opportunity to investigate allegations of infringement of the '885 patent with the notice provided.

Because a genuine dispute of material fact remains as to whether Google committed willful or indirect infringement of the '966 patent, Google's motion as to willful and indirect infringement of the '966 patent is **DENIED**. Because Google has shown that there are no genuine disputes of material fact as to whether it committed willful or indirect infringement of the '885 patent, however, Google's motion as to willful and indirect infringement of the '885 patent is **GRANTED**.

4. SONOS'S MOTION: BREACH OF CONTRACT AND CONVERSION.

This order now turns to Sonos's motion for summary judgment on Google's claims of breach of contract and conversion, which derive from a 2013 collaboration agreement between the parties (SAC ¶¶ 85–97). According to Google, Sonos claimed as its own Google's intellectual property rights arising from Google's development work in integrating Google Play Music with Sonos speakers, even though their agreement gave Google intellectual property rights "'arising from or related' to 'any and all development work done by or on behalf of Google in creating the integrated offering'" (Google Opp. 1 (quoting Dkt. No. 479-4 § 3.4)). According to Sonos, however, it invented the "direct control" technology underlying that development work in 2011 when it filed the application (specification only) that led to the '033 patent, and Sonos never assigned intellectual property rights ostensibly arising from that application to Google in the 2013 agreement (Sonos Br. 1, 10–15). Sonos further argues that even if such development work *was* Google's intellectual property under the 2013 agreement — and Sonos would have breached that agreement and committed conversion when it filed the claims for the '033 patent in 2019 — the 2013 agreement had by then been superseded by another agreement such that there could be no breach (Sonos Br. 2, 15–16).

Google offered to "withdraw [these] claims without prejudice" to "streamline the issues for summary judgment and trial" if this order decided the asserted claims of the '033 patent are invalid, which it has (Dkt. No. 552). This order finds Google's suggested resolution appropriate to keep trial focused on what has always been the fulcrum of this dispute: patent infringement and associated defenses. Sonos's motion for summary judgment is therefore

DENIED AS MOOT, with the understanding that the breach of contract and conversion claims are out of the case.

5. GOOGLE'S MOTION: NON-INFRINGEMENT OF THE '885 AND '966 PATENTS BASED ON PURPORTED DESIGN-AROUND.

Lastly, this order circles back to Google's motion. After the prior order granted summary judgment of infringement of claim 1 of the '885 patent, Google apparently began changing its products and introducing a redesigned speaker that it disclosed to Sonos during discovery (Google Br. 20). Google contends that its redesigned speaker no longer infringes the asserted claim of the '885 patent — and cannot infringe the asserted claims of the '966 patent — because the redesigned speaker no longer operates in "standalone mode" after it is added to a new speaker group before that group is invoked (Google Br. 22). In brief, a speaker operating in standalone mode "is configured to playback media individually," and Google has added a new function to its source code ("StopCurrentApp()") that requires a redesigned speaker to stop playback before being added to a group ('885 patent 11:47–48; Google Br. 22). Sonos counters that the redesigned speaker continues to operate in standalone mode even under such circumstances and thereby continues to infringe the asserted claims of the '885 and '966 patents (Sonos Opp. 21, 23).

This order will not allow Google to cut to the front of the line in order to vet its purported design-around when so many questions of fact (and law) involving the original accused products remain. Experience teaches that the evaluation of redesigned products is aided by analysis of the main issues at trial, which will include the original speakers' infringement of the asserted claims of the '966 patent. Google will have to wait its turn. The redesigned speaker will be vetted in due course. Google's motion as to non-infringement of the asserted claims of the '885 and '966 patents based on its purported design-around is **DEFERRED**.

CONCLUSION

For the foregoing reasons, Google's motion for summary judgment is **GRANTED IN PART**, **DENIED IN PART**, and **DEFERRED IN PART**. Specifically, Google's motion as to invalidity of the '033 patent and no willful or indirect infringement of the '885 patent is

GRANTED. Google's motion as to invalidity of the '885 and '966 patents, and no willful or indirect infringement of the '966 patent is **DENIED**, whereas Google's motion as to no willful or indirect infringement of the '033 patent is **DENIED AS MOOT**. Google's motion as to non-infringement of the '885 and '966 patents based on a purported design-around is **DEFERRED**. Meanwhile, Sonos's motion for summary judgment as to Google's breach of contract and conversion claims is **DENIED AS MOOT**.

The issues now set for trial are: (i) Sonos's claim for infringement (direct, willful, and indirect) of the asserted claims of the '966 patent; (ii) Google's counterclaim for non-infringement of the asserted claims of the '966 patent; (iii) Google's counterclaims for invalidity of the asserted claims of the '885 and '966 patents; (iv) damages for infringement of the asserted claim of the '885 patent; and (v) any and all remaining issues in the entire case, except the undersigned will consider Google's purported design-around in a bench trial after the rest of the issues are tried before the jury.

This order hereby **CONSOLIDATES** this action and the related affirmative infringement action (No. C 21-07559 WHA) for the purpose of taking them to trial. If the parties object, they are ordered to show cause by **TUESDAY, APRIL 18, 2023, at 5:00 P.M.**

IT IS SO ORDERED.

Dated: April 13, 2023.

WILLIAM ALSUP
UNITED STATES DISTRICT JUDGE

United States District Court
Northern District of California

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SONOS, INC.,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

No. C 20-06754 WHA
No. C 21-07559 WHA

(Consolidated)

ORDER RE PROSECUTION LACHES AND POST-TRIAL MOTIONS

INTRODUCTION

In the lead-up to trial, all agreed that any remaining affirmative defenses would be decided by the judge after the jury verdict. Following a verdict in favor of the patent holder, the judge has now considered those defenses. Under the doctrine of prosecution laches, this order finds and holds that the patents in suit are **UNENFORCEABLE**.

The essence of this order is that the patents issued after an unreasonable, inexcusable, and prejudicial delay of *over thirteen years* by the patent holder, Sonos, Inc. Sonos filed the provisional application from which the patents in suit claim priority in 2006, but it did not file the applications for these patents and present the asserted claims for examination until 2019. By the time these patents issued in 2019 and 2020, the industry had already marched on and put the claimed invention into practice.

In fact, in 2014, five years before Sonos filed the applications and presented the claims, accused infringer Google LLC shared with Sonos a plan for a product that would practice what would become the claimed invention. The parties were exploring a potential collaboration, but it never materialized. Google then began introducing its own products that practiced the invention in 2015. Even so, Sonos waited until 2019 to pursue claims on the invention (and until 2020 to roll out the invention in its own product line). Because Sonos's applications for the patents in suit ostensibly descended from the 2006 provisional application, Sonos claimed a priority date before Google's disclosures and product releases. Once the patents in suit issued, Google's work putting the invention into practice fell under a cloud of infringement.

Trial brought to light what happened here. This was not a case of an inventor leading the industry to something new. This was a case of the industry leading with something new and, only then, an inventor coming out of the woodwork to say that he had come up with the idea first — wringing fresh claims to read on a competitor's products from an ancient application.

Even if the provisional application Sonos filed in 2006 or the corresponding non-provisional application Sonos filed in 2007 had actually disclosed the invention, that would be all the more reason to hold Sonos waited too long to claim it, to the prejudice of Google, not to mention other companies and consumers. But, as will be shown below, those applications failed to disclose the invention. What's more, in 2019, during the prosecution of the applications for the patents in suit, Sonos amended the specification to insert new matter, despite telling the patent examiner the inserted matter was not new. Under black letter patent law, that new matter necessarily sunk any claim of priority.

STATEMENT

This order constitutes findings of fact and conclusions of law, the affirmative defense of prosecution laches having been tried to the bench. All declarative statements herein are findings of fact.

The patents in suit are United States Patent Nos. 10,848,885 and 10,469,966. They generally concern managing groups of multimedia players (*e.g.*, "smart speakers") in a multiroom system. Much like how one can customize, save, and invoke groups of email

addresses from selected contacts with a name like "Ball Team" or "Band," the patents contemplate customizing, saving, and invoking groups of multimedia players from selected rooms with a name like "Morning" or "Downstairs." They refer to the multimedia players as "zone players" and the customized, saved groups of zone players that can be invoked on demand as "zone scenes." Specifically, the patents in suit claim devices that implement *overlapping* zone scenes, which share one or more zone players. Just as a single email address can be a member of "Ball Team" *and* "Band," a single zone player can be a member of "Morning" *and* "Downstairs."

This order will now walk through the relevant history, but a short synopsis helps.

Seeking to improve upon the wireless multiroom audio system it released in 2005, Sonos set out to patent zone scenes, *i.e.*, customized, saved groups of zone players that could be invoked on demand. Sonos filed a provisional application in 2006, a corresponding non-provisional application in 2007, and a daisy chain of continuation applications over the next decade. During the prosecution of those applications, however, the patent examiner insisted that the prior art had already disclosed this idea. Sonos's applications were repeatedly rejected, and Sonos only secured zone scene claims with variations of little consequence.

Then, in 2019, Sonos filed continuation applications for the patents in suit. To get around the prior art, Sonos sought to patent zone scenes with a new twist: overlap. With overlap, a zone player could be a member of more than one zone scene at the same time. This was thirteen years after Sonos filed the provisional application, but also five years after Google had *itself* disclosed overlapping zone scenes to Sonos, and four years after Google had released products that implemented the feature. Initially, Sonos's applications for the patents in suit were rejected on obviousness grounds. Yet after Sonos amended the applications to incorporate new specification language (with new matter) and narrowed claim language (with "standalone mode" limitations), they issued as patents. Sonos promptly asserted these patents against Google.

1. THE SONOS 2005 PRIOR ART SYSTEM.

At the turn of the century, home audio typically involved radios, turntables, and CD players in individual rooms. Although a lucky few had multiroom systems that allowed them to play the same music in more than one room, those systems required installers to pull wires through the walls and ceilings.

Founded in Santa Barbara in 2002, Sonos set out to make multiroom audio higher tech, lower cost, and more accessible by creating a wireless system built on computer networks and processors. It envisioned placing devices, called "zone players," in various rooms of the home to provide music for those rooms, or "zones." Each zone player would be connected to other zone players and to the internet using network technology, not wires, and operated using a hand-held controller with a screen, not an infrared remote control. A key feature of Sonos's vision was the ability to group zone players in different zones to play music in synchrony.

In 2003, as Rincon Networks, Sonos began designing hardware and writing software for its first wireless multiroom audio system. By summer 2004, it demoed product prototypes at the All Things Digital conference. And, by January 2005, Sonos shipped its first commercial wireless multiroom audio system. All agree that the system was prior art for our purposes. This order will refer to it as the Sonos 2005 prior art system. It consisted of the ZonePlayer 100 ("ZP100") and the Controller 100 ("CR100").

Readers familiar with Sonos's contemporary products should be mindful that these earlier products were different. The ZP100 was a wireless internet-connected "smart amplifier" rather than a smart speaker. Sonos's first zone players were wirelessly connected to other zone players and to the internet, but each one was still hard-wired to the speaker(s) it powered. Sonos released its first wireless internet-connected smart speaker in September 2014 (which, incidentally, did not practice the claimed invention; that did not occur until June 2020). Moreover, the CR100 was a discrete hand-held controller rather than an app on a mobile device. Recall, in 2005, the iPhone was still two years in the future. Sonos's first controller was its own hardware product with a non-touch screen and buttons that allowed a user to

manage zone players and music playback. Sonos released its first controller app for mobile devices (the iPhone and iPod Touch) in October 2008.

The Sonos 2005 prior art system made waves, drawing attention from the likes of Microsoft Cofounder Bill Gates at the flagship Consumer Electronics Show that year. Importantly, this first commercial wireless multiroom system allowed for grouping zone players in different zones to play music in synchrony. However, as Sonos Chief Innovation Officer Nicholas Millington and Sonos Director of User Experience Robert Lambourne both testified, this system had limitations in terms of how zone players could be grouped. Lambourne went on to be listed as the named inventor on the applications for the patents in suit and the applications from which they descend.

As stated, a key feature of Sonos's vision was the ability to group zone players in different zones to play music in synchrony. The Sonos 2005 prior art system achieved this using "ad hoc grouping," in which zone players were grouped on the fly. For a user to create a "zone group" in which selected zone players would play the same music at the same time, that user had to link a first zone player to one or more additional zone players, one at a time. The linked additional zone player(s) would be instantly configured to play music in synchrony with the first zone player as soon as the linking occurred. If a user then wanted to play music on a zone player within that zone group separately or in a new zone group, that user had to destroy the existing zone group by dropping one or more linked additional zone players, one at a time.

Significantly, "zone groups" were not "zone scenes." They did not allow a user to customize and save groups of zone players that could be invoked on demand. Nor did they allow a user to create a group of zone players that included one or more zone players from an existing group without destroying the existing group. In other words, zone groups could play different music simultaneously in different sets of zone players, but zone players could be members of only one zone group. Zone groups could not *overlap*.

To demonstrate, imagine a user of the Sonos 2005 prior art system had four zone players in four zones: one in her dining room, one in her living room, one in her bedroom, and one in her bathroom. Let's say she started out playing Joan Baez in her dining room. If she wanted

to play Joan Baez in her dining room *and living room* simultaneously, she would create a zone group by linking those zone players on her controller, selecting "Dining Room," then "Link Zone," and then "Living Room." "Living Room" would be instantly configured to play Joan Baez in synchrony with "Dining Room." If she paused, resumed, or changed the music, the music would be paused, resumed, or changed in the dining room and living room.

In the meantime, our user could play Bob Dylan in her bedroom. She could also play Bob Dylan in her bedroom *and bathroom* simultaneously, creating another zone group by linking those zone players on her controller, selecting "Bedroom," then "Link Zone," and then "Bathroom." "Bathroom" would be instantly configured to play Bob Dylan in synchrony with "Bedroom." At this point, our user would have two distinct zone groups: one composed of "Dining Room" and "Living Room" playing Joan Baez, the other composed of "Bedroom" and "Bathroom" playing Bob Dylan.

Say our user now wanted to listen to Joan Baez in her bedroom as well. She would first destroy the zone group composed of the zone players in her bedroom and bathroom by unlinking those zone players using her controller, selecting that zone group, then "Drop Zone," and then "Bathroom." She would then link the zone player in her bedroom to the zone group composed of the zone players in her dining room and living room by selecting that zone group, then "Link Zone," and then "Bedroom." "Living Room" *and* "Bedroom" would be instantly configured to play Joan Baez in synchrony with "Dining Room." This would create a *new, real-time* zone group composed of the zone players in her dining room, living room, and bedroom. The zone group composed of just the zone players in her dining room and living room would *no longer exist*.

Note the Sonos 2005 prior art system did not allow users to select multiple zone players and link or unlink them simultaneously. Users had to select individual zone players and link or unlink them one at a time. There was a way to link multiple zone players simultaneously in the Sonos 2005 prior art system, however. This was done using the built-in "All Zones-Party Mode" feature, "party mode" for short.

In the Sonos 2005 prior art system, "All Zones-Party Mode" was listed alongside available zone players under "Link Zone." When selected, it simultaneously linked *all* of the zone players in a given system (thereby destroying any ad hoc zone group). So, if our user was playing Joan Baez in her dining room and wanted to play Joan Baez throughout, she would simultaneously link all of the zone players in her system on her controller, selecting "Dining Room," then "Link Zone," and then "All Zones-Party Mode." "Living Room," "Bedroom," and "Bathroom" would be instantly configured to play Joan Baez in synchrony with "Dining Room." As explained by Inventor Lambourne, "[i]t was sort of a shortcut to grouping all of the rooms together" that "was baked into the product" (Tr. 420:9–10, 15). After selecting party mode, however, if a user wanted to play music on fewer than all of the zone players, there was no shortcut. That user would have to unlink individual zone players, one at a time. Thus, if our user wanted to play Joan Baez only in the dining room after selecting party mode, she would have to drop the zone players in the living room, bedroom, and bathroom, one by one.

Putting it all together, in the Sonos 2005 prior art system, the only way to link zone players simultaneously was using party mode, which linked all of the zone players. A user of the Sonos 2005 prior art system could not customize and save a group of zone players to invoke on demand, much less customize and save *multiple* groups of zone players *with one or more overlapping zone players* to invoke on demand.

2. THE IDEAS OF ZONE SCENES AND OVERLAPPING ZONE SCENES.

The grouping limitations of the Sonos 2005 prior art system led Sonos customers and employees to explore potential improvements.

A. CUSTOMER COMMENTS AND INVENTOR SKETCHES.

Not long after Sonos first shipped the Sonos 2005 prior art system, customers began posting comments on Sonos's own online forums calling for more advanced grouping functionalities.

On February 27, 2005, in a forum post titled "Virtual Zones and Zone Grouping," a customer going by the name of "theboyg" observed, "[t]his 'link/unlink' business is really cumbersome," and asked, "[w]hy can't I have a virtual zone — ie a zone called 'Downstairs'"

so that "I can group all my downstairs zones into this" and "I don't have to keep manually linking/unlinking multiple zones everytime" (TX2424). In other words, back in 2005, theboyg requested a customized, saved group of zone players that could be invoked on demand.

On September 22, 2005, in a forum post titled "Macro / presets," a customer going by the name of "JeffT" took it a step further, suggesting "save[d] Zone links," such as "Morning mode for the units I want in the morning," and "2 party modes, Summer and Winter," in which "[t]he Summer mode would include the deck speakers and the Winter mode would not" (TX3930). In other words, back in 2005, JeffT requested customized, saved, *overlapping* groups of zone players that could be invoked on demand.

Sonos did not introduce such grouping functionalities to its products until June 2020. Contemporaneously with these Sonos forum posts, however, Inventor Lambourne set forth parallel ideas in his notebooks and correspondence.

In one notebook sketch, Inventor Lambourne depicted an alarm clock feature that would allow a user to select music to wake up to and rooms to play that music in — a customized, saved group of zone players that could be invoked on demand. This sketch was undated, but the date listed two pages later was February 28, 2005, one day after theboyg's request for a "Downstairs" group (TX8236 at 40, 42). Shortly thereafter, in another notebook sketch, Inventor Lambourne depicted permanently joining one or more zone players together. This sketch was also undated, but the date listed on the following page was March 2, 2005 (TX6539 at 2–3).

The following month, Inventor Lambourne traded emails with a Sonos colleague, Andrew Schulert, about the grouping limitations of their own home systems. They compared the merits of Inventor Lambourne's proposed "Permanent Zone Groups" approach, in which zones could be configured to always appear as one entity, and Inventor Lambourne's proposed "Zone Profiles" approach, in which zones could be put into different customized, saved groups that could be invoked on demand, such as "downstairs" and "mornings." Inventor Lambourne observed that "making the UI [*i.e.*, user interface] simple enough" was a problem with the

proposed Zone Profiles approach. Colleague Schulert said his first reaction was that the Zone Profiles approach "would be the biggest bang for the buck" (TX0120 at 1).

And, on October 21, 2005, one month after JeffT's request for "Summer" and "Winter" groups, Inventor Lambourne sketched "Alarm Clock / Zone Profiles / Groups," with a circle that said, "group profiles," and text below it that said, "[p]ick a room group/profile, same room can be in two groups" (TX6539 at 24). That same day, he also sketched "Room Join Macros" illustrating "downstairs," "party mode," and "morning mode" alongside each other and a new group being formed, with text that explained "one room can be part of 2 sets" — customized, saved, *overlapping* groups of zone players that could be invoked on demand (TX6539 at 31).

B. THE UI DOCUMENTS.

On December 21, 2005, Inventor Lambourne wrote up a UI document setting out a path for new grouping functionality based on "zone scenes" (TX6545). He also wrote up another UI document focused on the alarm clock feature, which referred to "zone scenes" (TX6544 at 27). Although the UI documents look like user manuals, they were internal, exploratory documents, for Sonos use only. The UI documents were supplied to the jury and the judge as conception documents because the parties stipulated that they disclosed the claimed invention. This order accepts this stipulation without weighing in on the adequacy of the disclosure. As such, the stipulated conception date is December 21, 2005.

Relevant here, the zone scenes UI document offered two improvements to the grouping functionality of the Sonos 2005 prior art system. *First*, it described "zone scenes," *i.e.*, customized, saved groups of zone players that could be invoked on demand. *Second*, it described a nimbler form of ad hoc grouping.

Let's start with "zone scenes." According to the zones scenes UI document, "[t]he Zone Scene feature" would "allow[] the user to arrange the zones into groups using one single command" (TX6545 at 2). "Simple Scenes" would allow a user to set up one group in a zone scene. The document gave the example of a "Morning Scene" that could group zone players in the bedroom, den, and dining room, while leaving the remaining zone players in the bathroom, family room, and foyer untouched (*id*. at 2). "Advanced Scenes" would allow a user to set up

more than one group in a zone scene. The document gave the example of an "Evening Scene" that could group zone players in the bedroom, den, and dining room — and, separately, the garage and garden — with the remaining zone players in the bathroom, family room, and foyer "separated from any group if they were part of a group before the Zone Scene was invoked" (*id*. at 2–3).

The zone scenes UI document *explicitly disclosed* customizing and saving a group of zone players that could be invoked on demand like "Morning Scene" and "Evening Scene." It also explicitly disclosed customizing and saving several such groups, depicting selection from a "Party Mode" zone scene and a "Morning Wakeup" zone scene in one instance, as well as from a "Party Mode" zone scene, a "Wakeup" zone scene, and a "Garden Party" zone scene in another (*id*. at 5–6). But the zone scenes UI document *did not explicitly disclose* customized, saved, *overlapping* groups of zone players that could be invoked on demand. Whereas Inventor Lambourne's notebook sketches had text that stated the "same room can be in two groups" and "one room can be part of 2 sets," no such text can be found in the zone scenes UI document (*see* TX6539 at 24, 31). Note "Morning Scene" and "Evening Scene" belonged to different systems, with the system in which "Evening Scene" was created containing additional zone players in the garage and garden. Similarly, there was no explicit disclosure of customized, saved, overlapping groups of zone players that could be invoked on demand in the alarm clock UI document.

So how did the UI documents disclose the claimed invention? They *implicitly disclosed* overlapping zone scenes by reference to party mode in the Sonos 2005 prior art system. Significantly, the alarm clock UI document stated that "'Party Mode' that currently ships with the product is one example of a Zone Scene" (TX6544 at 27). The zone scenes UI document similarly referred to the "current Party Mode setting" and represented "Party Mode" as a "Zone Scene" in various figures (TX6545 at 2; *see id*. at 5–6). When the zone scenes UI document showed a "Party Mode" zone scene next to a "Morning Wakeup" zone scene in one instance, and a "Party Mode" zone scene next to "Wakeup" and "Garden Party" zone scenes in another, it would have been understood that zone scenes would overlap because it would have been

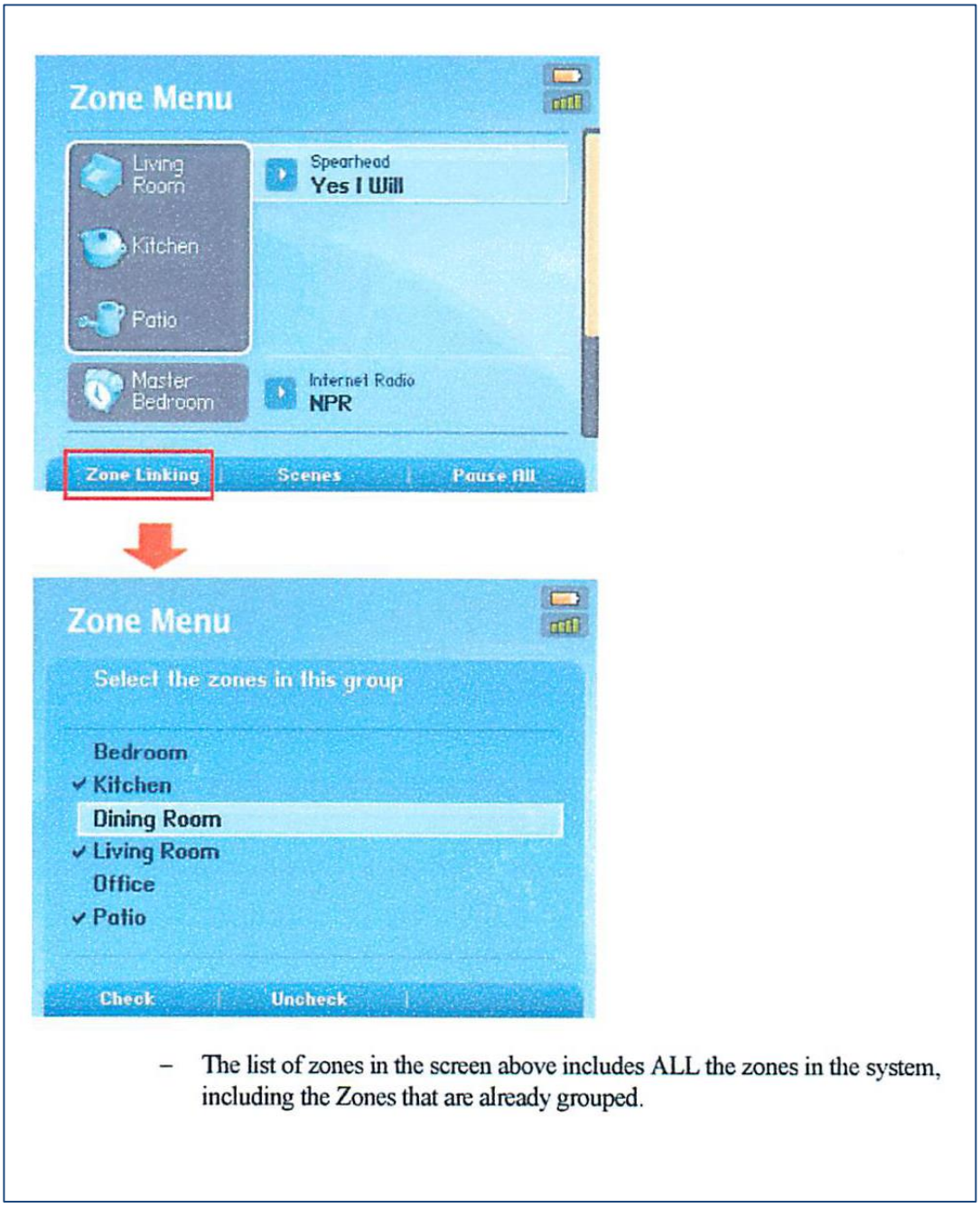
understood that the "Party Mode" zone scene would group all of the zone players in a given system. As such, the UI documents implicitly disclosed customized, saved, overlapping groups of zone players that could be invoked on demand. To be sure, this disclosure depended on inference, but both sides stipulated that the UI documents disclosed the claimed invention. Accordingly, this order credits the implicit disclosure.

* * *

The zone scenes UI document had distinct sections on "Invoking a Scene," showing "various user Interface methods for invoking a configuration on a Handheld Controller or Desktop Controller," versus "Scene Setup," showing various user interface methods for configuring a zone scene from a desktop controller only. According to this document, it was "not expected that the Zone Scenes should be set up using the Handheld Controller" (*id*. at 5, 9).

Meanwhile, the zone scenes UI document had a distinct section on "Alternative Linking Methods," which showed an "adaptation of the Link and Drop Zone feature" of the Sonos 2005 prior art system, *i.e.*, ad hoc grouping (*id*. at 17–18). Whereas the zone scene feature would allow for groups of zone players to be set up *in advance* on a *desktop controller*, this "Zone Linking" feature would allow for groups of zone players to be set up *in real-time* on a *handheld controller*. It pertained to ad hoc "zone groups," *not "zone scenes."* This ad hoc grouping was an improvement over the ad hoc grouping in the Sonos 2005 prior art system, however.

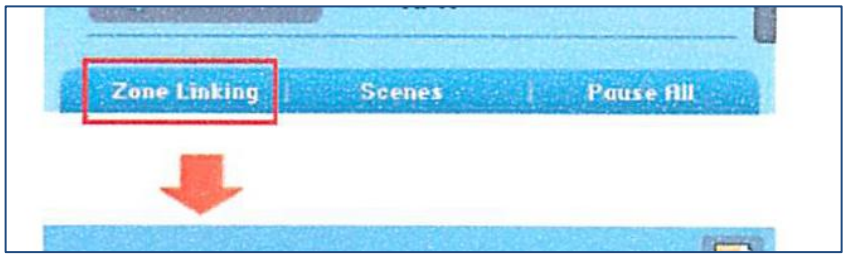
Whereas the ad hoc grouping in the Sonos 2005 prior art system "allow[ed] the user to link and drop Zones *one at a time*," "[t]his feature would allow the user to link and drop *multiple* zones in one screen," "check[ing] Zones that w[ould] be a part of a zone group, and uncheck[ing] those that w[ould not]" (*ibid*.) (emphasis added). Here, "the list of the zones in the screen" would "include[] ALL the zones in the system, including the Zones that [were] already grouped" (*id*. at 17). This would allow for more efficient ad hoc grouping. The "Zone Linking" feature was depicted as follows:



Zone Scenes UI Document: "Zone Linking" Feature Diagram.

(*ibid.*).

To repeat, "Zone Linking," as depicted above, was ad hoc grouping, not "Scene Setup." Ad hoc "zone groups" were not "zone scenes." They were addressed in different sections in the zone scenes UI document and even accessed using different soft buttons on the handheld controller. By way of demonstration, the diagram is cropped below:



Zone Scenes UI Document: Cropped "Zone Linking" Feature Diagram (Soft Buttons).

The complete diagram will become all the more important later on in connection with the issue of new matter inserted by way of amendment.

3. THE FIRST ZONE SCENE PATENT APPLICATIONS.

The patents in suit descend from a family of patent applications that claim priority to, or the benefit of, a provisional application filed in September 2006 through a corresponding non-provisional application filed in September 2007. September 2006 was more than one year after the commercial release of the Sonos 2005 prior art system but less than one year after the stipulated conception date. Each of the earlier applications in the "zone scene patent family" is "incorporated by reference in its entirety for all purposes" in its successors, including the patents in suit.[1]

[1] Specifically, the April 2019 applications for the '885 and '966 patents were continuations of, and claimed priority to, an application filed in April 2016, which issued in July 2022 as United States Patent No. 11,388,532. The April 2016 application for the '532 patent was a continuation of, and claimed priority to, an application filed in August 2014, which issued in May 2016 as United States Patent No. 9,344,206. The August 2014 application for the '206 patent was a continuation of, and claimed priority to, an application filed in May 2013, which issued in September 2014 as United States Patent No. 8,843,228. The May 2013 application for the '228 patent was a continuation of, and claimed priority to, an application filed in September 2007, which issued in July 2013 as United States Patent No. 8,483,853. And, the September 2007 application for the '853 patent claimed priority to a corresponding provisional application filed in September 2006 as United States Patent Application No. 60/825,407.

The prosecution histories of the applications for the patents in suit are in the trial record, abridged to exclude tens of thousands of pages of prior art references and other publications (gratuitously) submitted (*see* TX004; TX006). The prosecution histories of the parent applications in the patent family are not in the trial record, though the parties provided excerpts in binders requested by the judge during trial (*see* Tr. 1030:13–19). The same holds for the resulting patents (*ibid.*). Seeing that the judge must consider these prosecution histories and patents in order to evaluate arguments raised herein, this order takes judicial notice of these prosecution histories and patents.[2]

A. THE 2006 PROVISIONAL APPLICATION.

On September 12, 2006, Sonos filed a "provisional application," with Inventor Lambourne listed as the named inventor, entitled "Controlling and manipulating groupings in a multi-zone music or media system" (TX2651). A provisional application is a temporary form of patent application that is not required to include any patent claims or information disclosure (prior art) and is never reviewed by a patent examiner. It operates as a low-cost placeholder, establishing an earlier effective filing date for a corresponding non-provisional application filed within twelve months that claims its subject matter. Although a provisional application is never "published" or made publicly searchable, it is "made available to the public" as an individual file when a corresponding non-provisional application is published, as one was here eventually.[3]

The specification of this provisional application consisted of a "Detailed Description of the Preferred Embodiments," an assortment of implementations involving zones, zone players, zone groups, and zone scenes. It was drafted broadly. Many described embodiments did not relate to zone scenes at all, such as those in which "memory is used to save one or more saved

[2] Courts may judicially notice facts that "can be accurately and readily determined from sources whose accuracy cannot reasonably be questioned." Fed. R. Evid. 201(b)(2). Patents and prosecution histories are public records. *Boyden v. Burke*, 55 U.S. 575, 576 (1852); *Data Engine Techs. LLC v. Google LLC*, 906 F.3d 999, 1008 n.2 (Fed. Cir. 2018). They can be accessed using the Patent Center tool on the Patent and Trademark Office website.

[3] *See* 35 U.S.C. § 122(b)(2)(A)(iii); 37 C.F.R. § 1.14(a)(1)(iv). Today, the individual files are accessible using the Patent Center tool.

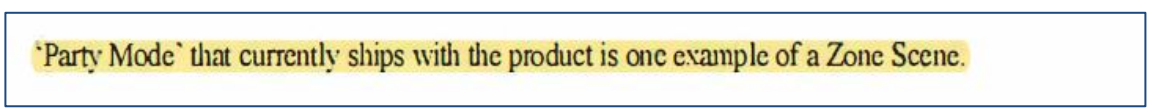
zone configuration files that may be retrieved for modification at any time" and in which "a user creates a zone group including at least two zone players from the controller that sends signals or data to one of the zone players" (TX2651 at 15, 19). In any event, the specification of the provisional application eventually described zone scene technology as follows:

> According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to as a zone scene or scene, zones can be configured in a particular scene (*e.g.*, morning, afternoon, or garden), where a predefined zone grouping and setting of attributes in for the grouping are determined.

(*id*. at 21). It also described an "extension of this embodiment to trigger a zone scene command as an alarm clock function" (*id*. at 22). The provisional application did not include any claims.

It did include two sizable appendices, however. Each appendix was "annexed" to the specification to "provid[e] examples to teach and refer to various features, detailed designs, uses, advantages, configurations and characteristics in one embodiment of the present invention" (*id*. at 22–23). At first glance at trial, Appendix A and Appendix B looked identical to the aforementioned zone scenes UI document and alarm clock UI document, respectively (*compare* TX6545 *and* TX6544, *with* TX2651 at 29–48 *and id*. at 49–81). Yet, as was discovered at trial and will be taken up below, the UI documents were *altered* before they were annexed to the provisional application specification. In particular, one sentence was omitted from the second page of the zone scenes UI document (*compare* TX6545 at 2, *with* TX2651 at 30). Meanwhile, the alarm clock UI document nearly doubled in size, but the page on zone scenes was left out (*compare* TX6544 at 27, *with* TX2651 at 49–81).

Keep in mind that the highlighted language was excluded from the UI documents when they were submitted as appendices to the provisional application specification:



Alarm Clock UI Document, Language Omitted from Appendix B Highlighted.

> The Zone Scene feature allows the user to arrange the zones into groups using one single command. This is similar to the current Party Mode setting that is available. However, the Zone Scene feature is much more flexible and powerful.

Zone Scenes UI Document, Language Omitted from Appendix A Highlighted.

(TX6544 at 27; TX6545 at 2). Significantly, whereas both sides agree that the original UI documents disclosed the claimed invention, they dispute whether the provisional application, with these altered versions of the UI documents appended, did so.

B. THE 2007 NON-PROVISIONAL APPLICATION.

On September 11, 2007 — one day short of twelve months after the provisional application was filed — Sonos filed a corresponding non-provisional application with Inventor Lambourne listed as the named inventor, likewise entitled "Controlling and manipulating groupings in a multi-zone music or media system." This non-provisional application "claim[ed] the benefits of the provisional application" that it "incorporated by reference for all purposes" ('853 patent cross reference to related application). Because the non-provisional application was filed with a request for nonpublication, it was not published until it issued as United States Patent No. 8,483,853 on July 9, 2013. Although this patent has never been asserted against Google or others, its prosecution set a pattern for its descendants.

Like the provisional application, the non-provisional application was drafted broadly. The specification explained that "the present invention pertain[ed] to controlling a plurality of multimedia players, or simply players, in groups" ('853 patent 2:21–22). But it also described, "[a]ccording to one aspect of the present invention, a mechanism . . . to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone," and, "[a]ccording to another aspect of the present invention, the scene [being] activated at any time or a specific time" and "used as an alarm" (*id*. at 2:23–26, 31–32, 36). In addition to including patent claims, the non-provisional application included an abstract, a background of the invention, a summary of the invention, a brief description of the drawings, and several new drawings.

On March 8, 2011, the non-provisional application received a non-final rejection from the Patent and Trademark Office, as the patent examiner found that all of its claims were anticipated by another Sonos patent, with CIO Millington listed as the named inventor, published on February 10, 2005. A few months later, on July 7, 2005, following an interview with the patent examiner, Sonos requested reconsideration and amended the non-provisional application "to provide an updated claim set directed to a certain set of embodiments," apparently those involving zone scenes. Even so, on October 13, 2011, the non-provisional application received a final rejection from the PTO, as the patent examiner found the new claim set unpatentable over a user manual for the Yamaha Digital Mixing Engine ("DME") 32 system, another "media player and controller" that was "functional in the manner claimed" (Final Rejection, Oct. 13, 2011, at 3). This order will refer to the user manual as the Yamaha DME prior art.

According to the patent examiner, the Yamaha DME prior art taught, *inter alia*, "user interface functions to graphically configure plural audio processor scenes and configurations upon a plurality of cascaded i/o interfaces," as well as "storage and recall of scenes and configurations comprising specific operation parameters," "including synchronization and connections among plural networked audio processors" (*ibid.*). This was the first rejection based on the Yamaha DME prior art in the patent family, but it would not be the last. Over the years, the very same patent examiner would go on to reject the applications for the patents in suit and *every single parent application* — often more than once, and often with nearly identical language — based on the Yamaha DME prior art.

After this "final rejection," having initially declined to amend its claims while seeking continued examination on December 13, 2011, Sonos narrowed them considerably in an amendment submitted on February 7, 2012, and the patent examiner issued a notice of allowance on April 18, 2013. The first zone scene patent issued as the '853 patent on July 9, 2013, at which point it was published and the provisional application from which it descended was made available to the public. Critically, the '853 patent did not claim customized, saved,

overlapping groups of zone players that could be invoked on demand. As stated, the '853 patent has never been asserted against Google (or others).

4. GOOGLE'S DISCLOSURE AND IMPLEMENTATION OF OVERLAPPING ZONE SCENES.

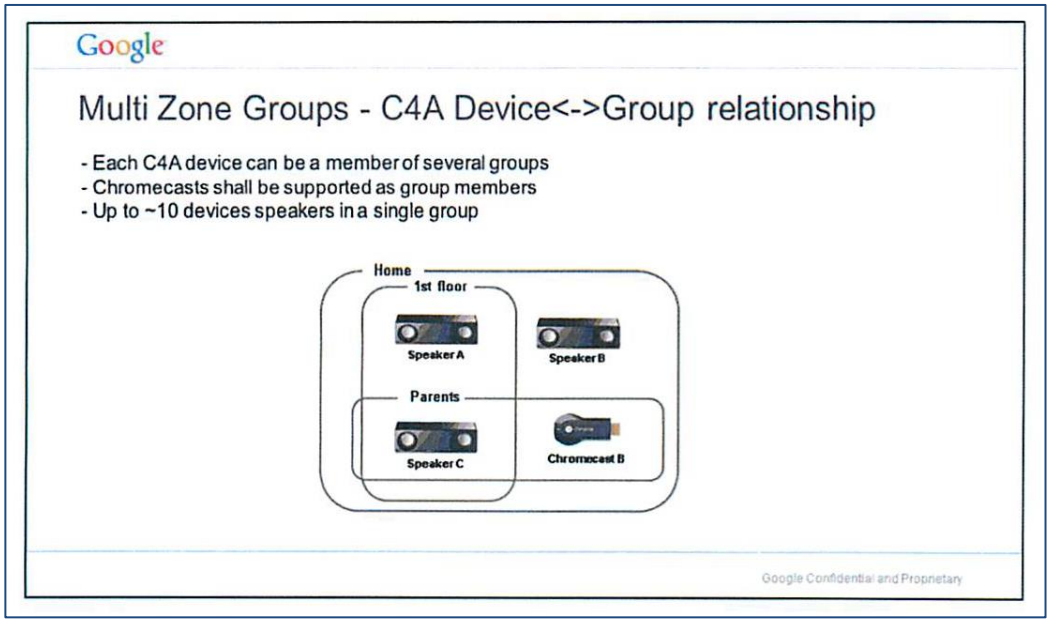
Just before the '853 patent issued, Sonos and Google employees exchanged a series of emails that gave rise to meetings between the two companies. By now it was 2013. Smartphones had taken hold, music and video streaming was taking off, and both sides saw that they stood to gain from working with each other. Having just launched a digital music service, Google Play Music, Google was eager to integrate it with Sonos products. Meanwhile, having waited many years for "streaming music adoption to really become a thing," as Sonos General Counsel Alaina Kwasizur put it at trial, Sonos was eager to make more digital music services accessible on its products to further cement its position as the leader in wireless multiroom audio (Tr. 1010:3). Audio-focused competitors Bluesound and Denon would release competing products in 2013 and 2014.

According to CIO Millington's testimony, seeing that "one of the key purposes" of Sonos products "was to play streaming music services from the internet," Sonos personnel "had kept in touch over the years with some Google personnel who were working on . . . Google's music services" (Tr. 299:18–20). Shortly after Google Play Music launched on May 15, 2013, CIO Millington sent Google Engineer Chris Yerga an email congratulating him on the launch and complimenting him that it had been well received. Engineer Yerga wrote back that he was a fan of Sonos and that he wanted to talk about bringing Sonos and Google together with respect to the new digital music service. So, that July, the parties held a meeting to discuss how Google Play Music could be made available to Sonos users. At this meeting, Sonos shared its hardware products and its application programming interface used to integrate digital music services. More fawning followed, with Google Engineer Debajit Ghosh emailing his positive feedback, telling CIO Millington that Sonos had built "an incredible product" (TX359).

The following year, in July 2014, the parties held another meeting at which Google pitched a new collaboration — participation in the Cast for Audio program. At this meeting, Google shared its vision (and a "Confidential and Proprietary" slide deck) for providing a

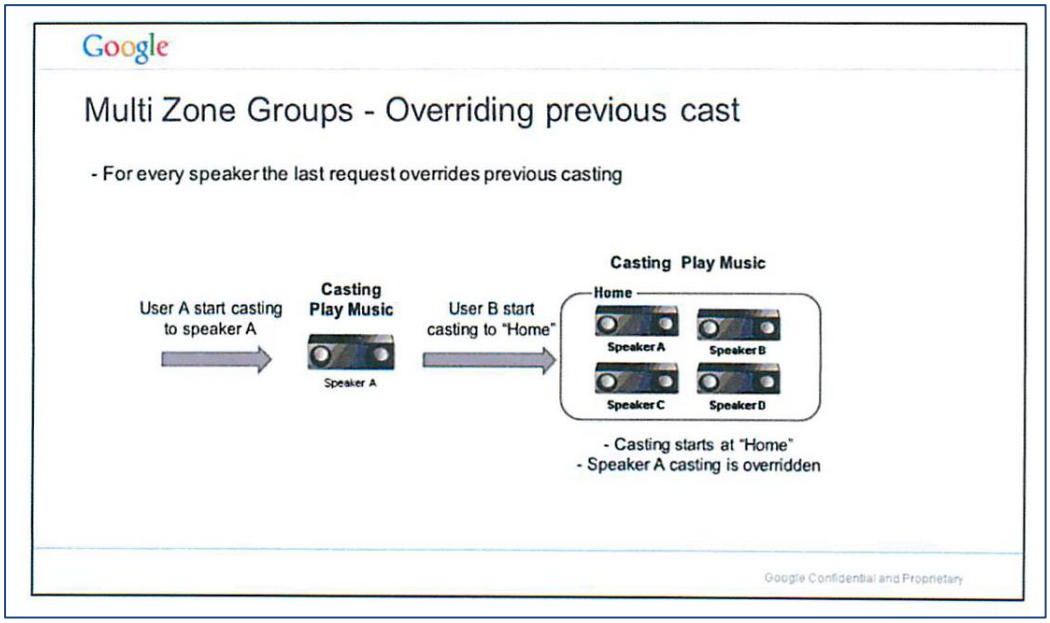
simple, standardized platform that would connect devices that played music with devices that controlled streaming apps. This stood to help audio device manufacturers used to supporting music playback from traditional sources like radio broadcast and CDs, as well as streaming companies experiencing challenges integrating their apps with the wide variety of audio devices on the market. It also stood to help consumers bearing the brunt of incompatibility — Google's proposed program would have been cross-brand, supporting products from different manufacturers (*see* TX0125 at 3–4). Using Google's Cast for Audio software, an audio device manufacturer like Sonos would have been able to make its devices compatible with third-party audio devices and third-party streaming apps.

Notably, in pitching Cast for Audio to Sonos, Google shared plans for a "Cast Multi-Zone feature" (TX0125 at 5). Several presentation slides focused on "Multi Zone Groups" (*id.* at 17–22). Specifically, one slide explained that each Cast for Audio device would "be a member of several groups," *e.g.*, "1st floor" and "Parents" (*id.* at 18). In other words, Google directly revealed to Sonos its plans to create a product that would implement *customized, overlapping groups* of multimedia players:

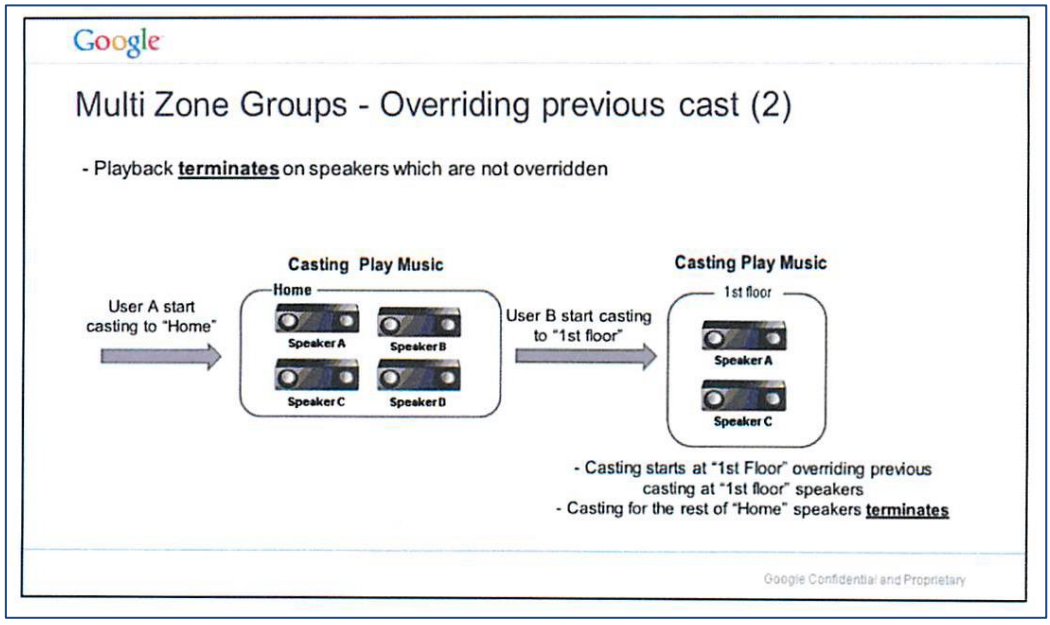


Cast for Audio Slide Deck: Customized Overlap.

(*ibid*.). Moreover, other slides showed a user continuing to play music on one multimedia player individually (*e.g.*, "Speaker A") before that player was invoked in a group (*e.g.*, "Home"), and a user continuing to play music on multimedia players in one group (*e.g.*, "Home") before some configuration of those players was invoked in another group (*e.g.*, "1st Floor"). In other words, Google directly revealed to Sonos its plans to create a product that would implement *saved* groups of multimedia players that could be *invoked on demand*:



Cast for Audio Slide Deck: Save & Invoke I.



Cast for Audio Slide Deck: Save & Invoke II.

(*id*. at 24–25). All told, at this meeting, Google decisively disclosed to Sonos its plans to create a product that would implement customized, saved, overlapping groups of multimedia players that could be invoked on demand — plans to practice what would become the claimed invention of the patents in suit.

Recall, at that time, Sonos products were themselves still incapable of practicing the invention. Zone players remained "smart amplifiers" hard-wired to one or more speakers; Sonos did not launch its first smart speaker until a few months after this presentation in September 2014, and it did not roll out the invention in its own products until June 2020. Sonos said nothing to Google about infringement of its patents or potential patents.

In the end, Sonos did not participate in the Cast for Audio program, which failed to materialize. But soon, as General Counsel Kwasizur explained, "we started to see big technology companies . . . showing up in our neighborhood" (Tr. 297:16–18). In December 2015, Google entered the wireless multiroom space with two new Chromecast devices. It is undisputed that these devices were released with the accused functionality. According to Sonos, they practiced the invention. In November 2016, Google launched its first smart speaker product, the Google Home, and in October 2017, it went on to launch another, the Google Home Mini. It is likewise undisputed that these products, and several other Google products that followed, were released with the accused functionality. According to Sonos, they too practiced the invention. Around this time, Amazon and Apple were also entering the fray, releasing their own smart speakers in 2017 and 2018, respectively, which presumptively were released with the accused functionality as well. Many consumers sought out products offered by Google, some on account of lower prices, others on account of voice-assistive technology and integration with the Google ecosystem.

5. THE PATENTS IN SUIT.

In order for a patent holder to claim priority to a provisional application, it must claim priority to an intermediate non-provisional continuing application that is copending, *i.e.*, not yet patented or abandoned. Although the April 2019 applications for the patents in suit were not themselves copending with the September 2006 provisional application, they were

copending with the September 2007 non-provisional application that claimed priority to it through a daisy chain of continuation applications. A pattern developed. Just before a patent would issue, Sonos would file another continuation application to keep the daisy chain alive.[4]

By November 2018, Sonos had three "zone scene patents" — the '853 patent, which issued on July 9, 2013; United States Patent No. 8,843,228, which issued on September 23, 2014; and United States Patent No. 9,344,206, which issued on May 17, 2016. It had yet to assert any of them. Those patents did not claim overlapping zone scenes. And, recall, zone scenes were already disclosed by the prior art. As such, those patents claimed niche variations of little consequence. For example, in the reasons for allowance of the '206 patent, the patent examiner observed that "[t]he prior art does not reasonably teach a loudspeaker system wherein a first independent playback device in the form of a networked loudspeaker or networked master loudspeaker is polled or subject to discovery to determine a zone scene configuration or plurality thereof . . . . " (Notice of Allowance, Jan. 20, 2016).

Sonos also had a further application pending, which served as the parent application for the patents in suit. This application ultimately issued after them as United States Patent No. 11,388,532 on July 12, 2022. On November 14, 2018, however, Sonos had just received a final rejection of that application from the PTO, once again on account of the Yamaha DME prior art. This was the same prior art that had been relied upon by the same patent examiner in initially rejecting all of the parent applications in the family.

According to the patent examiner, Yamaha "DME cause[d] an indication to be displayed which [wa]s provided by the utility of an open or new command sufficient to open or create a zone scene for instantiation on the plurality of playback devices" and "a particular configuration of players" (Final Rejection, Nov. 14, 2018, at 5). He observed that this was "substantially similar to the disclosed invocation of a scene such as upon the instant disclosed players upon the event of a stored alarm configuration," which, the "Examiner must point

[4] In fact, it remains alive today. There is a pending application, filed one day before the parent application of the patents in suit issued as its own patent, sixteen years after the provisional application (*see* United States Patent Application No. 17/861,882).

out . . . [was] the extent of the indication disclosed by the [preceding] applications" (*id*. at 6). The examiner then emphasized that "it would have been obvious to one of ordinary skill in the art on or before the effective priority date of the instant application to operate the DME disclosed displayed selectable indicators to cause one or more zone scenes to be invoked on two or more playback devices," "[a]s this would comprise no more than a choice between a finite number of identified predictable solutions" (*id*. at 7). According to the patent examiner, based on the Yamaha DME prior art, it would have been obvious to customize, save and invoke groups of zone players on demand. Zone scenes remained obvious.

To get around this, and to secure patents that would read on the products of the big technology companies who had shown up in the neighborhood, Sonos reframed the invention it attempted to claim in the '532 patent. On March 21, 2019, in a request for reevaluation, Sonos for the first time made the argument that the Yamaha DME prior art had not disclosed customizing, saving, and later invoking *overlapping* zone scenes, "wherein the zone configuration data characterizes two or more zone scenes, wherein a first zone scene identifies a first group configuration *including the first independent playback device and a second independent playback device*, and wherein a second zone scene identifies a second group configuration *including the first independent playback device but not the second independent playback device*" (Remarks Made in Amendment, Mar. 21, 2019, at 8–9). Sonos concurrently amended the claim language to refer to "two or more" zone scenes instead of "at least one" (Claims, Mar. 21, 2019; *see, e.g.*, *id*. at 2).

Then, on April 12, 2019, less than a month after filing its request for reevaluation and amendment of the application for the '532 patent, Sonos filed the continuation applications for the patents in suit, the '885 and '966 patents (TX003; TX001). Unlike the prior applications in the family, these two applications were filed "Track One" for prioritized (expedited) examination, and they were filed with a combined 70,000 pages of disclosures — even though the patent examiner's rejections had only rested on one prior art publication, either alone or in combination with a few other prior art publications, over the course of the last thirteen years. (Those disclosures explain the twenty-six pages of "References Cited" at the beginning of the

'885 patent, and the eighteen pages of "References Cited" at the beginning of the '966 patent.) Whereas the '885 patent claimed the technology from the perspective of a zone player (*e.g.*, a smart speaker), the '966 patent claimed the technology from the perspective of a computing device that controlled at least three zone players (*e.g.*, a smartphone).

Like the other applications in the patent family, the applications for the patents in suit claimed priority to the 2006 provisional application and incorporated it by reference, but they also contained new abstracts that expressly highlighted overlapping zone scenes. Specifically, the applications described the creation of "a first zone scene including a first preconfigured grouping of zones" with a "first zone" and "second zone," creation of "a second scene including a second preconfigured grouping of zones" with a "first zone" and "third zone," and an instruction invoking one of those zone scenes that causes the zones to be "configured" for synchronous playback (TX0004 at 4703; TX0006 at 43). They also included claims that expressly called for groups of zone players that shared a zone and thereby attempted to claim overlapping zone scenes (TX0004 at 4696–4702; TX0006 at 35–42).

On July 5, 2019, Sonos received non-final rejections for both of these new applications from the PTO, again, on account of the Yamaha DME prior art. The patent examiner observed that "while DME does not explicitly teach the inclusion, exclusion etc, of particular enumerated first, second, etc. players of the set of available players to form, create, save, recall etc. a particular first, second etc. grouping[,] Examiner takes official notice that the grouping and sub-grouping of a constellation of audio players was well known" and that the "DME system enables the practice of the claimed subject matter without undue experimentation" (TX0004 at 4577; TX0006 at 3804). In other words, not only were zone scenes obvious, so were overlapping zone scenes. In its response, Sonos did the following.

First, Sonos amended the *claims* of both applications to clarify that "the first zone player" would operate "in a standalone mode in which" it was "configured to play back media individually . . . until a given one of the first and second zone scenes has been selected for invocation," at which point it would transition out of standalone mode to play music in synchrony with one or more zone players (TX0004 at 810–12; TX0006 at 4087–88; *see*

generally TX0004 at 810–20; TX0006 at 4087–4100). In essence, the standalone mode limitations provided (slightly) more detail on implementing overlap, thereby narrowing the proposed claims to evade prior art.

Second, Sonos amended the *specification and figures* of both applications (TX0004 at 808–09; TX0006 at 4085–86). Ordinarily, an applicant can only amend continuation applications to pursue new claims for subject matter previously disclosed; the idea is that, because all of the subject matter was previously disclosed in a parent application, the new claims should be entitled to that parent application's earlier effective filing date. But 37 C.F.R. Section 1.57(g) provides for an exception. Specifically, it provides for the insertion of material incorporated by reference into the specification or drawings of a continuation application by way of amendment when that amendment is accompanied by a statement that the material being inserted is material previously incorporated by reference *and that the amendment contains no new matter*.

Pursuant to that regulation, on August 23, 2019, Sonos claimed to "insert material into the specification and figures that was previously incorporated by reference in this application" (TX0004 at 821; TX0006 at 4101). In doing so, it represented that "the amendment contain[ed] no new matter" and that "the inserted material c[ould] be found at least at pp. 5–6 and 17 of Appendix A to [the] provisional application," "the entirety of which was incorporated by reference on the filing date of this application" (*ibid.*). Again, whether there was indeed new matter has become important here and will be addressed below.

On Sonos's representation that its amendment to the specification and figures contained no new matter, the patent examiner allowed the amendments to the applications for the patents in suit (and the application for the '532 patent). The '966 patent issued on November 5, 2019, and the '885 patent issued on November 24, 2020.

6. OUR LITIGATION.

On September 29, 2020, Sonos sued Google for patent infringement in the Western District of Texas. One day before, Google sued Sonos for declaratory relief in the Northern District of California. And, one year later, the infringement action was transferred to this

district at the direction of the Federal Circuit. The civil actions were related and ultimately consolidated for trial.[5]

Originally, Sonos asserted five patents, including the '966 patent and one of its predecessors, the '206 patent. But after Judge Alan Albright indicated that he was inclined to find the '206 patent claims indefinite shortly before the infringement action was transferred, Sonos opted to dismiss its infringement claims based on the '206 patent. It asserted the '885 patent instead, which had just issued.

Here, summary judgment motions whittled down the actions. By the time of our trial in May 2023, they turned on the '885 and '966 patents. With respect to the '885 patent, Sonos asserted claim 1 and accused Google media players (*e.g.*, a Google Nest Mini speaker). With respect to the '966 patent, Sonos asserted claims 1, 2, 4, 6, and 8, and accused all smartphones and other computing devices that have or had the Google Home app installed (*e.g.*, an iPhone with the Google Home app).[6] After an order found claim 1 of the '885 patent infringed, Google implemented a redesign that it disclosed to Sonos during discovery. On account of this redesign, it contended that the accused products no longer infringed the asserted claims of either patent.

The issues tried by the jury were: (1) Sonos's claim for direct infringement of claim 1 of the '885 patent with respect to the redesigned accused products, and Google's associated non-infringement and invalidity defenses; (2) Sonos's claim for direct, indirect, and willful infringement of claims 1, 2, 4, 6, and 8 of the '966 patent with respect to the original and redesigned accused products, and Google's associated non-infringement and invalidity

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[5] Prior orders have described the twists and turns of our entangled actions in greater detail. *See Sonos, Inc. v. Google LLC*, No. C 20-06754 WHA, 2023 WL 2962400, at *1, 19 (N.D. Cal. Apr. 13, 2023); *Sonos, Inc. v. Google LLC*, 591 F. Supp. 3d 638, 641 (N.D. Cal. 2022), *leave to appeal denied*, 2022 WL 1486359 (Fed. Cir. May 11, 2022).

[6] At trial, contrary to Sonos's position, the judge ruled that the mere installation of the Google Home app on a computing device did not itself infringe, and that Google was incapable of infringing the '966 patent unless the accused products were networked with at least three zone players that might be added to overlapping zone scenes using the Google Home app (Final Charge 15; Tr. 1403:5–11). It cannot be that Google would infringe on account of someone who installed the Google Home app to control her smart lights and had no zone players, or had three *Sonos* zone players that could not be added to zone scenes using the Google Home app.

defenses; and (3) damages for infringement of claim 1 of the '885 patent and, if applicable, claims 1, 2, 4, 6, and/or 8 of the '966 patent. The parties stipulated, and the judge agreed, that remaining affirmative defenses and injunctive relief would be evaluated by the judge after the jury verdict, with each side having "14 hours [of evidence time] to present *all* of the issues to be tried in this case" (Final Pretrial Order 8; *see* Proposed Final Pretrial Order 2–3, 5).

A unanimous jury found: (1) Google failed to prove, by clear and convincing evidence, that the asserted claims of either patent were invalid; (2) Sonos proved, by a preponderance of the evidence, that claim 1 of the '885 patent was infringed with respect to the redesigned accused products; and (3) Sonos failed to prove, by a preponderance of the evidence, that claims 1, 2, 4, 6, and 8 of the '966 patent were infringed with respect to the original and redesigned accused products. As for damages, the jury found that a per-unit royalty of $2.30 would adequately compensate Sonos for Google's infringement of the '885 patent, and it multiplied this by 14,133,558 units to derive a $32,507,183.50 damages award (Dkt. No. 774).

For reference, claim 1 of the '885 patent is included below:

> **1.** A first zone player comprising:
> a network interface that is configured to communicatively couple the first zone player to at least one data network;
> one or more processors;
> a non-transitory computer-readable medium; and
> program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:
> while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players;
> (i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and
> (ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the second zone player is different than the third zone player;
> after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone

> scenes has been selected for invocation;
> after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and
> based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

('885 patent 11:36–12:22).

After the jury verdict, the judge requested briefing on the remaining affirmative defenses and injunctive relief, and the parties filed renewed motions for judgment as a matter of law. Google argued, *inter alia*, that the patents are unenforceable under the affirmative defense of prosecution laches. A hearing followed. This order follows full briefing and oral argument.

ANALYSIS

Prosecution laches is an equitable affirmative defense. The doctrine may "render a patent unenforceable when it has issued only after an unreasonable and unexplained delay in prosecution that constitutes an egregious misuse of the statutory patent system under a totality of the circumstances." *Hyatt v. Hirshfeld*, 998 F.3d 1347, 1360 (Fed. Cir. 2021) (quoting *Cancer Rsch. Tech. Ltd. v. Barr Lab'ys, Inc.*, 625 F.3d 724, 728 (Fed. Cir. 2010)). As such, it "places an additional, equitable restriction on patent prosecution conduct beyond those imposed by statute or PTO regulation." *Id*. at 1366. A patent applicant must "not only comply with the statutory requirements and PTO regulations but must also prosecute its applications in an equitable way that avoids unreasonable, unexplained delay that prejudices others." *Ibid*.

To prove prosecution laches as a defense to patent infringement, an accused infringer must show: (1) the patent holder's delay in prosecution was unreasonable and inexcusable under the totality of circumstances; and (2) the accused infringer suffered prejudice attributable to the delay. *Cancer Rsch.*, 625 F.3d at 729. With respect to the first element, the determination of unreasonable and inexcusable delay is not limited to the circumstances

surrounding the particular patent applications at issue and can include "the prosecution history of all of a series of related patents and overall delay in issuing claims." *Symbol Techs., Inc., v. Lemelson Med., Educ. & Rsch Found., LP* (*Symbol Techs., II*), 422 F.3d 1378, 1385–86 (Fed. Cir. 2005). With respect to the second element, prejudice requires a showing of intervening rights, in that "either the accused infringer or others invested in, worked on, or used the claimed technology during the period of delay." *Cancer Rsch.*, 625 F.3d at 729.

The Federal Circuit has not expressly clarified an accused infringer's burden of proof for prosecution laches, so this order errs on the side of caution and applies clear and convincing evidence, consistent with what is required for other unenforceability defenses. *See, e.g.*, *id*. at 732 (applying clear and convincing evidence for inequitable conduct); *see also Personalized Media Commc'ns, LLC v. Apple, Inc.*, 552 F. Supp. 3d 664, 684–85 (E.D. Tex. 2021) (Judge Rodney Gilstrap), *aff'd*, 57 F.4th 1346 (Fed. Cir. 2023) (applying clear and convincing evidence for prosecution laches). In the end, it makes no difference here.[7]

1. UNREASONABLE AND INEXCUSABLE DELAY.

Having considered the totality of the circumstances, this order concludes, by clear and convincing evidence, that Sonos was guilty of unreasonable and inexcusable delay in its prosecution of the patents in suit.

To recap, Sonos filed the provisional application from which the patents claim priority in September 2006, but it did not file applications for the patents in suit, with claims on overlapping zone scenes, until April 2019. Moreover, those claims were amended to include the "standalone mode" limitations in August 2019 before the applications issued as patents in November 2019 and November 2020. That was *over thirteen years* after Sonos had filed the provisional application. That was also well after Google had disclosed the claimed invention to Sonos and, on its own, brought the claimed invention to the market.

[7] Likewise, the Federal Circuit has not expressly clarified whether the presumption that a delay of more than six years is unreasonable, inexcusable, and prejudicial applies when prosecution laches is raised as a defense to infringement, as it does when it is raised in a civil action challenging an adverse decision of the PTO. *See Hyatt*, 998 F.3d at 1369; *see also Personalized Media Commc'ns*, 552 F. Supp. 3d at 685 (declining to apply presumption). This order does not reach this question. It too makes no difference here.

Although the Federal Circuit has "not set forth any firm guidelines" for determining when a delay in prosecution is unreasonable and inexcusable, it has "discussed precedent such as *Woodbridge v. United States*, 263 U.S. 50, 44 S. Ct. 45, 68 L. Ed. 159 (1923), and *Webster Electric Co. v. Splitdorf Electrical Co.*, 264 U.S. 463, 44 S. Ct. 342, 68 L. Ed. 792 (1924), wherein the Supreme Court applied the doctrine of prosecution laches to render patents unenforceable." *Symbol Techs. II*, 422 F.3d at 1385. In these two decisions, the Supreme Court found patents unenforceable based on nine-year and eight-year delays in presenting claims. *See Woodbridge*, 263 U.S at 50; *Webster*, 264 U.S. at 465. In the decision in which the Federal Circuit applied prosecution laches for the first time, it likewise found patents unenforceable based on an eight-year delay in presenting claims. *In re Bogese*, 303 F.3d 1362, 1369 (Fed. Cir. 2002). And, in its two most recent decisions affirming prosecution laches determinations, the Federal Circuit found patents unenforceable based on ten-year to nineteen-year delays in presenting claims. *See Personalized Media Commc'ns, LLC v. Apple Inc.* (*PMC*), 57 F.4th 1346, 1355 (Fed. Cir. 2023) (citing *Hyatt*, 998 F.3d at 1368). Here, Sonos delayed thirteen years in presenting claims. "The magnitude of [Sonos's] delay in presenting [its] claims for prosecution suffices to invoke prosecution laches." *Hyatt*, 998 F.3d at 1367.

Remarkably, at trial, Sonos never provided any sworn explanation for why it waited until April 2019 to claim overlapping zone scenes. The only sworn explanation addressed a different delay: delay in coming out with its own products that implemented overlapping zone scenes, which took place in June 2020. Even crediting the testimony of Sonos's witnesses that earlier Sonos products lacked sufficient memory to practice the claimed invention (*see, e.g.*, Tr. 915:20–22), that in no way explained why Sonos failed to seek claims on this invention until April 2019. In other words, this testimony addressed why Sonos delayed in practicing the invention, not why Sonos delayed in patenting it.

Meanwhile, the thrust of Sonos's explanation in its post-trial brief is that it diligently prosecuted the family of patent applications in the interim: from September 2006, when it filed a provisional application that allegedly disclosed the invention; through September 2007, when it filed a corresponding non-provisional application that allegedly disclosed the

invention; through May 2013, August 2014, and April 2016, when it filed additional non-provisional applications that incorporated those earlier applications by reference; all the way up to April 2019, when it filed the applications for the patents in suit that claimed the invention (*see* Opp. 6). In other words, Sonos emphasizes that it complied with the statutory requirements and PTO regulations. Yet a patent applicant must "not only comply with the statutory requirements and PTO regulations but must also prosecute its applications in an equitable way that avoids unreasonable, unexplained delay that prejudices others." *Hyatt*, 998 F.3d at 1360 (citation omitted). That Sonos diligently prosecuted patent applications in the interim does not render the delay any less unreasonable and inexcusable. Indeed, it renders the delay *all the more* unreasonable and inexcusable.

At all relevant times in the more than thirteen years it took for Sonos to present its claims, Sonos had related applications on file. It would have been a small step for Sonos to amend those applications to claim the invention. Likewise, nothing prevented Sonos from filing parallel applications with new claims covering the invention. Sonos did not have to run out its string of inert applications before turning to claim the invention that mattered. Indeed, Sonos already had an application pending (for the '532 patent) when it filed the applications for the patents in suit.

Moreover, the Federal Circuit has explained that "subject matter disclosed by a patentee, but not claimed, is considered dedicated to the public," the reason being "that members of the public reading a disclosure of particular subject matter are entitled, absent a claim to it, to assume that it is not patented and therefore dedicated to the public." *Eli Lilly & Co. v. Hospira, Inc.*, 933 F.3d 1320, 1334 (Fed. Cir. 2019) (citations omitted). True, the Federal Circuit has recognized an exception for subject matter "claimed in a continuation or other application based on the disclosure," *ibid.*, but it has also recognized that unreasonable, inexcusable delay "is not what is contemplated by the patent statute when it provides for continuation and continuation-in-part applications" and "creates an 'adverse effect on businesses that [are] unable to determine what [is] patented from what [is] not patented.'" *See Hyatt*, 998 F.3d at 1361 (alterations in original) (quoting *Symbol Techs. II*, 422 F.3d at 1386).

As such, that an invention may have been lurking between the lines of an earlier application does not excuse a delay in presenting claims on it.

It is also true that a patent applicant is allowed to draft claims to read on competitors' products and claim a priority date that precedes them. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 909 n.2 (Fed. Cir. 2004) (citing *Kingsdown Med. Consultants, Ltd. v. Hollister Inc.*, 863 F.2d 867, 874 (Fed. Cir. 1988)). But that is only so long as there is no unreasonable, inexcusable delay, and so long, of course, that an earlier specification really did disclose the claimed invention.

2. PREJUDICE.

In addition, having considered the totality of the circumstances, this order concludes, by clear and convincing evidence, that Google suffered prejudice by reason of delay by Sonos.

Again, this element requires a showing of intervening rights, in that "either the accused infringer or others invested in, worked on, or used the claimed technology during the period of delay." *Cancer Rsch.*, 625 F.3d at 729. Here, Google began investing in the accused products by at least 2015, when it released its first products that practiced the invention. Sonos never offered sworn evidence that Google suffered no economic prejudice. To the contrary, its very theory of the case presented at trial was that Google invested in building out a line of products that infringed Sonos's patents and that Google profited off this investment. There is no question that Google worked on, invested in, and used the claimed technology during the period of Sonos's delay.

In its post-trial brief, Sonos attempts to sidestep the issue by arguing that there was no prejudice because Google could have studied the tortured prosecution history dating back to 2006 before investing in infringing products (*see* Opp. 11). This argument is highly unpersuasive for several reasons.

First, unearthing the layers of file histories would have resembled an exercise in archeology. As even Sonos's own counsel acknowledged at trial, "it is, actually, a very confusing priority chain. I've seen a lot, and it's confusing" (Tr. 969:1–3). Because the 2007 non-provisional application was filed with a request for non-publication, it was not even

published until it issued in 2013 — mere months before Sonos and Google first explored a Google Play Music collaboration, and one year before the Cast for Audio presentation. Furthermore, the 2006 provisional application, by definition, *was never published*. It was made available to the public in 2013, but it was (and is) not publicly searchable like standard patents and patent applications.

Second, the earlier applications *never claimed the invention*. Claims define a patent holder's rights. "[W]e look to the words of the claims themselves . . . to define the scope of the patented invention." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). We do not look to the specifications of much earlier related patents to define the scope of a patented invention, and we certainly do not look to an appendix to the specification of a much earlier unpublished provisional application.

Third, it turns out that the earlier applications *never disclosed the invention*. That is why Sonos had to add new matter. If Sonos itself was unable to find the disclosure in the specification prior to 2019, how could Google have been expected to find it? Sonos's machinations during prosecution, inserting new matter into the specification and masquerading it as subject matter previously disclosed, have turned out to be so important that they will be detailed separately.

Another unavailing argument Sonos raises in its post-trial brief is that there was no prejudice because Sonos had previously patented broader claims that would read on Google's products (*see* Opp. 11). But, with the exception of the '206 patent claims (that Sonos promptly withdrew upon Judge Albright's comment on indefiniteness), Sonos never asserted *any of these earlier claims*. This is telling. Those claims were, in fact, *very narrow*, with the patent examiner having repeatedly rejected any suggestion that Sonos had invented zone scenes (and having at least once rejected the suggestion that Sonos had invented overlapping zone scenes).

In sum, in considering the totality of the circumstances, including the prosecution history of the series of related patents and the overall delay in issuing claims, this order finds and concludes, by clear and convincing evidence, that Sonos was guilty of unreasonable and

inexcusable delay in prosecution of the patents in suit, to the extreme prejudice of Google and others.

This order will now take up two of Sonos's arguments that do not carry the day but warrant a deeper dive.

3. PROSECUTION LACHES APPLIES TO POST-1995 APPLICATIONS.

Much ink has been spilled by Sonos in seeking to demonstrate that the affirmative defense of prosecution laches is dead (Opp. 2–3, 5–6). It is not.

Sonos (correctly) observes that, despite issuing comprehensive opinions expounding on the doctrine of prosecution laches in recent years, and even as recently as a few months ago, the Federal Circuit has yet to affirm the application of this defense to patent applications originally filed after 1995. Needless to say, if the doctrine were dead with respect to applications filed after 1995, it would have been easy for the Federal Circuit to say so in opinions it issued after 1995. And, the Federal Circuit has *only* affirmed the application of prosecution laches *after* 1995 (in 2023, 2021, 2005 and 2002). *See PMC*, 57 F.4th at 1350; *Hyatt*, 998 F.3d at 1370; *Symbol Techs. II*, 422 F.3d at 1385; *In re Bogese*, 303 F.3d at 1363. Meanwhile, the defense was only endorsed by the Federal Circuit as a grounds for challenging patent enforceability *after* 1995 (based on Supreme Court precedent from a century ago). *Symbol Techs. v. Lemelson*, 277 F.3d 1361, 1364–68 (Fed. Cir. 2002).

So why 1995? Essentially, Sonos contends that prosecution laches lost its luster that year because that was when the United States moved from a patent term of 17-years-from-issuance to a patent term of 20-years-from-filing, thereby reducing the incentive to delay the issuance of a "submarine patent" that surfaces unexpectedly and catches competitors off guard. Because the '885 and '966 patents claim priority to a 2006 provisional application through a 2007 non-provisional application, Sonos ostensibly "did not (and could not) 'postpone' its patent monopoly by delaying filing its patent applications" for the patents in suit (Opp. 5). According to Sonos, "[p]rosecution laches developed to thwart the 'practice' of 'deliberately and without excuse postpon[ing] beyond the date of the actual invention, the beginning of the term of [the patentee's] monopoly,'" and "that practice was a relic of the pre-1995 patent system" (*ibid.*

(quoting *Hyatt*, 998 F.3d at 1360)). In support, Sonos selectively quotes the Federal Circuit's 2021 opinion in *Hyatt*, which itself quotes the Supreme Court's 1923 opinion in *Woodbridge*. But that 1923 decision, a forebearer of the prosecution laches defense, was not so circumscribed. Nor was *Hyatt*'s reading of it, for that matter.

As the Federal Circuit explained in *Hyatt*, *Woodbridge* "held that, by delaying to 'mak[e] the term of the monopoly square with the period when the commercial profit from it would have been highest,' [the patent holder] 'forfeit[ed] the right to a patent by designed delay.'" *Hyatt*, 998 F.3d at 1360 (quoting *Woodbridge*, 263 U.S. at 56). The Supreme Court recognized that this delay improperly "postpon[ed] the time when the public could freely enjoy [the invention] for nearly 10 years." *Woodbridge*, 263 U.S. at 56. Likewise, in *Webster*, a decision that issued the following year, the Supreme Court held that the patent claims first presented to the PTO following an eight-year delay reflected "an undue extension of the patent monopoly against private and public rights" and rendered the underlying patent unenforceable. *See Webster*, 264 U.S. at 466. In establishing the defense of prosecution laches, the Supreme Court was less concerned with the nuances of patent term duration and more concerned with manipulation of patent monopoly for profit at the expense of public enjoyment. And that is precisely what this Court is concerned with here.

Sonos waited over *thirteen years* to patent the invention. Although this did not delay the priority date, it did "postpone[] beyond the date of the actual invention[] the beginning of the term of [Sonos's] monopoly." *Woodbridge*, 263 U.S. at 56. There simply *was no monopoly* on the claimed invention until the patents issued in 2019 and 2020. Having conceived of the claimed invention in 2005 (as stipulated), having known that Google planned to release a product that practiced it as early as 2014, and having known that Google, in fact, released products that practiced it as early as 2015, Sonos undertook "designed delay." It imposed limitations on the public's right to practice the invention after the fact, at considerable expense to Google, other companies, and consumers. Sonos thereby made the term of its patent monopoly "square with the period when the commercial profit from it would be highest" —

after Google and others had put the invention into practice and Sonos had sustained "damages." *Ibid*.

Just this year, the Federal Circuit rejected an argument that a district court committed legal error in finding unreasonable and inexcusable delay because the "conduct look[ed] nothing like *Hyatt* or the handful of other cases that have found prosecution laches." *PMC*, 57 F.4th at 1354. One can anticipate the same argument being made on appeal here. In rejecting the argument, the Federal Circuit emphasized that prosecution laches is a "flexible doctrine." *Ibid*. True, our patents are not the "submarine patents" of yesteryear, but they likewise issued after many years of lurking beneath the surface, catching competitors off guard. Sonos let the industry develop and only then sought to extract an invention from a much earlier application that would read on an industry trend. It is worse than that, actually, for Sonos learned of Google's specific product plans and *still waited five years* to frame claims to read on those products. A patent holder may only need a short (seven-year) term to extract a substantial (thirty-two-million-dollar) damages award.

Sonos has done exactly what the Supreme Court has long said should not be done. "It will not do for the patentee to wait until other inventors have produced new forms of improvement, and then, with the new light thus acquired, under pretence of inadvertence and mistake, apply for such an enlargement of his claim as to make it embrace these new forms." *Miller v. Bridgeport Brass Co.*, 104 U.S. 350, 355 (1881). As the Supreme Court explained in reference to reissues, "the rule of laches should be strictly applied; and no one should be relieved who has slept upon his rights, and has thus led the public to rely on the implied disclaimer involved in the terms of the original patent." *Ibid*. So too here.

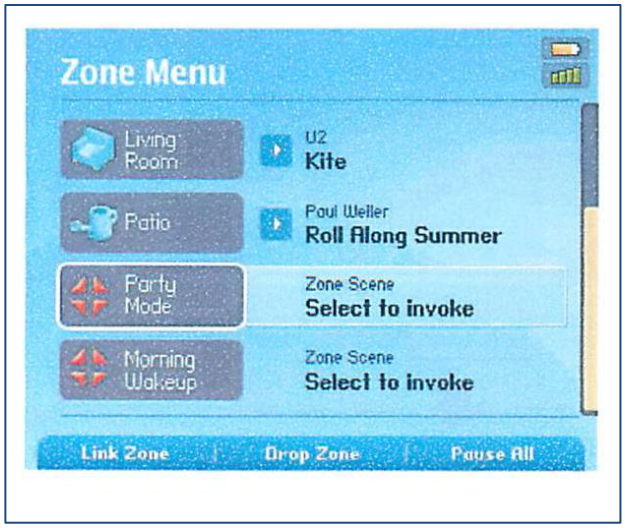
4. NO DISCLOSURE IN ORIGINAL APPLICATIONS.

This order now turns to the details of a point made above — namely, that contrary to Sonos's position, the 2006 provisional application and the 2007 non-provisional application actually failed to disclose the invention. The truth is that Sonos did not so much as adumbrate, let alone disclose, the claimed invention *in any of its filings prior to 2019.*

In essence, Sonos's position is that because both sides agree the UI documents disclosed the claimed invention, and the UI documents were appended to the provisional application as appendices, the provisional application disclosed the claimed invention. And, because the provisional application disclosed the claimed invention, and all subsequent non-provisional applications incorporated the provisional application by reference, all subsequent non-provisional applications disclosed the claimed invention (*see* Opp. 10).

As it turns out, however, this reasoning falls apart upon examination. The UI documents were *not* annexed to the provisional application as appendices. Rather, *altered versions of the UI documents* were annexed to the provisional application as appendices. Therein lies the rub.

Recall, the original zone scenes UI document *explicitly disclosed* zone scenes, *i.e.*, customized, saved groups of zone players that could be invoked on demand. For example, in the section on "Invoking a Scene," a "Party Mode" zone scene and a "Morning Wakeup" zone scene were displayed next to each other in one instance, and a "Party Mode" zone scene, a "Wakeup" zone scene, and a "Garden Party" zone scene were displayed next to each other in another. The visuals are now included below for reference:



Original Zone Scenes UI Document: "Party Mode" and "Morning Wakeup" Zone Scenes.

Original Zone Scenes UI Document: "Party Mode," "Wakeup," and "Garden Party" Zone Scenes.

(TX6545 at 5–6). And, the original UI documents *implicitly disclosed* overlapping zone scenes by reference to party mode in the Sonos 2005 prior art system. Specifically, the original alarm clock UI document stated that "'Party Mode' that currently ships with the product is one example of a Zone Scene" (TX6544 at 27). The original zone scenes UI document similarly referred to the "current Party Mode setting" and represented "Party Mode" as a "Zone Scene" in various figures (TX6545 at 2, 5–6). Accordingly, when the original zone scenes UI document showed a "Party Mode" zone scene next to the "Morning Wakeup" zone scene, and a "Party Mode" zone scene next to "Wakeup" and "Garden Party" zone scenes, it would have been understood that these zone scenes would overlap because it would have been understood

that the "Party Mode" zone scene would group all of the zone players in a system. As such, the original UI documents implicitly disclosed customized, saved, *overlapping* groups of zone players that could be invoked on demand — *i.e.*, the claimed invention. Both sides stipulated that the original UI documents conceived of the claimed invention but dispute whether the 2006 provisional application and the 2007 non-provisional application disclosed the invention (thereby reducing it to practice).

Importantly, before the UI documents were appended to the provisional application as appendices, *certain language was omitted*. What was omitted? Crucially omitted was *all language describing party mode in the Sonos 2005 prior art system as a zone scene.* The relevant excerpts of the original UI documents with the highlighted language showing omissions are reproduced below:

> 'Party Mode' that currently ships with the product is one example of a Zone Scene.

Alarm Clock UI Document, Language Omitted from Appendix B Highlighted.

> The Zone Scene feature allows the user to arrange the zones into groups using one single command. This is similar to the current Party Mode setting that is available. However, the Zone Scene feature is much more flexible and powerful.

Zone Scenes UI Document, Language Omitted from Appendix A Highlighted.

(TX6544 at 27; TX6545 at 2).

The provisional application specification likewise did not mention party mode as a zone scene. Instead, it advanced the idea that zone scenes were an invention, stating, for example, that "a set of zones . . . dynamically linked together using one command[] [u]sing what is referred to as a zone scene or scene" was inventive (TX2651 at 22). The provisional application specification also explained that "[o]ptionally, a system may be supplied with a command that links all zones in one step" and that "[t]his may be a simple form of a zone scene" (*ibid.*).

Significantly, Sonos's deletion of the highlighted language in turn *omitted its (implicit) disclosure of overlapping zone scenes*. The public (and the patent examiner) would have had no way of knowing what party mode meant in Appendix A.[8] Accordingly, when Appendix A showed a "Party Mode" zone scene next to the "Morning Wakeup" zone scene — and a "Party Mode" zone scene next to "Wakeup" and "Garden Party" zone scenes — it no longer would have been understood that these zone scenes would overlap because it no longer would have been understood that the "Party Mode" zone scene would group all of the zone players in a system. The sentences needed to understand this were omitted. As such, as the provisional application did not disclose customized, saved, *overlapping* groups of zone players that could be invoked on demand — *i.e.*, the claimed invention.

Why did Sonos omit this language? Party mode in the Sonos 2005 prior art system *was what was described as inventive* in the 2006 provisional application specification. It was "a set of zones [that] can be dynamically linked together using one command[]" with a "predefined zone grouping" (TX2651 at 21). Sonos, no doubt, saw the risk that its own product — the Sonos 2005 prior art system, released in January 2005 — would have served as invalidating prior art for a broad zone scene patent.[9]

At trial, Inventor Lambourne suggested that language from the original UI documents describing party mode as it existed in the Sonos 2005 prior art system as a zone scene was untrue and never should have been there:

[8] For example, "party mode" was also discussed at summary judgment in these very actions to mean something entirely different in relation to Google prior art. *See Sonos, Inc. v. Google LLC*, No. C 20-06754 WHA, 2023 WL 2962400, at *6–12 (N.D. Cal. Apr. 13, 2023).

[9] As Sonos explained in a post-trial brief, "under pre-AIA [35 U.S. Code Section] 102(b), a reference qualifies as prior art if it was . . . 'in public use or on sale' in the United States more than one year prior to a patent's effective filing date . . . . This 'one year prior' date is commonly referred to as the patent's 'critical date' . . . . [T]he 'critical date' for purposes of pre-AIA [Section] 102(b) (*i.e.*, the date that is one year before the effective filing date) is September 12, 2005, and any alleged reference that precedes that critical date will qualify as prior art under pre-AIA [Section] 102(b) regardless of conception date" (Dkt. No. 809 at 2, 4). Based on the claimed priority date of September 12, 2006 (the filing date of the 2006 provisional application), the Sonos 2005 prior art system, released in January 2005, is pre-AIA Section 102(b) prior art.

> **Q.** Do you see kind of in the middle of the screen, the middle of the page here there's a sentence that says, "Party Mode that currently ships with the product is one example of a zone scene"?
>
> **A.** Yes . . .
>
> **Q.** Sitting here today, do you believe that to be a true statement?
>
> **A.** No.
>
> **Q.** So, if it's not true, why did you write it?
>
> **A.** These were some notes that I added to the end of a spec that was sort of — the main body of the spec was previous pages. I used the — I used the description imprecisely. I think if I was to write — could write it again I wouldn't have used the word zone — Party Mode as an example of zone scene there.

(Tr. 462:16–20, 463:2–11).[10] This order rejects the explanation as not credible and finds that the omitted language was accurate and left out for the reason stated above.

The excising of party mode from the UI documents perhaps helped Sonos then, but it hurts Sonos now because it excised the only basis for finding the 2006 provisional application disclosed overlap. Accordingly, this order finds and concludes that the claimed invention was *not disclosed* by the 2006 provisional application. And, because it was not disclosed by the 2006 provisional application, it was not disclosed by the 2007 non-provisional application and the subsequent continuation applications by virtue of their incorporating by reference the 2006 provisional application. Sonos was too clever by half.

* * *

Sonos also contends that, irrespective of what was in the 2006 provisional application, the claimed invention was disclosed in the 2007 non-provisional specification, which was likewise incorporated by reference into all of the subsequent continuation applications. The

[10] Inventor Lambourne then suggested that the original zone scenes UI document had "more clear descriptions, more accurate descriptions of zone scenes" (Tr. 453:15–17). But, as discussed, there was no language in the original zone scenes UI document stating that "Party Mode," as it appears in that document, did not operate like "the current Party Mode setting that [was] available" (TX6545 at 2). Specifically, the document observed that the "Zone Scene feature" was "similar to the current Party Mode" but "more flexible and powerful" (*ibid.*). That did not mean, however, that "Party Mode," as it appeared in that document, was itself "more flexible and powerful" than the "current Party Mode" (*ibid.*).

judge has reviewed all of the passages that Sonos contends disclosed the claimed invention (including those in a 56-page trial brief) and now disagrees. Here too, there was no disclosure of *overlapping* zone scenes whatsoever — only zone scenes generally, like in the 2006 provisional application.

In some instances, Sonos points to language describing *individual* zone scenes. The 2007 non-provisional specification described "form[ing] respective groups, *each* of which is set up *per a scene*," *i.e.*, a "Simple Scene" in the original zone scenes UI document (Dkt. No. 723 at 26 (quoting '853 patent 2:40–41); *id*. at 31 (quoting '853 patent 1:54–66)) (emphasis added). It also described "*a scene* creat[ing] separate groups of zones," *i.e.*, an "Advanced Scene" in the original zone scenes UI document (Dkt. No. 723 at 28–29 (quoting '853 patent 8:29–47)) (emphasis added). But in describing *individual* zone scenes, the specification never disclosed *overlapping* zone scenes.

In other instances, Sonos claims support for disclosure through mixing and matching distinct embodiments, combining one that disclosed a zone scene that "links all zones" with another that separately disclosed a zone scene that links some zones (Dkt. No. 723 at 27–28 (quoting, *e.g.*, '853 patent FIG. 3A, FIG. 3B, 8:52–60, 9:1–15)). A claimed invention is hardly disclosed "by picking and choosing claim elements from different embodiments that are never linked together in the specification." *Flash-Control, LLC v. Intel Corp.*, No. 20-2141, 2021 WL 2944592, at *4 (Fed. Cir. July 14, 2021). Moreover, *the Sonos 2005 prior art system also disclosed linking all zones and, separately, linking some zones*. Mixing and matching, therefore, shows nothing more than what the prior art already showed.

Further, Sonos looks to the disclosure in the description of the problem solved: that it was "difficult for the traditional system to accommodate the requirement of dynamically arranging the ad hoc creation and deletion of groups" (Dkt. No. 723 (quoting '853 patent 1:59–2:17)). With the power of hindsight, Sonos proceeds to clarify the problem as "each time a user created a new group with the 'den' player, the previous group with the 'den' player would be destroyed" (*id*. at 31). But *the specification itself* proceeded to clarify the problem as "the audio players have to be adjusted one at a time" and "there is a need to individually or

systematically adjust the audio volume of the audio players" ('853 patent 2:7–10). Which is to say, *overlapping* zone scenes was not the required solution. The required solution was simply *zone scenes*, with audio players "readily grouped" instead of linked one by one, and with "the players in a scene react[ing] in a synchronized manner" (*id*. at 2:6, 26–27).

Finally, Sonos focuses on Figure 6, which "shows a flowchart or process of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone" ('853 patent 9:59–61; *see id*. at FIG 6). In that flowchart, included below, there is an arrow after "save the scene with parameters" leading back up to "configure a zone scene." But there is no indication that a zone player that is already a member of a saved zone scene would be available for inclusion in a subsequent one. Indeed, the specification *teaches against this*, explaining that "[t]he user may be given an interface to select *four of the ten players* to be associated with the scene" (*id*. at 10:3–4).

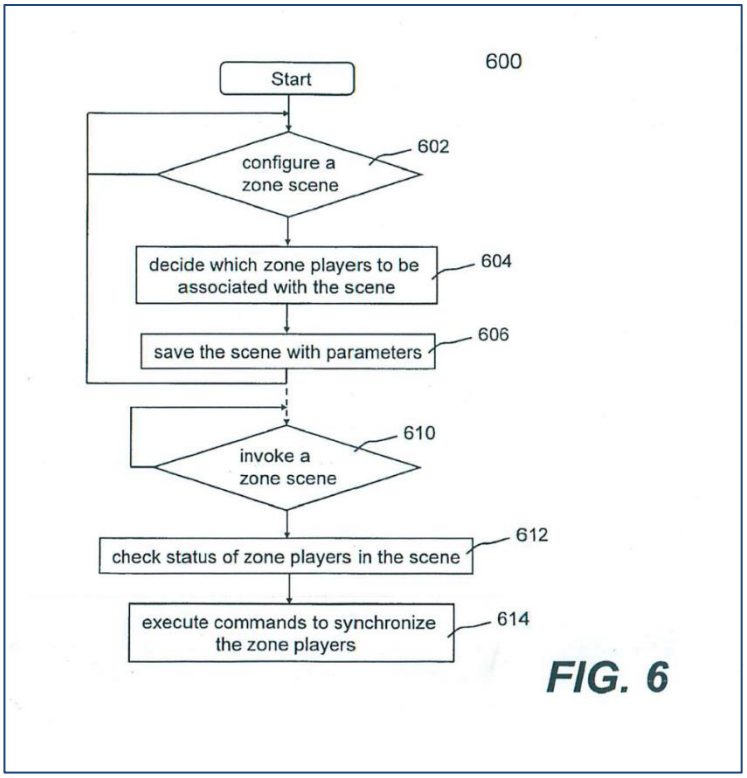


Figure 6 from 2007 Non-Provisional Application (and Patents in Suit).

In sum, Sonos did not disclose the claimed invention in the 2006 provisional application, the 2007 non-provisional application, or any of the subsequent continuation applications by virtue of their incorporation by reference prior to 2019.

5. THE NEW MATTER.

So where *was* the claimed invention disclosed? When the judge inquired at trial, upon realizing that "the heart of the case is the overlapping," Sonos pointed to a passage in the specification of the patents in suit (the italicized sentence being the critical disclosure):

> FIG. **5**B shows another user interface **520** to allow a user to form a scene. The user interface **520** that may be displayed on a controller or a computing device, lists available zones in a system. *The list of zones in the user interface **520** includes ALL the zones in the system, including the zones that are already grouped.* A checkbox is provided next to each of the zones so that a user may check in the zones to be associated with the scene.

(Tr. 659:15–22, 662:6; '885 and '966 patent 10:12–19).

Counsel for Sonos had represented, and Sonos witnesses proceeded to represent, that the specification of the patents in suit was identical to the specification of the earlier applications. Specifically:

- Counsel for Sonos stated that the specification of the patents in suit "ha[d] an initial sentence in the very first [*sic*] that says this application claims priority to such and such an application. Other than that, no changes" (Tr. 656:15–22).
- Sonos Expert Dr. Kevin Almeroth testified that the patents in suit "date[d] back over time where patents were filed with the same specification and they ha[d] different sets of claims at the end. But the description of the invention, what the specification [was], the columns in it, the figures, that's all the same" (Tr. 676:25–677:5).
- General Counsel Kwasizur proffered testimony that referred to the "patents in the zone scene family" as "patents that ha[d] the same specification as both the asserted patents in this case" (Dkt. No. 705 at 3). Meanwhile, her supporting declaration explained that the 2007 non-provisional application issued as a patent that "share[d] a substantively identical specification to the zone patents at issue in this case" (Dkt. No. 705-1 ¶ 8).

But, this was not true, as counsel for Sonos later confessed:

> I need to apologize for a clarification. You and I had a discussion yesterday about the specification in this case and whether it's the same, and I said it was the same, and that's true insofar as there's

> an incorporation by reference in the specification to the provisional.
>
> However, the specification has changed in slight ways as the applicant has amended the specification over the years to bring in things from the provisional, which is perfectly permissible under Rule 57(g). I just thought I should bring that up.

(Tr. 748:6–16). Yes, he should have brought that up. But even this was misleading. It later turned out that the sentence (italicized above) that Sonos had directed the judge to in order to support disclosure of the claimed invention *did not appear* in the 2007 non-provisional application specification. Rather, it was *added during prosecution in August 2019 by way of amendment* — mere months after the applications for the patents in suit were filed — with a statement that this material was previously incorporated by reference in this application and this amendment contained no new matter. That prosecution statement identified specific pages of Appendix A to the 2006 provisional application where the inserted material could be found (TX0004 at 821; TX0006 at 4101).

In fact, this was the very same sentence that the judge had earlier used as his primary evidence in finding written description support for overlap at summary judgment last year. Sonos had moved for summary judgment of infringement of claim 1 of the '885 patent. Google had opposed and cross-moved for summary judgment of invalidity of that claim, asserting, *inter alia*, that it lacked written description support. Sonos, in reply, had directed the judge to the sentence:

> [T]he '885 Patent discloses that when a user is selecting which "zone players" to add during setup of each "zone scene," the user is presented with "ALL the zones in the system, including the zones that are already grouped" – which conveys to a POSITA that each "zone scene" being set up can include any grouping of "zone players" in a multi-zone audio system, regardless of whether the "zone players" are included in any other "zone scenes" and thus that multiple "zone scenes" with one or more overlapping "zone players" can be set up and exist at the same time.

(Dkt. No. 273-4 at 9 (citing '885 patent 10:12–19, 10:4–6; 10:36–42; Ex. R, ¶ 47)).

At that time, neither party informed the judge that this very passage had been inserted by way of amendment in August 2019. As the judge explained at trial upon learning this, "I ruled for Sonos specifically [calling] out a sentence in the specification that was served up by Sonos

to say there was an adequate written description," "I did not realize that that came in later by amendment," and "[t]hat would have made a difference to me if I had known that" (Tr. 1410:16–20). Put another way, "I got a half a deck of cards" and "I was not told the complete truth" (Tr. 2023:1–2).

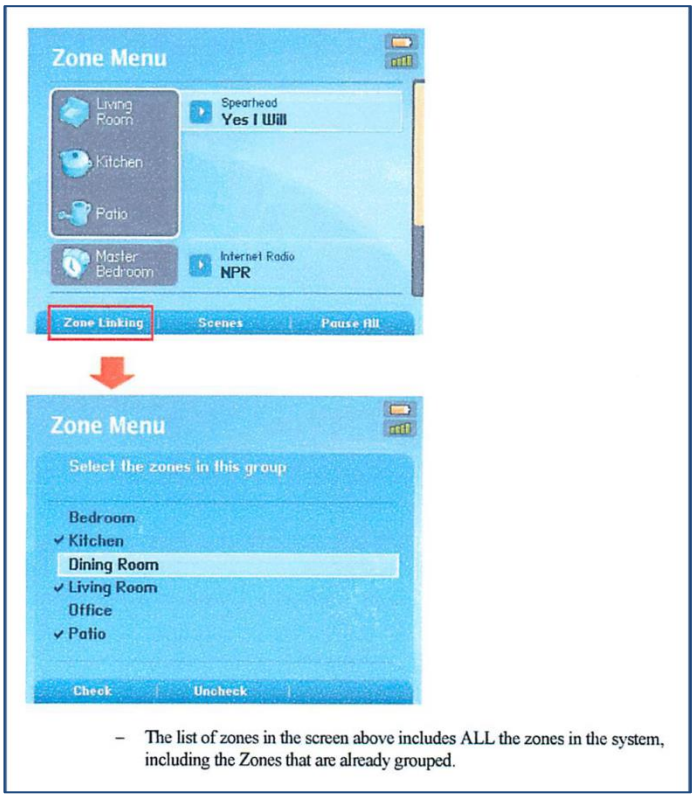
It is axiomatic under patent law that new matter cannot be added to a continuation application's specification. *See Pfizer, Inc. v. Teva Pharms. USA, Inc.*, 518 F.3d 1353, 1361 (Fed. Cir. 2008) (citing *Asseff v. Marzall*, 189 F.2d 660, 661 (D.C. Cir.1951)). That application inherits a parent application's priority date and is limited to that parent application's disclosure. Likewise, a patent may claim the benefit of a provisional application only if it "relies on subject matter . . . that is present in and supported by its provisional." *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1377 (Fed. Cir. 2015) (citation omitted). If a patent applicant adds new matter to a continuation application, it is not entitled to claim the benefit of an earlier application.

According to Sonos, it properly amended the specification under 37 C.F.R. Section 1.57(g), which provides for "insertion of material incorporated by reference into the specification or drawings of an application . . . by way of an amendment to the specification or drawings" so long as it is "accompanied by a statement that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter." Sonos asserts that it provided such a statement to the patent examiner, the inserted material was material previously incorporated by reference (with the entire provisional application), and the inserted material contained no new matter since it came from Appendix A to the 2006 provisional application (*see, e.g.*, Dkt. No. 723 at 18). Alas, not so.

Again, the critical sentence inserted in 2019 is italicized below:

> FIG. **5**B shows another user interface **520** to allow a user to form a scene. The user interface **520** that may be displayed on a controller or a computing device, lists available zones in a system. *The list of zones in the user interface **520** includes ALL the zones in the system, including the zones that are already grouped.* A checkbox is provided next to each of the zones so that a user may check in the zones to be associated with the scene.

('885 and '966 patent 10:12–19). Contrary to Sonos's position, the descriptive sentence inserted into the specification of the patents in suit was *not* the same as that included in Appendix A and the original zone scenes UI document. "The list of zones in the screen above . . . " became "The list of zones in the *user interface* ***520***" (*compare* TX6545 at 17, *with* '885 and '966 patent 10:15). The use of the reference number "**520**" indicated that the sentence was describing Figure 5B. And, Figure 5B was *not* the diagram that this sentence had described in Appendix A and the original zone scenes UI document. Rather, Figure 5B was a truncated version of that diagram, reappropriated to show "another user interface **520** to allow a user to form a scene" — *despite the fact that the Appendix A image, we know now, had not shown forming a zone scene at all.*



"Zone Linking" from Appendix A to Provisional Application (and Original Zone Scenes UI Document).

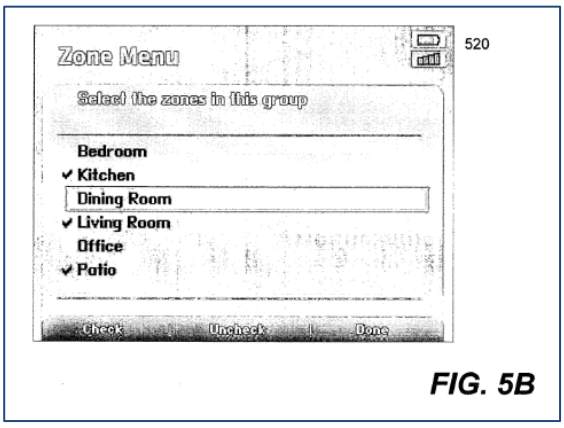


Figure 5B from Patents in Suit.

Recall, Appendix A and the original zone scenes UI document had described "Zone Linking" as distinct from "Scene Setup." Indeed, Appendix A and the original zone scenes UI document *expressly stated* that it was "not expected that the Zone Scenes should be set up using the Handheld Controller," like what Figure 5B ostensibly shows.

In Appendix A and the original zone scenes UI document, the descriptive sentence stating that "the list of zones in the screen above includes ALL the zones in the system, including the zones that are already grouped," explained how this "Zone Linking" feature "would allow the user to link and drop multiple zones in one screen" on an ad hoc basis using a handheld controller, "check[ing] Zones that will be a part of a zone group, and uncheck[ing] those that won't" (TX6545 at 17–18). This referred to ad hoc grouping — nimbler ad hoc grouping than what was available in the Sonos 2005 prior art system, but ad hoc grouping all the same. The descriptive sentence had *nothing to do with zone scenes.* Zone scenes were discussed elsewhere in both Appendix A and the original zone scenes UI document, and accessed using a distinct soft button. The old sentence was given a new and different meaning. It had referred to ad hoc grouping, but Sonos reappropriated it to refer to zone scenes. It was, therefore, new matter. Sonos's reappropriation was "a clear abuse of the PTO's patent examination system, which may alone suffice to satisfy the prejudice requirement of prosecution laches." *Hyatt*, 998 F.3d at 1370.[11]

[11] There were other manipulations as well. As observed by Google, submitting over 70,000 pages of largely superfluous disclosures across the patents in suit while requesting prioritized examination "created a perfect storm" to overwhelm the PTO (Br. 8 (quoting *Hyatt*, 998 F.3d at 1368)). Again, this was hardly diligent prosecution. Sonos could have filed "Track One" applications as early as 2011, and it could have filed the bulk of those largely superfluous disclosures even earlier. What's more, in prosecuting patent family applications, Sonos often submitted superfluous disclosures after receiving a notice of allowance, adding work for the patent examiner and further delaying the date of issuance until Sonos could craft a new continuation application and keep its daisy chain of continuation applications alive. The application for the '532 patent, the parent application of the patents in suit, received *ten additional notices of allowance* before it issued (well over a year after receiving its first such notice). The '885 patent likewise received several notices of allowance; having initially issued around the same time as the '966 patent, Sonos proceeded to file a Request for Continued Examination on November 18, 2019. Many of the superfluous disclosures submitted to the PTO were documents from this very litigation. One of the firms representing Sonos here also represented Sonos in the prosecution of these patents.

Sonos claimed the priority date of the 2006 provisional application because the inventive subject matter was ostensibly disclosed by that application. But here, this subject matter could not have been disclosed until 2019, when the reappropriated sentence was strategically and deceptively added to the specification of the patents in suit. "The disclosure of a continuation application must be the same as the disclosure of the prior-filed application; *i.e.*, the continuation must not include anything which would constitute new matter if inserted in the original application." MPEP § 211.05 (9th ed. Rev. 7.2022, Feb. 2023). Otherwise, it is not entitled to the priority date of the prior-filed application. When new matter is added to a specification of a continuation application by way of amendment, the effective filing date should be the date of the amendment that added the new matter.

As such, it turns out that Sonos is not entitled to its claimed priority date of September 12, 2006, when the provisional application was filed; or a priority date of September 11, 2007, when the non-provisional application was filed; or a priority date based on any of the continuation applications in the daisy chain leading up to 2019, for that matter. The effective filing date of the patents in suit should be August 23, 2019.

That which infringes if later anticipates if before. It is undisputed that Google released products with the accused functionality in December 2015. Those accused products are now prior art. This order finds and concludes that the patents in suit are anticipated by Google's products and are therefore **INVALID**.

6. WRITTEN DESCRIPTION REDUX.

To summarize, this order finds and concludes that the patents in suit are unenforceable on account of prosecution laches. It also finds and concludes that the patents are invalid as anticipated by the accused products themselves, because Sonos was not entitled to its claimed priority date on account of new matter added to the specification. One last step is required in the interests of justice. A pretrial order sustained the specification of the patents in suit against a written description challenge. With a more complete record, it is clear that was in error.

This order has explained that the earlier applications did not disclose the claimed invention. So, that means that the claimed invention must be disclosed by material that was

added by way of amendment on August 23, 2019. After all, "drafters of patent applications know that they must describe their inventions as well as disclose how to enable their use." *AbbVie Deutschland GmbH & Co., KG v. Janssen Biotech, Inc.*, 759 F.3d 1285, 1298 (Fed. Cir. 2014). "The essence of the written description requirement is that a patent applicant, as part of the bargain with the public, must describe his or her invention so that the public will know what it is and that he or she has truly made the claimed invention." *Ibid.* (citation omitted).

What was added on August 23, 2019? The application was amended to include: (1) Figures 7 and 8, (2) descriptions of Figures 7 and 8, and (3) the new-matter sentence describing Figure 5B.

Figures 7 and 8 were identical to images in Appendix A (and the original zone scenes UI document) and were not new matter. They showed a "Party Mode" zone scene and a "Morning Wakeup" zone scene displayed next to each other in one instance, and a "Party Mode" zone scene, a "Wakeup" zone scene, and a "Garden Party" zone scene displayed next to each other in another.

Invoking a Scene I from Appendix A.

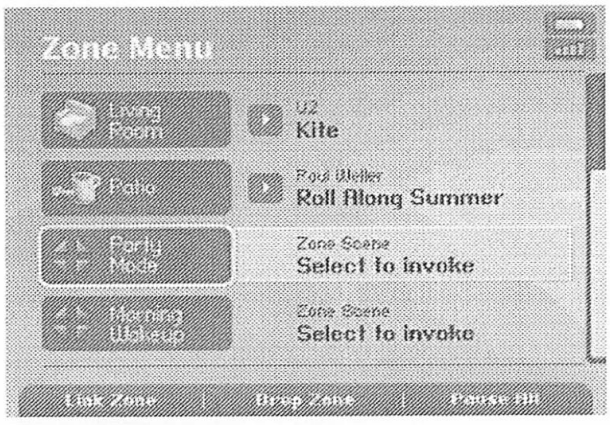


FIG. 7

Figure 7 from Patents in Suit.

FIG. 8

Invoking a Scene II from Appendix A.

Figure 8 from Patents in Suit.

(TX6545 5–6; ’885 and ’966 patents at FIG. 7, FIG. 8). Given, however, that Appendix A did not disclose overlapping zone scenes in light of the omission of sentences discussed previously, Figures 7 and 8 likewise did not disclose overlapping zone scenes. These zone scenes could have been distinct groups of zone players, like those available in the Sonos 2005 prior art system, but with the new feature to save and invoke on demand. This order finds that these figures were properly inserted by way of amendment under 37 C.F.R. Section 1.57(g), but that they had no effect in terms of disclosing the claimed invention. Meanwhile, the descriptions of Figures 7 and 8 likewise did not indicate that zone scenes could overlap; they merely referred to “selectable indications of zone scenes” and “available zone scenes” (’885 and ’966 patents 11:15, 19–20).

This leaves the single new-matter sentence describing Figure 5B. Put aside the new-matter point and ask: Did that sentence disclose the claimed invention?

To glean overlapping zone scenes from this sentence, one must do so by way of inference. Because Figure 5B shows a "user interface **520**" for forming a scene that "lists available zones in a system," and because the "list of zones in the user interface **520** includes ALL the zones in the system, including the zones that are already grouped," one can infer zone scenes overlap (*id*. at 10:12, 14–17). That's it. That is the sole adumbration of overlapping zone scenes in the entire six-page specification, as amended (again, even forgiving the new-matter point).

The Federal Circuit has been clear that "novel aspects of the invention must be disclosed and not left to inference." *See Crown Operations Int'l, Ltd. V. Solutia Inc.*, 289 F.3d 1367, 1380 (Fed. Cir. 2002) (citing *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997)). "Working backward from a knowledge of [the claims]" to "derive written description support from an amalgam of disclosures plucked selectively" does not cut it. *See Novozymes A/S v. DuPont Nutrition Biosciences APS*, 723 F.3d 1336, 1349 (Fed. Cir. 2013). A person of ordinary skill in the art "must immediately discern the limitation at issue in the claims," *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000), "viewing the matter from the proper vantage point 'of one with no foreknowledge of the specific [limitation.]'" *Novozymes*, 723 F.3d at 1349 (quoting *In re Ruschig*, 379 F.2d 990, 995 (C.C.P.A. 1967)).

Other patent appeals courts have recognized this as well. Indeed, the Patent Trial and Appeal Board recently observed "[i]t is well-settled that one cannot disclose a forest in the original application, and then later pick a tree out of the forest and say here is my invention." *Ex parte Hassler et al.*, No. 2020-001367, 2020 WL 6781447, at *5 (P.T.A.B. Nov. 13, 2020) (quoting *Purdue Pharma*, 230 F.3d at 1326). In doing so, it extended an analogy made by the Court of Customs and Patent Appeals in reference to written description several decades ago:

> It is no help in finding a trail or in finding one's way through the woods where the trails have disappeared — or have not yet been made, which is more like the case here — to be confronted simply by a large number of unmarked trees. Appellants are pointing to trees. We are looking for blaze marks which single out particular trees. We see none.

In re Ruschig, 379 F.3d at 994–95. Likewise, we see none here. The trial evidence has made clear that the sentence describing Figure 5B would not allow a person of skill in the art to recognize that the inventor invented what is claimed — that is, overlapping zone scenes.

To help demonstrate, let's revisit how the Sonos 2005 prior art system worked. Recall, in 2005, if three zone players were grouped, two of those zone players would have been configured to play music in synchrony with one of those zone players. For example, if our hypothetical user wanted to play music in her dining room, living room, and bedroom, she would start with a "leader" zone player, say "Dining Room." Then, she would link another zone player, say "Living Room," at which point "Living Room" would be instantly configured to play music in synchrony with "Dining Room." And, then, she would link yet another zone player, say "Bedroom," at which point "Bedroom" would be instantly configured to play music in synchrony with "Dining Room" and, thereby, "Living Room." In this configuration, "Living Room" and "Bedroom" *were not connected to each other*. Rather, they were both connected to and configured to play music in synchrony with the "leader" zone player, "Dining Room."

Now, let's consider the zone scenes of the original UI documents, which the parties stipulate disclosed the claimed invention. If our user had invoked a first zone scene composed of the zone players in her dining room, living room, and bedroom, and she then invoked a second zone scene composed of the zone players in her dining room and bathroom, what would happen? (Note the overlap of the zone player in the dining room.) Would "Dining Room" keep playing music in the first zone scene configuration? Would the system tell the user that the second zone scene configuration was unavailable due to "Dining Room" already being in use? Would "Dining Room" switch over to the second zone scene configuration? *If so, what if "Dining Room" was the "leader" zone player?* How would the "Living Room" and "Bedroom" zone players know to stay grouped in the first zone scene configuration? None of these questions were addressed, much less solved, in the specification of the patents in suit. Yet these questions bristle upon consideration.

At trial, by contrast, Google explained how it was able to implement the claimed invention in 2015. Specifically, according to Google Engineer Kenneth MacKay, each zone player in its system was assigned a dynamic leader rating, and the zone player with the highest rating would serve as the leader for the zone scene — the one that the other zone players synchronized to. When a "leader" zone player was invoked in a second zone scene, the first zone scene would persist with a new "leader" zone player based on which remaining zone player had the highest leader rating. As such, the original "leader" zone player could move to another zone scene. To repeat, nothing in the specification of the patents in suit explained such a solution (or even recognized this problem). Meanwhile, Google considered four options for facilitating overlapping group membership and settled on this one (TX6454).

Before trial, a prior order rejected Google's arguments that claim 1 of the '885 patent was invalid for lack of written description (Dkt. No. 309 at 14–17). These arguments were raised in an opposition brief, and Sonos filed a reply brief that pointed to the sentence describing Figure 5B. Relying on that sentence, the prior order found sufficient written description support for limitations involving overlap. To repeat, the judge was not made aware in the briefing (or at the hearing, or otherwise until trial,) that this sentence had been inserted by amendment in August 2019. That, alone, would have been a red flag. But the judge was also not made aware that none of the earlier applications in the zone scene family had claimed overlap until 2019. Nor was the judge made aware of how the Sonos 2005 prior art system and Google's accused products grouped speakers by synchronizing to a "leader." Nor was the judge made aware that overlap was the lynchpin of the claimed invention. When the judge observed this at trial, and, in light of this, asked about the written description support for overlap, Sonos emphasized that what was inventive was "separating the defining of the group from the implementation of the group," *i.e.*, customizing, saving, and invoking (*see* Tr. 751:21–22). But the patent examiner clarified that this was not true.

Maybe this is beside the point now, given the rulings made earlier in this order. But Sonos has indicated that it may bring lawsuits against others in the industry based on these patents. It would be a miscarriage of justice for Sonos to assert that this district judge has

already found that written description was adequate when, with the benefit of the trial record, it has since become evident that it was inadequate. Accordingly, the part of the prior order on written description is **VACATED**. *See* Fed. R. Civ. P. 54(b).

CONCLUSION

It is wrong that our patent system was used in this way. With its constitutional underpinnings, this system is intended to promote and protect innovation. Here, by contrast, it was used to punish an innovator and to enrich a pretender by delay and sleight of hand. It has taken a full trial to learn this sad fact, but, at long last, a measure of justice is done.

In sum, under the doctrine of prosecution laches, the patents in suit are **UNENFORCEABLE**. What's more, they are anticipated by the accused products themselves on account of new matter having been inserted into the specification and are thus **INVALID**. And, the portion of the prior order on written description (Dkt. No. 309 at 14–17) is **VACATED**. In light of these holdings, all remaining affirmative defenses are **MOOT** and all post-trial motions are **DENIED AS MOOT**. Final judgment will be entered.

IT IS SO ORDERED.

Dated: October 6, 2023.

WILLIAM ALSUP
UNITED STATES DISTRICT JUDGE

United States District Court
Northern District of California

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SONOS, INC.,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

No. C 20-06754 WHA
No. C 21-07559 WHA

FINAL JUDGMENT

For the reasons stated in the accompanying order, final judgment is hereby entered in favor of Google LLC and against Sonos, Inc. in No. C 21-07559 WHA.

In No. C 20-06754 WHA, declaratory relief is hereby entered in favor of Google LLC and against Sonos, Inc. that: (1) United States Patent Nos. 10,848,885 and 10,469,966 are unenforceable due to prosecution laches, and (2) United States Patent Nos. 10,848,885 and 10,469,966 are invalid as anticipated by the accused products as measured by the adjusted priority date on account of new matter having been inserted into the specification.

The Clerk shall close the file.

IT IS SO ORDERED.

Dated: October 10, 2023.

WILLIAM ALSUP
UNITED STATES DISTRICT JUDGE

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

SONOS, INC.,

Plaintiff,

vs.

GOOGLE LLC,

Defendant.

Case No. 3:20-cv-06754-WHA
Consolidated with Case No. 3:21-cv-07559-WHA

~~[PROPOSED]~~ AMENDED FINAL JUDGMENT

Consistent with Google's unopposed motion to amend the judgment, previous rulings by the court, and agreements by the parties, the Court amends and supplements its judgment in these consolidated actions as follows:

1. Sonos's claims of infringement of U.S. Patent No. 9,344,206 were dismissed with prejudice. *Sonos, Inc. v. Google LLC*, No. 3:21-cv-07559-WHA ("Transferred Action"), Dkt. 151; *Sonos, Inc. v. Google LLC*, No. 3:20-cv-06754-WHA ("California Action"), Dkt. 132.

2. Sonos's claims of infringement of U.S. Patent No. 9,219,460 were dismissed without prejudice. *See* Transferred Action, Dkts. 50, 51.

3. Judgment is entered for Google and against Sonos that claim 13 of U.S. Patent No. 9,967,615 is not infringed and is invalid. *See* California Action, Dkts. 316, 566.

4. Judgment is entered for Google and against Sonos that claims 1, 2, 4, 9, 11, 12, 13, and 16 of U.S. Patent No. 10,779,033 are invalid. *See* California Action, Dkt. 566.

5. Google's claims for breach of contract and conversion and requests for related relief are dismissed without prejudice. *See* California Action, Dkts. 552, 566 at 31.

6. Judgment is entered for Google and against Sonos that claims 1, 2, 4, 6, and 8 of U.S. Patent No. 10,469,966 are invalid and the '966 patent is unenforceable. *See* California Action, Dkt. 868.

7. Judgment is entered for Google and against Sonos that claim 1 of U.S. Patent No. 10,848,885 is invalid and the '885 patent is unenforceable. *See* California Action, Dkt. 868.

Taxable costs will be addressed by separate order. Requests for attorneys' fees have been postponed by stipulation. *See* California Action, Dkt. 874. All other claims and requests for relief and any related defenses are denied as moot.

IT IS SO ORDERED.

DATED: November 14, 2023.

The Honorable William Alsup
United States District Court Judge

US009967615B2

(12) **United States Patent**
Coburn, IV et al.

(10) **Patent No.: US 9,967,615 B2**
(45) **Date of Patent: *May 8, 2018**

(54) **NETWORKED MUSIC PLAYBACK**

(71) Applicant: **Sonos, Inc**, Santa Barbara, CA (US)

(72) Inventors: **Arthur Coburn, IV**, Cambridge, MA (US); **Joni Hoadley**, Santa Barbara, CA (US)

(73) Assignee: **Sonos, Inc.**, Santa Barbara, 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. days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/628,952**

(22) Filed: **Feb. 23, 2015**

(65) **Prior Publication Data**

US 2015/0172756 A1 Jun. 18, 2015

Related U.S. Application Data

(63) Continuation of application No. 13/341,237, filed on Dec. 30, 2011, now Pat. No. 9,654,821.

(51) **Int. Cl.**
H04N 7/18 (2006.01)
H04N 21/436 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC ... ***H04N 21/43615*** (2013.01); ***H04L 65/4084*** (2013.01); ***H04N 21/4307*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 21/43615; H04N 21/6581; H04N 21/439; H04N 21/6125; H04N 21/64322;
(Continued)

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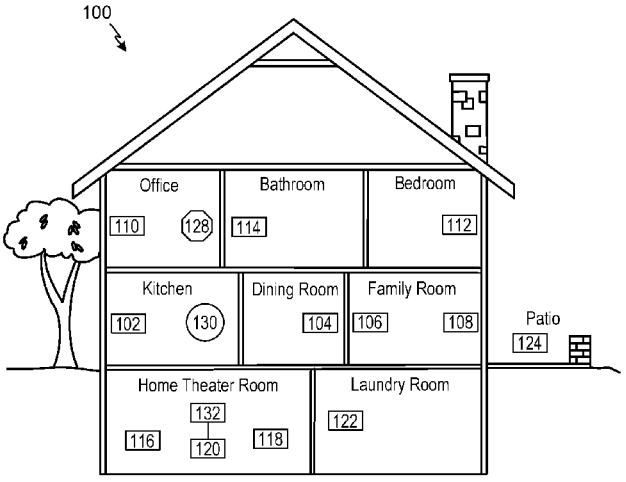
(74) *Attorney, Agent, or Firm* — McDonnell Boehnen Hulbert & Berghoff LLP

(57) **ABSTRACT**

Systems, methods, apparatus, and articles of manufacture to facilitate connection to a multimedia playback network are disclosed. An example method includes detecting a first input including an identification of a playback device; detecting a second input including an identification of an item on a controller, wherein multimedia content associated with the item is retrievable from a content provider; detecting a trigger, wherein the trigger is not the first input or the second input; and sending, in response to detecting the trigger, information regarding the multimedia content from the controller to the playback device, wherein the information includes an identification of the multimedia content for playback by the playback device, and wherein the information causes (a) the playback device to retrieve, independent of the controller, the multimedia content from the content provider and (b) playback of the retrieved multimedia content.

29 Claims, 11 Drawing Sheets



(51) **Int. Cl.**

H04N 21/658	(2011.01)
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H04N 21/61	(2011.01)
H04N 21/643	(2011.01)
H04N 21/6587	(2011.01)
H04N 21/472	(2011.01)
H04N 21/485	(2011.01)
H04N 21/81	(2011.01)
H04N 21/43	(2011.01)
H04N 21/433	(2011.01)
H04N 21/858	(2011.01)

(52) **U.S. Cl.**

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(58) **Field of Classification Search**

CPC H04N 21/6587; H04N 21/47202; H04N 21/4852; H04N 21/8113; H04N 21/4307; H04N 21/4333; H04N 21/8586; H04L 65/4084

See application file for complete search history.

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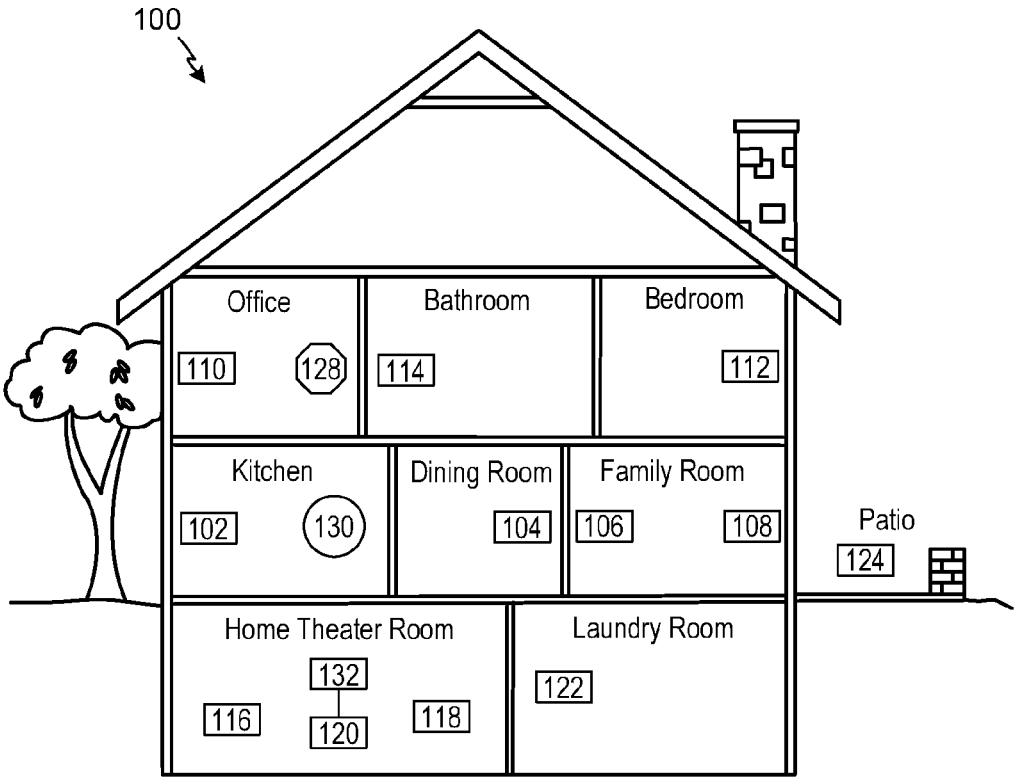
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Kitchen
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Patio
124
Home Theater Room
132
116
120
118
Laundry Room
122

FIGURE 1

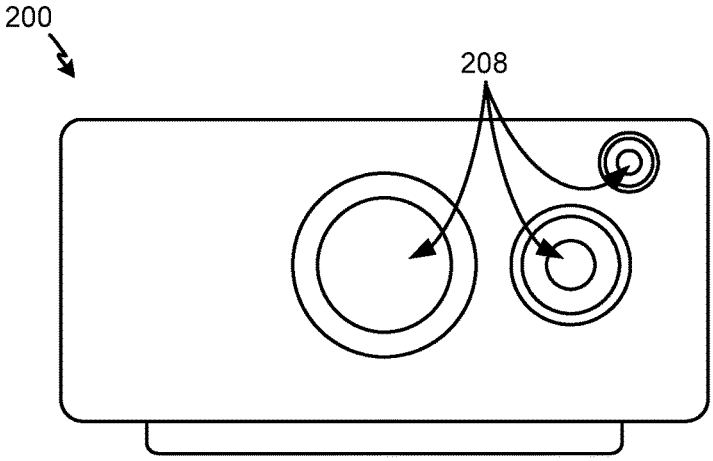


FIGURE 2A

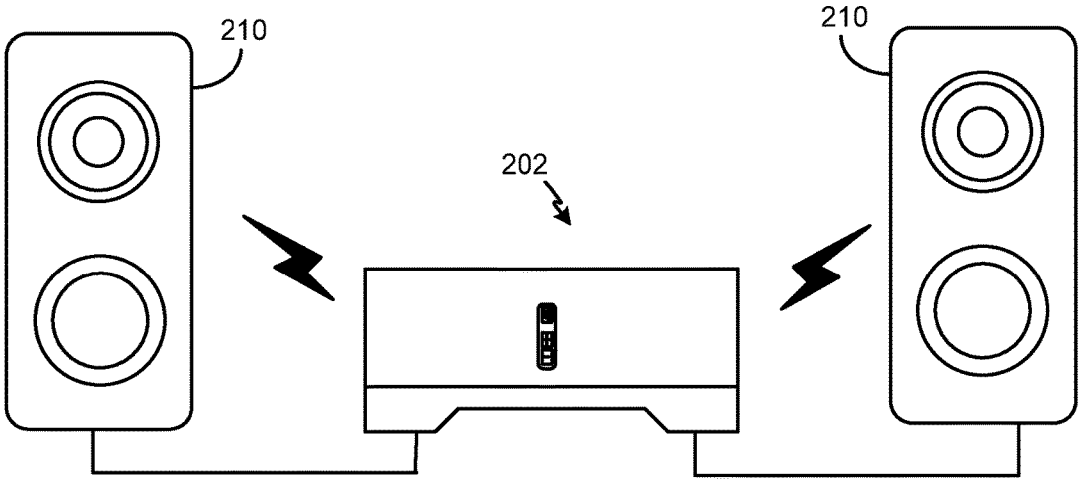


FIGURE 2B

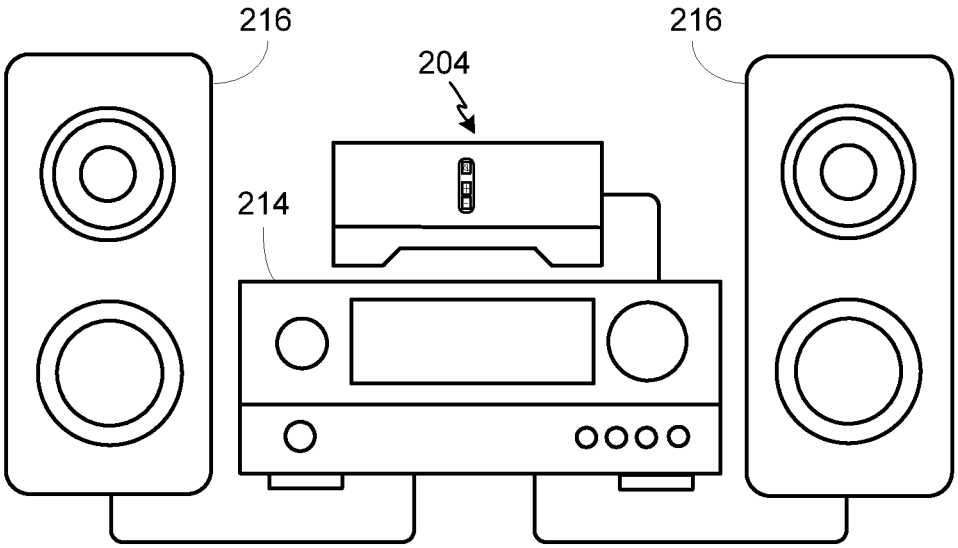


FIGURE 2C

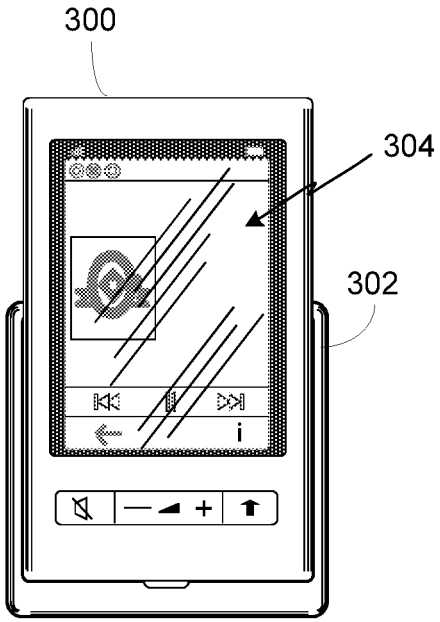
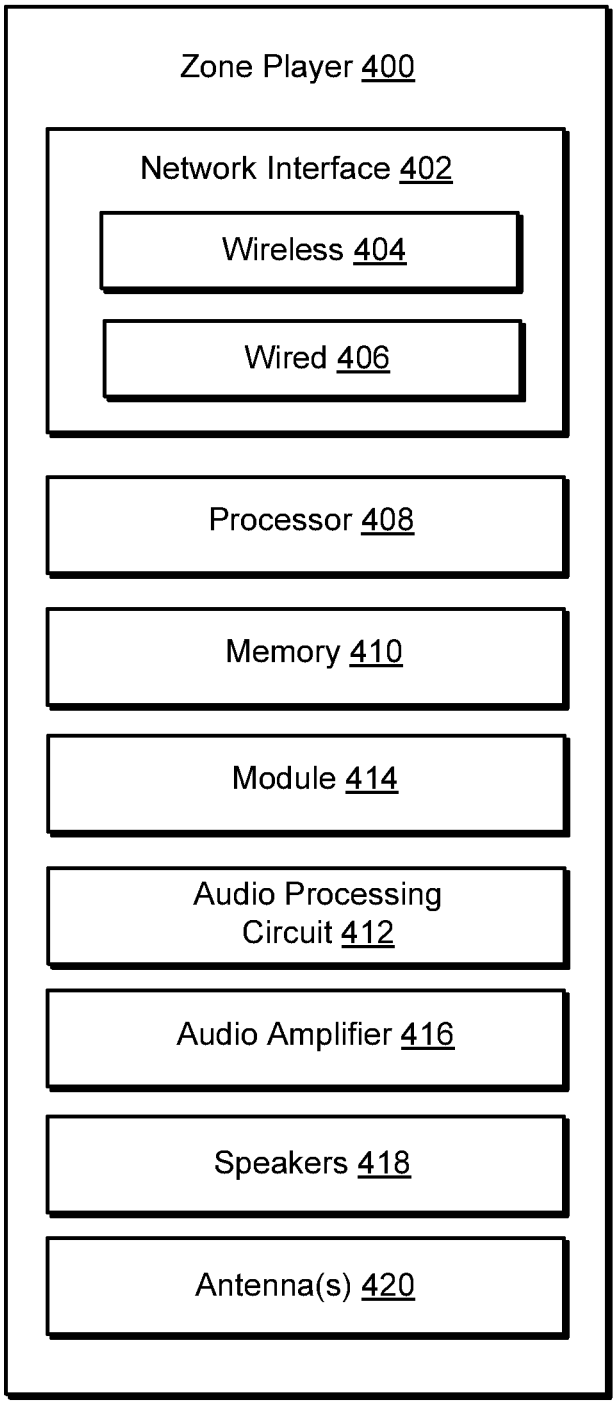


FIGURE 3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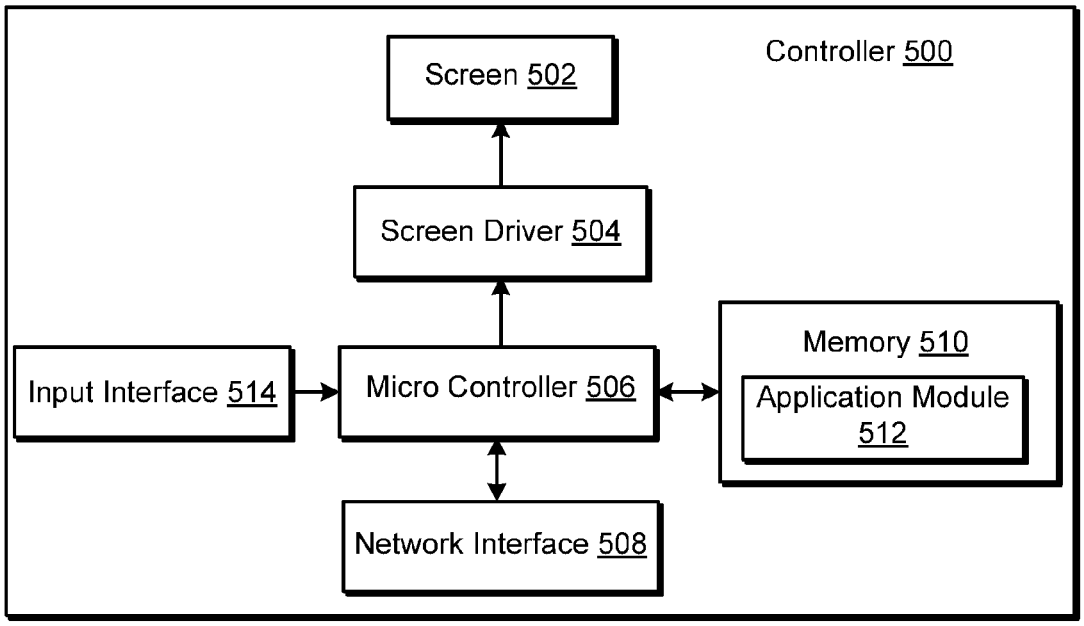
Network Interface 402
Wireless 404
Wired 406
Processor 408
Memory 410
Module 414
Audio Processing Circuit 412
Audio Amplifier 416
Speakers 418
Antenna(s) 420

FIGURE 4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Screen Driver 504
Input Interface 514
Micro Controller 506
Memory 510
Application Module 512
Network Interface 508

FIGURE 5

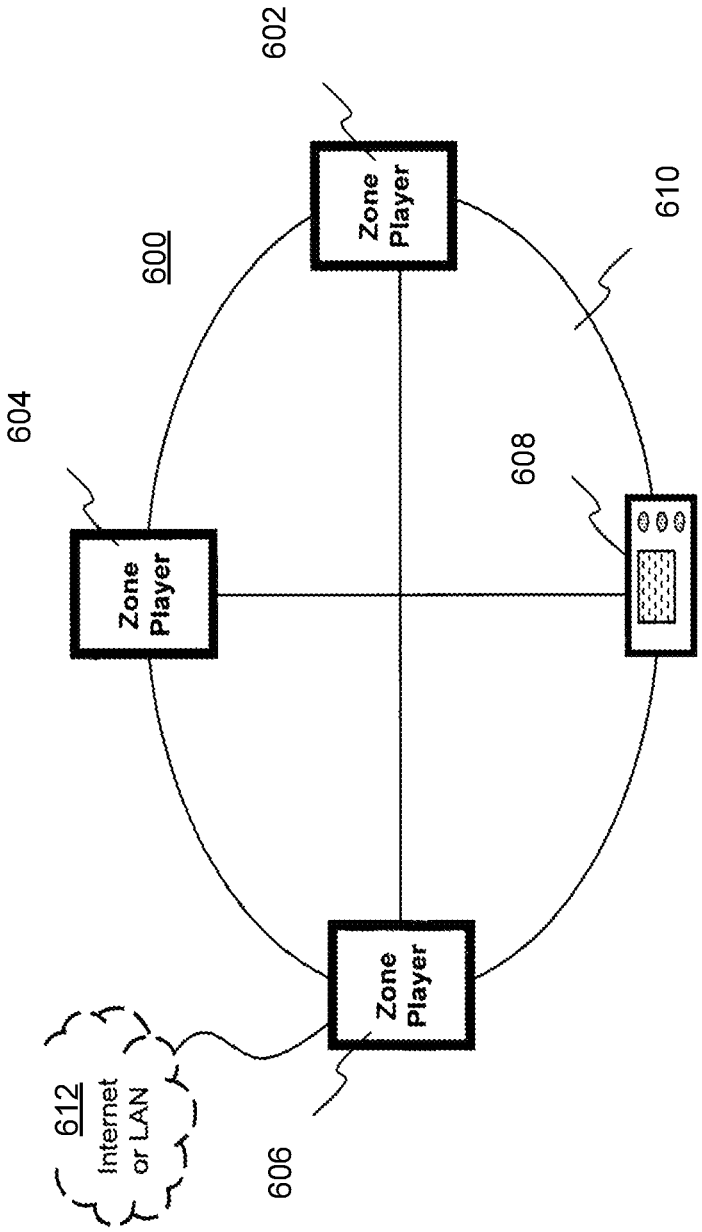
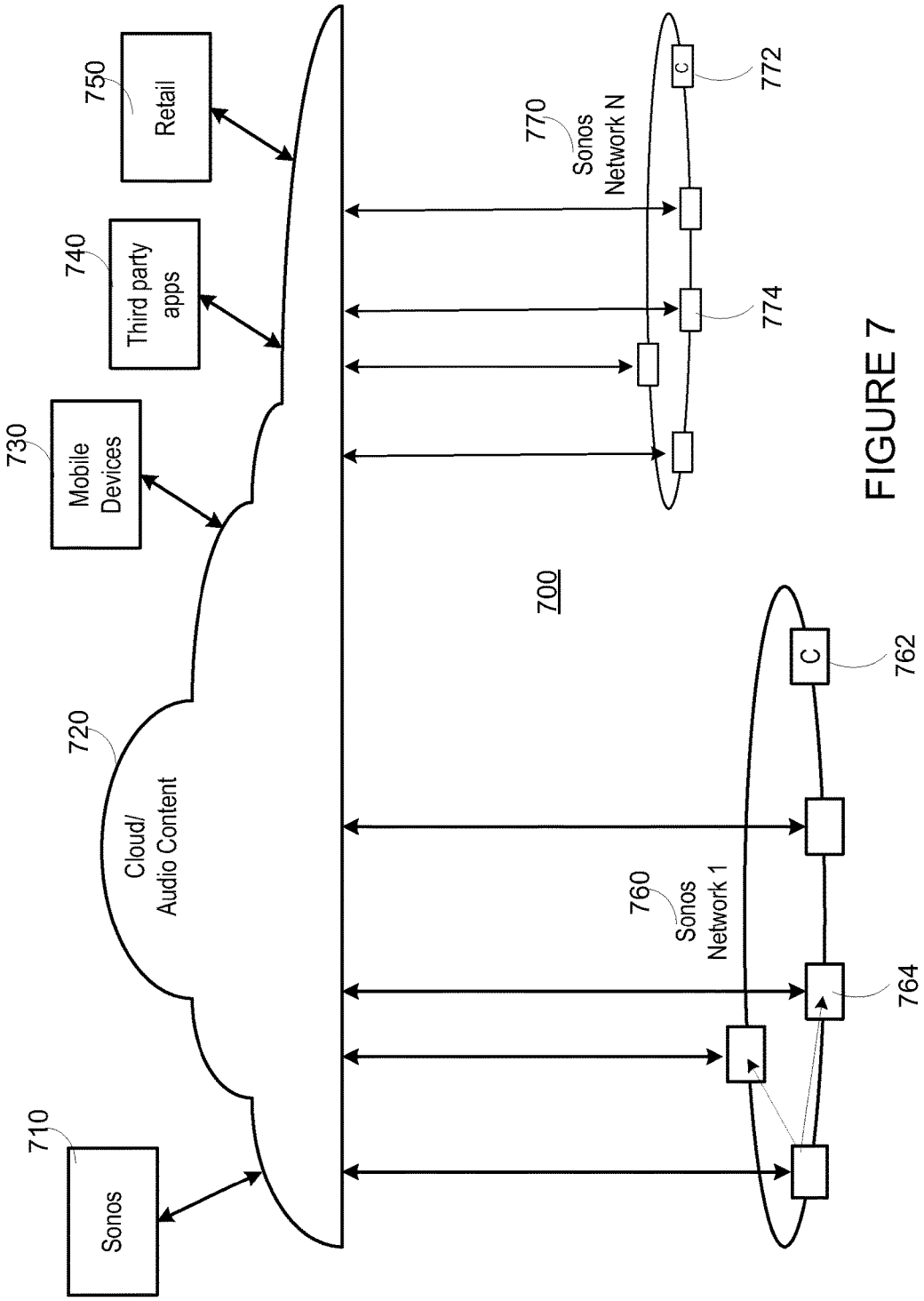

602
600
610
604
608
Zone Player
Zone Player
Zone Player
612
Internet or LAN
606

FIGURE 6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Mobile Devices
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Sonos Network 1
762
C
764

FIGURE 7

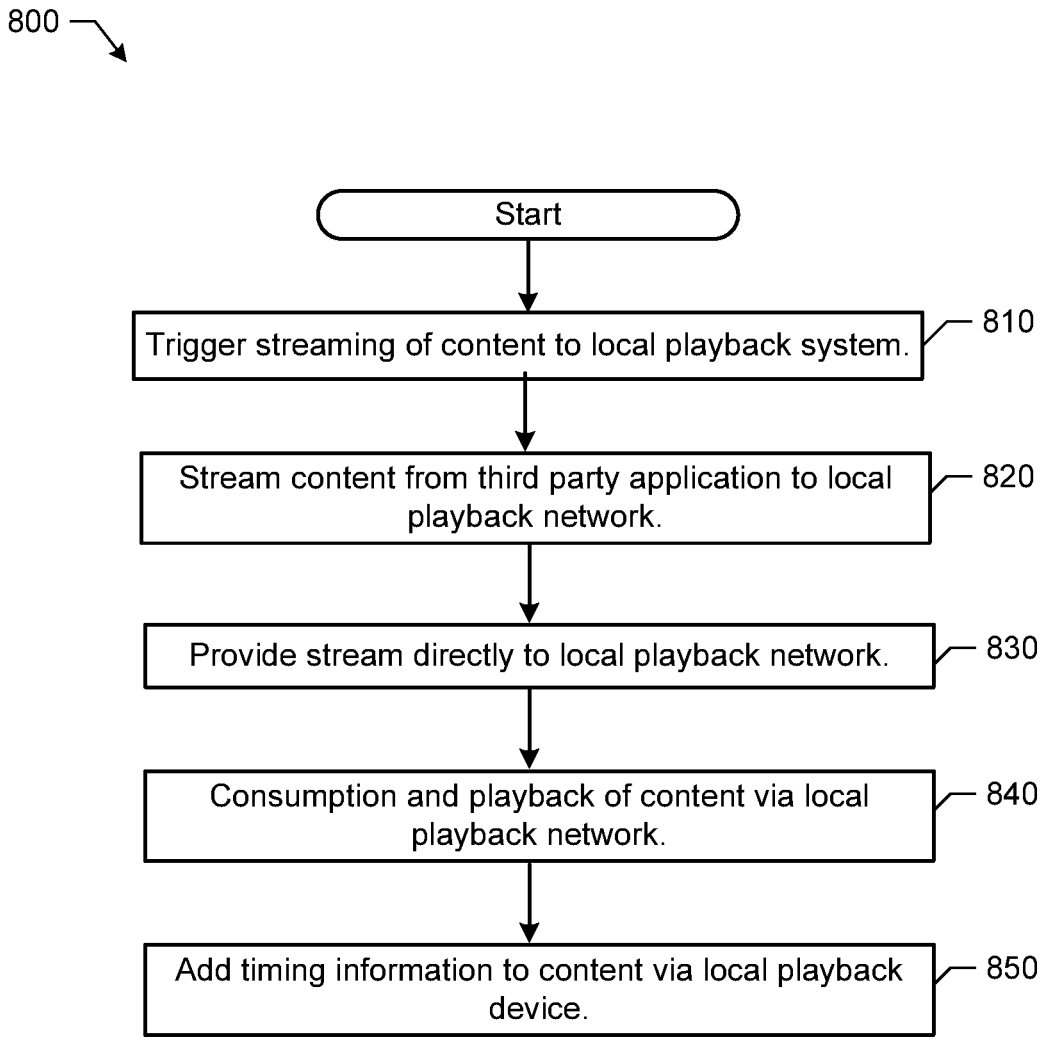
800
Start
Trigger streaming of content to local playback system.
810
Stream content from third party application to local playback network.
820
Provide stream directly to local playback network.
830
Consumption and playback of content via local playback network.
840
Add timing information to content via local playback device.
850

FIGURE 8

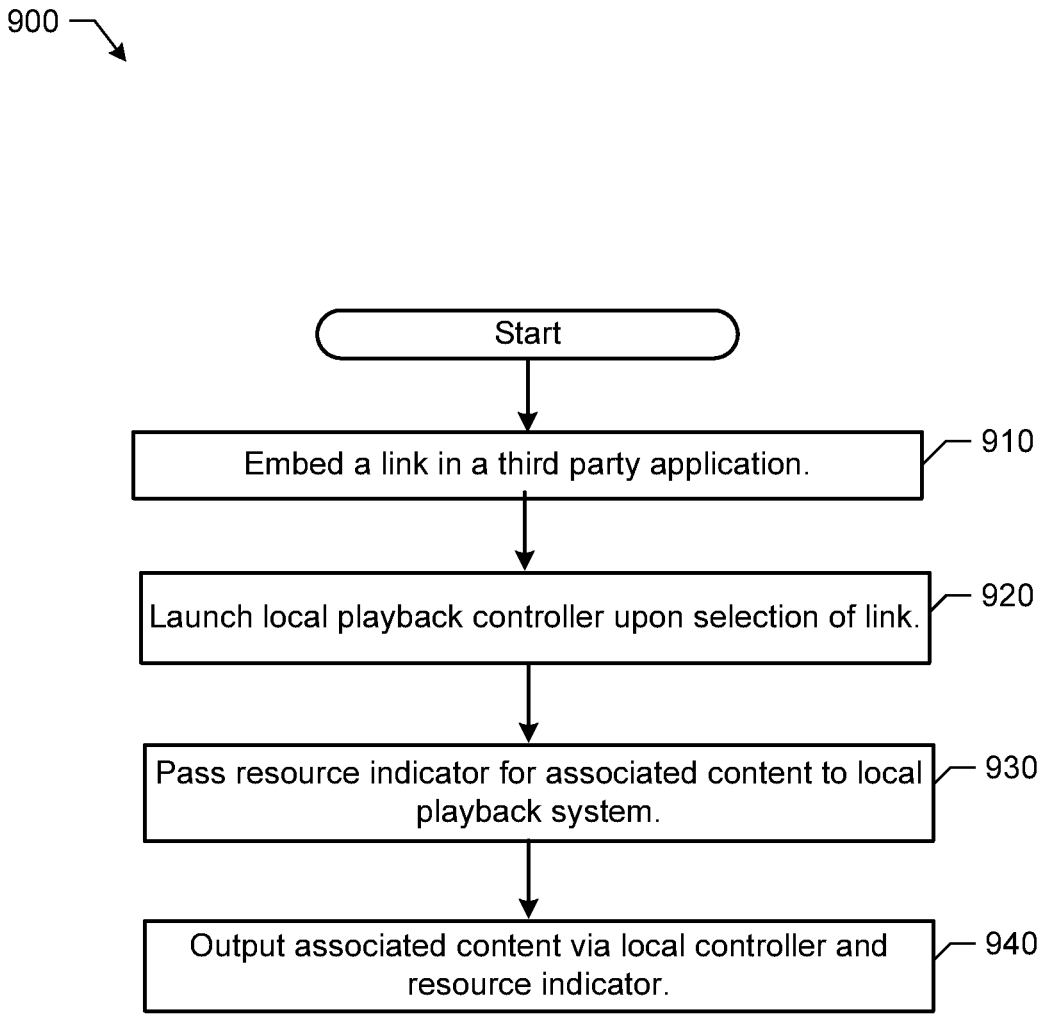
900
Start
Embed a link in a third party application.
910
Launch local playback controller upon selection of link.
920
Pass resource indicator for associated content to local playback system.
930
Output associated content via local controller and resource indicator.
940

FIGURE 9

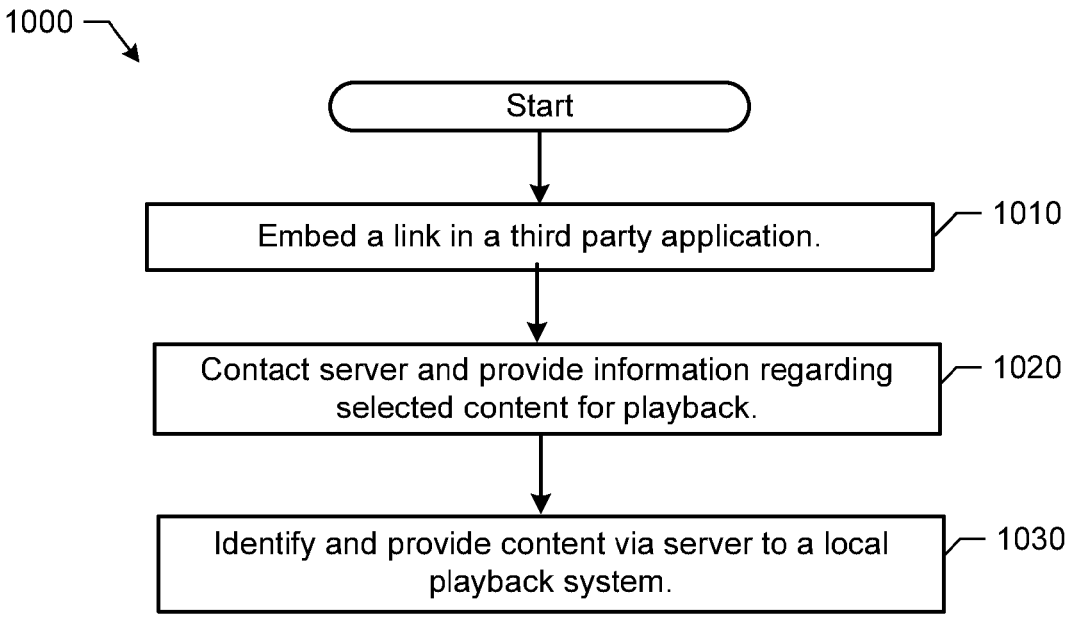
1000
Start
Embed a link in a third party application.
1010
Contact server and provide information regarding selected content for playback.
1020
Identify and provide content via server to a local playback system.
1030

FIGURE 10

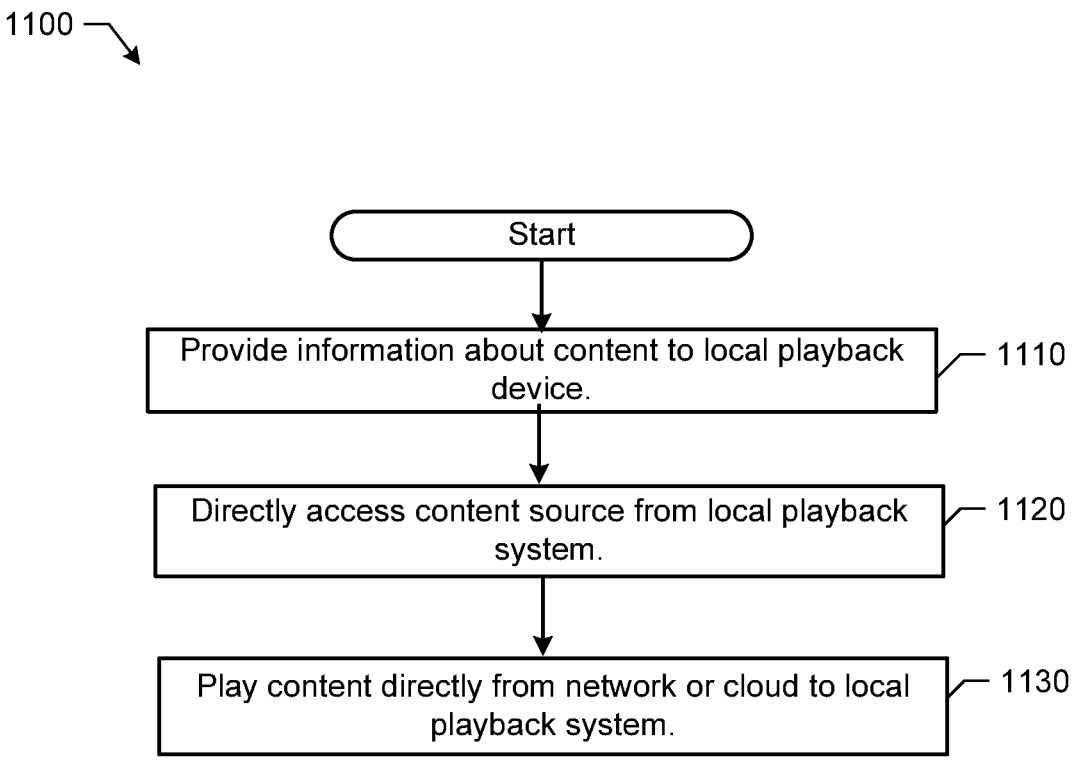
1100
Start
Provide information about content to local playback device.
1110
Directly access content source from local playback system.
1120
Play content directly from network or cloud to local playback system.
1130

FIGURE 11

NETWORKED MUSIC PLAYBACK

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of priority to U.S. Non-Provisional application Ser. No. 13/341,237, filed on Dec. 30, 2011, entitled "Systems and Methods for Networked Music Playback", which is hereby incorporated by reference in its entirety for all purposes.

FIELD OF THE DISCLOSURE

The disclosure is related to consumer electronics and, more particularly, to providing music for playback via one or more devices on a playback data network.

BACKGROUND

Technological advancements have increased the accessibility of music content, as well as other types of media, such as television content, movies, and interactive content. For example, a user can access audio, video, or both audio and video content over the Internet through an online store, an Internet radio station, an online music service, an online movie service, and the like, in addition to the more traditional avenues of accessing audio and video content. Demand for such audio and video content continues to surge. Given the high demand, technology used to access and play such content has likewise improved.

BRIEF DESCRIPTION OF THE DRAWINGS

Features, aspects, and advantages of the presently disclosed technology are better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. **1** shows an illustration of an example system in which embodiments of the methods and apparatus disclosed herein can be implemented;

FIG. **2**A shows an illustration of an example zone player having a built-in amplifier and speakers;

FIG. **2**B shows an illustration of an example zone player having a built-in amplifier and connected to external speakers;

FIG. **2**C shows an illustration of an example zone player connected to an A/V receiver and speakers;

FIG. **3** shows an illustration of an example controller;

FIG. **4** shows an internal functional block diagram of an example zone player;

FIG. **5** shows an internal functional block diagram of an example controller;

FIG. **6** shows an example ad-hoc playback network;

FIG. **7** shows a system including a plurality of networks including a cloud-based network and at least one local playback network; and

FIGS. **8-11** show flow diagrams for methods to provide audio content to a local playback system.

In addition, the drawings are for the purpose of illustrating example embodiments, but it is understood that the present disclosure is not limited to the arrangements and instrumentality shown in the drawings.

DETAILED DESCRIPTION

I. Overview

Wired or wireless networks can be used to connect one or more multimedia playback devices for a home or other location playback network (e.g., a home music system). Certain examples provide automatic configuration of parameters of a playback device to be coupled to a network with reduced or minimum human intervention. For example, a wired and/or wireless ad-hoc network is established to facilitate communications among a group of devices. Music and/or other multimedia content can be shared among devices and/or groups of devices (also referred to herein as zones) associated with a playback network.

Certain embodiments facilitate streaming or otherwise providing music from a music-playing application (e.g., browser-based application, native music player, other multimedia application, and so on) to a multimedia content playback (e.g., Sonos™) system. Certain embodiments provide simple, easy-to-use and secure systems and methods for multimedia content playback across a plurality of systems and locations. Certain embodiments facilitate integration between content partners and a playback system as well as supporting maintenance of such content and system.

Although the following discloses example systems, methods, apparatus, and articles of manufacture including, among other components, firmware and/or software executed on hardware, it should be noted that such systems, methods, apparatus, and/or articles of manufacture are merely illustrative and should not be considered as limiting. For example, it is contemplated that any or all of these firmware, hardware, and/or software components could be embodied exclusively in hardware, exclusively in software, exclusively in firmware, or in any combination of hardware, software, and/or firmware. Accordingly, while the following describes example systems, methods, apparatus, and/or articles of manufacture, the examples provided are not the only way(s) to implement such systems, methods, apparatus, and/or articles of manufacture.

When any of the appended claims are read to cover a purely software and/or firmware implementation, at least one of the elements in at least one example is hereby expressly defined to include a tangible medium such as a memory, DVD, CD, Blu-ray, and so on, storing the software and/or firmware.

Reference herein to "embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one example embodiment of the invention. The appearances of this phrase in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. As such, the embodiments described herein, explicitly and implicitly understood by one skilled in the art, can be combined with other embodiments.

Certain embodiments provide a method to provide content to a local playback network. The example method includes identifying multimedia content from a content provider. The example method includes passing information regarding the multimedia content to a local playback system including one or more multimedia playback devices in response to a trigger. The example method includes facilitating play of the multimedia content via a local playback network associated with the local playback system.

Certain embodiments provide a computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause the processor to implement a method to provide content to a local playback network. The example method includes identifying multimedia content from a content provider. The example method includes passing information regarding the multimedia content to a local playback system including one or

more multimedia playback devices in response to a trigger. The example method includes facilitating play of the multimedia content via a local playback network associated with the local playback system.

Certain embodiments provide a multimedia playback device including a wireless communication interface to communicate with a local playback network and a multimedia content source and a processor. The process is to identify multimedia content from the multimedia content source; pass information regarding the multimedia content to device on the local playback network in response to a trigger; and facilitate play of the multimedia content via the devices on the local playback network.

II. Example Environment

Referring now to the drawings, in which like numerals can refer to like parts throughout the figures, FIG. **1** shows an example system configuration **100** in which one or more of the method and/or apparatus disclosed herein can be practiced or implemented. By way of illustration, the system configuration **100** represents a home with multiple zones. Each zone, for example, represents a different room or space, such as an office, bathroom, bedroom, kitchen, dining room, family room, home theater room, utility or laundry room, and patio. While not shown here, a single zone can cover more than one room or space. One or more of zone players **102-124** are shown in each respective zone. A zone player **102-124**, also referred to as a playback device, multimedia unit, speaker, and so on, provides audio, video, and/or audiovisual output. A controller **130** (e.g., shown in the kitchen for purposes of illustration) provides control to the system configuration **100**. The system configuration **100** illustrates an example whole house audio system, though it is understood that the technology described herein is not limited to its particular place of application or to an expansive system like a whole house audio system **100** of FIG. **1**.

FIGS. **2**A, **2**B, and **2**C show example illustrations of zone players **200-204**. The zone players **200-204** of FIGS. **2**A, **2**B, and **2**C, respectively, can correspond to any of the zone players **102-124** of FIG. **1**. While certain embodiments provide multiple zone players, an audio output can be generated using only a single zone player. FIG. **2**A illustrates a zone player **200** including sound producing equipment **208** capable of generating sound or an audio output corresponding to a signal received (e.g., wirelessly and/or via a wired interface). The sound producing equipment **208** of the zone player **200** of FIG. **2**A includes a built-in amplifier (not shown in this illustration) and speakers (e.g., a tweeter, a mid-range driver, and/or a subwoofer). In certain embodiments, the zone player **200** of FIG. **2**A can be configured to play stereophonic audio or monaural audio. In some embodiments, the zone player **200** of FIG. **2**A can be configured as a component in a combination of zone players to play stereophonic audio, monaural audio, and/or surround audio. As described in greater detail below, in some embodiments, the example zone player **200** of FIG. **2**A can also transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on. Transmission of the second signal can be part of, for example, a system in which multiple zone players, speakers, receivers, and so on, form a network to, for example, present media content in a synchronization or distributed manner.

The example zone player **202** of FIG. **2**B includes a built-in amplifier (not shown in this illustration) to power a set of detached speakers **210**. The speakers **210** of FIG. **2**B can include, for example, any type of loudspeaker. The zone player **202** of FIG. **2**B can communicate a signal corresponding to audio content to the detached speakers **210** via wired and/or wireless channels. Instead of receiving and generating audio content as in FIG. **2**A, the zone player **202** of FIG. **2**B receives the audio content and transmits the same (e.g., after processing the received signal) to the detached speakers **210**. Similar to the example zone player **200** of FIG. **2**A, in some embodiments the zone player **202** can transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

The example zone player **204** of FIG. **2**C does not include an amplifier, but allows a receiver **214**, or another audio and/or video type device with built-in amplification, to connect to a data network **128** of FIG. **1** and to play audio received over the data network **128** via the receiver **214** and a set of detached speakers **216**. In addition to the wired couplings shown in FIG. **2**C, the detached speakers **216** can receive audio content via a wireless communication channel between the detached speakers **216** and, for example, the zone player **204** and/or the receiver **214**. In some embodiments the zone player **202** can transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

Example zone players include a "Sonos S5," "Sonos Play:5," "Sonos Play:3," "ZonePlayer 120," and "ZonePlayer 90," which are offered by Sonos, Inc. of Santa Barbara, Calif. Any other past, present, and/or future zone players can additionally or alternatively be used to implement the zone players of example embodiments disclosed herein. A zone player can also be referred to herein as a playback device, and a zone player is not limited to the particular examples illustrated in FIGS. **2**A, **2**B, and **2**C. For example, a zone player can include a wired or wireless headphone. In other examples, a zone player might include a subwoofer. In yet other examples, a zone player can include a sound bar. In an example, a zone player can include or interact with a docking station for an Apple iPod™ or similar device. In some embodiments, a zone player can relay one or more signals received from, for example, a first zone player to another playback device. In some embodiments, a zone player can receive a first signal and generate an output corresponding to the first signal and, simultaneously or separately, can receive a second signal and transmit or relay the second signal to another zone player(s), speaker(s), receiver(s), and so on. Thus, an example zone player described herein can act as a playback device and, at the same time, operate as a hub in a network of zone players. In such instances, media content corresponding to the first signal can be different from the media content corresponding to the second signal.

FIG. **3** shows an example illustration of a wireless controller **300** in a docking station **302**. The controller **300** can correspond to the controlling device **130** of FIG. **1**. The controller **300** is provided with a touch screen **304** that allows a user to interact with the controller **300**, for example, to retrieve and navigate a playlist of audio items, control operations of one or more zone players, and provide overall control of the system configuration **100**. In certain embodiments, any number of controllers can be used to control the system configuration **100**. In certain embodiments, there can be a limit on the number of controllers that can control the system configuration **100**. The controllers might be wireless like wireless controller **300** or wired to the data network **128**. Furthermore, an application running on any network-enabled portable devices, such as an iPhone™ iPad™

Android™ powered phone, or any other smart phone or network-enabled device can be used as a controller by connecting to the data network **128**. An application running on a laptop or desktop PC or Mac can also be used as a controller. Example controllers include a "Sonos® Controller 200," "Sonos® Controller for iPhone," "Sonos® Controller for iPad," "Sonos® Controller for Android, "Sonos® Controller for Mac or PC," which are offered by Sonos, Inc. of Santa Barbara, Calif. The flexibility of such an application and its ability to be ported to a new type of portable device is advantageous.

Referring back to the system configuration **100** of FIG. **1**, a particular zone can contain one or more zone players. For example, the family room of FIG. **1** contains two zone players **106** and **108**, while the kitchen is shown with one zone player **102**. Zones can be dynamically configured by positioning a zone player in a room or space and assigning via the controller **130** the zone player to a new or existing zone. As such, zones can be created, combined with another zone, removed, and given a specific name (e.g., "Kitchen"), if so programmed. The zone players **102** to **124** are coupled directly or indirectly to a data network, such as the data network **128** shown in FIG. **1**. The data network **128** is represented by an octagon in the figure to stand out from other components shown in the figure. While the data network **128** is shown in a single location, it is understood that such a network can be distributed in and around the system configuration **100**.

Particularly, the data network **128** can be a wired network, a wireless network, or a combination of both. In some embodiments, one or more of the zone players **102-124** are wirelessly coupled to the data network **128** based on a proprietary mesh network. In some embodiments, one or more of the zone players **102-124** are wirelessly coupled to the data network **128** using a non-mesh topology. In some embodiments, one or more of the zone players **102-124** are coupled via a wire to the data network **128** using Ethernet or similar technology. In addition to the one or more zone players **102-124** connecting to the data network **128**, the data network **128** can further allow access to a wide area network, such as the Internet.

In certain embodiments, the data network **128** can be created by connecting any of the zone players **102-124**, or some other connecting device, to a broadband router. Other zone players **102-124** can then be added wired or wirelessly to the data network **128**. For example, a zone player (e.g., any of zone players **102-124**) can be added to the system configuration **100** by simply pressing a button on the zone player itself, which enables a connection to be made to the data network **128**. The broadband router can be connected to an Internet Service Provider (ISP), for example. The broadband router can be used to form another data network within the system configuration **100**, which can be used in other applications (e.g., web surfing). The data network **128** can also be used in other applications, if so programmed. Further, in certain embodiments, the data network **128** is the same network used for other applications in the household.

In certain embodiments, each zone can play from the same audio source as another zone or each zone can play from a different audio source. For example, someone can be grilling on the patio and listening to jazz music via zone player **124**, while someone is preparing food in the kitchen and listening to classical music via zone player **102**. Further, someone can be in the office listening to the same jazz music via zone player **110** that is playing on the patio via zone player **124**. In some embodiments, the jazz music played via zone players **110** and **124** is played in synchrony. Synchronizing playback amongst zones allows for someone to pass through zones while seamlessly listening to the audio. Further, zones can be put into a "party mode" such that all associated zones will play audio in synchrony.

In certain embodiments, a zone contains two or more zone players. For example, the family room contains two zone players **106** and **108**, and the home theater room contains at least zone players **116**, **118**, and **120**. A zone can be configured to contain as many zone players as desired, and for example, the home theater room might contain additional zone players to play audio from a 5.1 channel or greater audio source (e.g., a movie encoded with 5.1 or greater audio channels). If a zone contains two or more zone players, such as the two zone players **106** and **108** in the family room, then the two zone players **106** and **108** can be configured to play the same audio source in synchrony, or the two zone players **106** and **108** can be paired to play two separate sounds in left and right channels, for example. In other words, the stereo effects of a sound can be reproduced or enhanced through the two zone players **106** and **108**, one for the left sound and the other for the right sound. In certain embodiments, paired zone players can play audio in synchrony with other zone players.

In certain embodiments, three or more zone players can be configured to play various channels of audio that is encoded with three channels or more sound. For example, the home theater room shows zone players **116**, **118**, and **120**. If the sound is encoded as 2.1 channel audio, then the zone player **116** can be configured to play left channel audio, the zone player **118** can be configured to play right channel audio, and the zone player **120** can be configured to play bass frequencies. Other configurations are possible and depend on the number of zone players and the type of audio. Further, a particular zone can be configured to play a 5.1 channel audio in one instance, such as when playing audio from a movie, and then dynamically switch to play stereo, such as when playing audio from a two channel source.

In certain embodiments, two or more zone players can be sonically consolidated to form a single, consolidated zone player. A consolidated zone player (though made up of multiple, separate devices) can be configured to process and reproduce sound differently than an unconsolidated zone player or zone players that are paired, because a consolidated zone player will have additional speaker drivers from which sound can be passed. The consolidated zone player can further be paired with a single zone player or yet another consolidated zone player. Each playback device of a consolidated playback device is preferably set in a consolidated mode.

According to some embodiments, one can continue to do any of: group, consolidate, and pair zone players, for example, until a desired configuration is complete. The actions of grouping, consolidation, and pairing are preferably performed through a control interface, such as using controller **130**, and not by physically connecting and reconnecting speaker wire, for example, to individual, discrete speakers to create different configurations. As such, certain embodiments described herein provide a more flexible and dynamic platform through which sound reproduction can be offered to the end-user.

Sources of audio content to be played by zone players **102-124** are numerous. Music from a personal library stored on a computer or networked-attached storage (NAS) can be accessed via the data network **128** and played. Internet radio stations, shows, and podcasts can be accessed via the data network **128**. Music services that let a user stream and download music and audio content can be accessed via the

data network **128**. Further, music can be obtained from traditional sources, such as a turntable or CD player, via a line-in connection to a zone player, for example. Audio content can also be accessed through AirPlay™ wireless technology by Apple, Inc., for example. Audio content received from one or more sources can be shared amongst the zone players **102** to **124** via the data network **128** and/or the controller **130**. The above-disclosed sources of audio content are referred to herein as network-based audio information sources. However, network-based audio information sources are not limited thereto.

The example home theater zone players **116**, **118**, **120** are coupled to an audio information source such as a television **132**. In some examples, the television **132** is used as a source of audio for the home theater zone players **116**, **118**, **120**, while in other examples audio information from the television **132** can be shared with any of the zone players **102-124** in the audio system **100**.

III. Example Playback Device

Referring now to FIG. **4**, there is shown an example functional block diagram of a zone player **400** in accordance with an embodiment. The zone player **400** of FIG. **4** includes a network interface **402**, a processor **408**, a memory **410**, an audio processing component **412**, a module **414**, an audio amplifier **416**, and a speaker unit **418** coupled to the audio amplifier **416**. FIG. **2**A shows an example illustration of such a zone player. Other types of zone players can not include the speaker unit **418** (e.g., such as shown in FIG. **2**B) or the audio amplifier **416** (e.g., such as shown in FIG. **2**C). Further, it is contemplated that the zone player **400** can be integrated into another component. For example, the zone player **400** could be constructed as part of a lamp for indoor or outdoor use.

Referring back to FIG. **4**, the network interface **402** facilitates a data flow between zone players and other devices on a data network (e.g., the data network **128** of FIG. **1**) and the zone player **400**. In some embodiments, the network interface **402** can manage the assembling of an audio source or file into smaller packets that are to be transmitted over the data network or reassembles received packets into the original source or file. In some embodiments, the network interface **402** can further handle the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **400**. Accordingly, in certain embodiments, each of the packets includes an Internet Protocol (IP)-based source address as well as an IP-based destination address.

In some embodiments, the network interface **402** can include one or both of a wireless interface **404** and a wired interface **406**. The wireless interface **404**, also referred to as an RF interface, provides network interface functions for the zone player **400** to wirelessly communicate with other devices (e.g., other zone player(s), speaker(s), receiver(s), component(s) associated with the data network **128**, and so on) in accordance with a communication protocol (e.g., any of the wireless standards IEEE 802.11a, 802.11b, 802.11g, 802.11n, or 802.15). To receive wireless signals and to provide the wireless signals to the wireless interface **404** and to transmit wireless signals, the zone player **400** of FIG. **4** includes one or more antennas **420**. The wired interface **406** provides network interface functions for the zone player **400** to communicate over a wire with other devices in accordance with a communication protocol (e.g., IEEE 802.3). In some embodiments, a zone player includes both of the interfaces **404** and **406**. In some embodiments, a zone player **400** includes only the wireless interface **404** or the wired interface **406**.

In some embodiments, the processor **408** is a clock-driven electronic device that is configured to process input data according to instructions stored in memory **410**. The memory **410** is data storage that can be loaded with one or more software modules **414**, which can be executed by the processor **408** to achieve certain tasks. In the illustrated embodiment, the memory **410** is a tangible machine readable medium storing instructions that can be executed by the processor **408**. In some embodiments, a task might be for the zone player **400** to retrieve audio data from another zone player or a device on a network. In some embodiments, a task might be for the zone player **400** to send audio data to another zone player or device on a network. In some embodiments, a task might be for the zone player **400** to synchronize playback of audio with one or more additional zone players. In some embodiments, a task might be to pair the zone player **400** with one or more zone players to create a multi-channel audio environment. Additional or alternative tasks can be achieved via the one or more software modules **414** and the processor **408**.

The audio processing component **412** can include one or more digital-to-analog converters (DAC), an audio preprocessing component, an audio enhancement component or a digital signal processor, and so on. In certain embodiments, the audio that is retrieved via the network interface **402** is processed and/or intentionally altered by the audio processing component **412**. Further, the audio processing component **412** can produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier **416** for play back through speakers **418**. In addition, the audio processing component **412** can include necessary circuitry to process analog or digital signals as inputs to play from zone player **400**, send to another zone player on a network, or both play and send to another zone player on the network. An example input includes a line-in connection (e.g., an auto-detecting 3.5 mm audio line-in connection).

The audio amplifier **416** is a device that amplifies audio signals to a level for driving one or more speakers **418**. The one or more speakers **418** can include an individual transducer (e.g., a "driver") or a complete speaker system that includes an enclosure including one or more drivers. A particular driver can be a subwoofer (for low frequencies), a mid-range driver (middle frequencies), and a tweeter (high frequencies), for example. An enclosure can be sealed or ported, for example.

A zone player **400** can also be referred to herein as a playback device. An example playback device includes a Sonos® Play:5, which is manufactured by Sonos, Inc. of Santa Barbara, Calif. The Play:5 is an example zone player with a built-in amplifier and speakers. In particular, the Play:5 is a five-driver speaker system that includes two tweeters, two mid-range drivers, and one subwoofer. When playing audio content via the Play:5, the left audio data of a track is sent out of the left tweeter and left mid-range driver, the right audio data of a track is sent out of the right tweeter and the right mid-range driver, and mono bass is sent out of the subwoofer. Further, both mid-range drivers and both tweeters have the same equalization (or substantially the same equalization). That is, they are both sent the same frequencies, just from different channels of audio. Audio from Internet radio stations, online music and video services, downloaded music, analog audio inputs, television, DVD, and so on, can be played from a Sonos® Play:5. While the Play:5 is an example of a zone player with

speakers, it is understood that a zone player with speakers is not limited to one with a certain number of speakers (e.g., five speakers as in the Play:5), but rather can contain one or more speakers. Further, a zone player can be part of another device, which might even serve a purpose different than audio (e.g., a lamp).

IV. Example Controller

Referring now to FIG. **5**, there is shown an example controller **500**, which can correspond to the controlling device **130** in FIG. **1**. The controller **500** can be used to facilitate the control of multi-media applications, automation and others in a system. In particular, the controller **500** is configured to facilitate a selection of a plurality of audio sources available on the network and enable control of one or more zone players (e.g., the zone players **102-124** in FIG. **1**) through a wireless network interface **508**. According to one embodiment, the wireless communications is based on an industry standard (e.g., infrared, radio, wireless standards IEEE 802.11a, 802.11b 802.11g, 802.11n, or 802.15). Further, when a particular audio is being accessed via the controller **500** or being played via a zone player, a picture (e.g., album art) or any other data, associated with the audio source can be transmitted from a zone player or other electronic device to the controller **500** for display.

The controller **500** is provided with a screen **502** and an input interface **514** that allows a user to interact with the controller **500**, for example, to navigate a playlist of many multimedia items and to control operations of one or more zone players. The screen **502** on the controller **500** can be an LCD screen, for example. The screen **500** communicates with and is commanded by a screen driver **504** that is controlled by a microcontroller (e.g., a processor) **506**. The memory **510** can be loaded with one or more application modules **512** that can be executed by the microcontroller **506** with or without a user input via the user interface **514** to achieve certain tasks. In some embodiments, an application module **512** is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for audio play back. In some embodiments, an application module **512** is configured to control the audio sounds (e.g., volume) of the zone players in a zone group. In operation, when the microcontroller **506** executes one or more of the application modules **512**, the screen driver **504** generates control signals to drive the screen **502** to display an application specific user interface accordingly.

The controller **500** includes a network interface **508** that facilitates wireless communication with a zone player. In some embodiments, the commands such as volume control and audio playback synchronization are sent via the network interface **508**. In some embodiments, a saved zone group configuration is transmitted between a zone player and a controller via the network interface **508**. The controller **500** can control one or more zone players, such as **102-124** of FIG. **1**. There can be more than one controller for a particular system. Further, a controller can be integrated into a zone player.

It should be noted that other network-enabled devices such as an iPhone®, iPad® or any other smart phone or network-enabled device (e.g., a networked computer such as a PC or Mac®) can also be used as a controller to interact or control zone players in a particular environment. In some embodiments, a software application or upgrade can be downloaded onto a network enabled device to perform the functions described herein.

In certain embodiments, a user can create a zone group including at least two zone players from the controller **500**. The zone players in the zone group can play audio in a synchronized fashion, such that all of the zone players in the zone group play back an identical audio source or a list of identical audio sources in a synchronized manner such that no (or substantially no) audible delays or hiccups could be heard. Similarly, in some embodiments, when a user increases the audio volume of the group from the controller **500**, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume.

A user via the controller **500** can group zone players into a zone group by activating a "Link Zones" or "Add Zone" soft button, or de-grouping a zone group by activating an "Unlink Zones" or "Drop Zone" button. For example, one mechanism for 'joining' zone players together for audio play back is to link a number of zone players together to form a group. To link a number of zone players together, a user can manually link each zone player or room one after the other. For example, assume that there is a multi-zone system that includes the following zones: Bathroom, Bedroom, Den, Dining Room, Family Room, and Foyer.

In certain embodiments, a user can link any number of the six zone players, for example, by starting with a single zone and then manually linking each zone to that zone.

In certain embodiments, a set of zones can be dynamically linked together using a command to create a zone scene or theme (subsequent to first creating the zone scene). For instance, a "Morning" zone scene command can link the Bedroom, Office, and Kitchen zones together in one action. Without this single command, the user would need to manually and individually link each zone. The single command might include a mouse click, a double mouse click, a button press, a gesture, or some other programmed action. Other kinds of zone scenes can be programmed.

In certain embodiments, a zone scene can be triggered based on time (e.g., an alarm clock function). For instance, a zone scene can be set to apply at 8:00 am. The system can link appropriate zones automatically, set specific music to play, and then stop the music after a defined duration. Although any particular zone can be triggered to an "On" or "Off" state based on time, for example, a zone scene enables any zone(s) linked to the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time and/or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed Universal Plug and Play (UPnP), no Internet connection for an Internet Radio station, and so on), a backup buzzer can be programmed to sound. The buzzer can include a sound file that is stored in a zone player, for example.

V. Example Ad-Hoc Network

Certain particular examples will now be provided in connection with FIGS. **6-8**B to describe, for purposes of illustration only, certain base systems and methods to provide and facilitate connection to a playback network. FIG. **6** shows that there are three zone players **602**, **604** and **606** and a controller **608** that form a network branch that is also referred to as an Ad-Hoc network **610**. The network **610** may be wireless, wired, or a combination of wired and wireless. In general, an Ad-Hoc (or "spontaneous") network is a local area network or other small network in which there is no one access point for all traffic. With an established Ad-Hoc network **610**, the devices **602**, **604**, **606** and **608** can all

communicate with each other in a "peer-to-peer" style of communication, for example. Furthermore, devices may come/and go from the network **610**, and the network **610** will automatically reconfigure itself without needing the user to reconfigure the network **610**.

Using the Ad-Hoc network **610**, the devices **602**, **604**, **606**, and **608** can share or exchange one or more audio sources and be grouped to play the same or different audio sources. For example, the devices **602** and **604** are grouped to playback one piece of music, and at the same time, the device **606** plays back another piece of music. In other words, the devices **602**, **604**, **606** and **608**, as shown in FIG. **6**, form a HOUSEHOLD that distributes audio and/or reproduces sound. As used herein, the term HOUSEHOLD (provided in uppercase letters to disambiguate from the user's domicile) is used to represent a collection of networked devices that are cooperating to provide an application or service. An instance of a HOUSEHOLD is identified with a household **10** (or household identifier).

In certain embodiments, a household identifier (HHID) is a short string or an identifier that is computer-generated to help ensure that it is unique. Accordingly, the network **610** can be characterized by a unique HHID and a unique set of configuration variables or parameters, such as channels (e.g., respective frequency bands), SSID (a sequence of alphanumeric characters as a name of a wireless network), and WEP keys (wired equivalent privacy or other security keys). In certain embodiments, SSID is set to be the same as HHID.

In certain embodiments, each HOUSEHOLD includes two types of network nodes: a control point (CP) and a zone player (ZP). The control point controls an overall network setup process and sequencing, including an automatic generation of required network parameters (e.g., WEP keys). In an embodiment, the CP also provides the user with a HOUSEHOLD configuration user interface. The CP function can be provided by a computer running a CP application module, or by a handheld controller (e.g., the controller **308**) also running a CP application module, for example. The zone player is any other device on the network that is placed to participate in the automatic configuration process. The ZP, as a notation used herein, includes the controller **308** or a computing device, for example.

In certain embodiments, configuration of a HOUSEHOLD involves multiple CPs and ZPs that rendezvous and establish a known configuration such that they can use a standard networking protocol (e.g., IP over Wired or Wireless Ethernet) for communication. In an embodiment, two types of networks/protocols are employed: Ethernet 802.3 and Wireless 802.11g. Interconnections between a CP and a ZP can use either of the networks/protocols. A device in the system as a member of a HOUSEHOLD can connect to both networks simultaneously. In an environment that has both networks in use, it is assumed that at least one device in a system is connected to both as a bridging device, thus providing bridging services between wired/wireless networks for others. The zone player **606** in FIG. **6** is shown to be connected to both networks, for example. The connectivity to the network **612** is based on Ethernet while the connectivity to other devices **602**, **604** and **608** is based on Wireless. It is understood, however, that in some embodiments each zone player **606**, **604**, **602** may access the Internet when retrieving media from the cloud (e.g., Internet) via the bridging device. For example, zone player **602** may contain a uniform resource locator (URL) that specifies an address to a particular audio track in the cloud. Using the URL, the zone player **602** may retrieve the audio track from the cloud, and ultimately play the audio out of one or more zone players.

VI. Example Music Sharing and Playback Configuration

Certain embodiments enable a user to stream music from a music-playing application (e.g., browser-based application, native music player, other multimedia application, and so on) to a local multimedia content playback (e.g., Sonos™) system. Certain embodiments provide secure systems and methods for multimedia content playback across a plurality of systems and locations. Certain embodiments facilitate integration between content partners and a playback system as well as supporting maintenance of such content and system.

FIG. **7** shows a system including a plurality of networks including a cloud-based network and at least one local playback network. The network includes a plurality of playback devices or players, though it is understood that the network may contain only one playback device. In certain embodiments, each player has an ability to retrieve its content for playback. Control and content retrieval can be distributed or centralized, for example. Input can include streaming content provider input, third party application input, mobile device input, user input, and/or other playback network input into the cloud for local distribution and playback.

As illustrated by the example system **700** of FIG. **7**, a plurality of content providers **720**-**750** can be connected to one or more local playback networks **760**-**770** via a cloud and/or other network **710**. Using the cloud **710**, a multimedia playback system **720** (e.g., Sonos™), a mobile device **730**, a third party application **740**, a retail location **750**, and so on can provide multimedia content (requested or otherwise) to local playback networks **760**, **770**. Within each local network **760**, **770**, a controller **762**, **772** and/or playback device **764**, **774** can provide a song identifier, song name, playlist identifier, playlist name, genre, preference, and so on, and/or simply receive content from a connected system via the cloud.

For example, a user listens to a third party music application (e.g., Pandora™ Rhapsody™, Spotify™, and so on) on her smart phone while commuting. She's enjoying the current channel and, as she walks in the door to her home, selects an option to continue playing that channel on her household music playback system (e.g., Sonos™). The playback system picks up from the same spot on the selected channel that was on her phone and outputs that content (e.g., that song) on speakers and/or other playback devices connected to the household playback system. A uniform resource indicator (URI) (e.g., a uniform resource locator (URL)) can be passed to a playback device to fetch content from a cloud and/or other networked source, for example. A playback device, such as a zone player, can fetch content on its own without use of a controller, for example. Once the zone player has a URL (or some other identification or address) for a song and/or playlist, the zone player can run on its own to fetch the content. Songs and/or other multimedia content can be retrieved from the Internet rather than a local device (e.g., a compact disc (CD)), for example. A third party application can open or utilize an application programming interface (API) to pass music to the household playback system without tight coupling to that household playback system.

In another example of an application determining a playlist and/or other content for playback, a user enjoys listening to music on an online music service (e.g., turntable.fm or other virtual room that a user can enter to choose from a plurality of online disc jockeys (DJs) deciding what to play next) using his Mac Book Pro™ at home. He likes the unique user experience the service offers, and he frequently hops from room to room discovering new music. To maximize sound quality, he plays the music on his household playback system (e.g., Sonos™). A button or other indicator can be added to the turntable.fm Web application to switch the content being played to the playback system for output (e.g., to the Sonos™ system rather than or in addition to the Mac Book™). While Web-based applications typically do not have access to items on a local network, certain embodiments enable a third-party Web-based application (e.g., Turntable.fm) to talk to a playback system (e.g., Sonos™) in a certain way (e.g., may have to log in with a username and password), and the identified user has the website send audio or audio and video down to a playback device (e.g., a zone player) on the playback system local network to play music there (or some other media).

In another example, a first user creates a playlist (e.g., a Spotify™ playlist). The first user visits a second user's house, pulls out her smart phone and shares her playlist by playing it on the second user's household playback (e.g., Sonos™) system using her third party (e.g., Spotify™) application. The first user may also go to the third party content provider's (e.g., Spotify's™) website and share her playlist on the second user's playback system.

Thus, certain embodiments provide cross-service linking such that a song identifier can be passed from one user and/or service to another to be fetched and played. A user having a playlist on his or her phone can visit a friend and, using her account on her friend's system, play a song to which she has an access right. A retrieved song can streamed locally to a user's phone, or an application can pass a song identifier to a local playback system which looks up the song identifier and finds an available audio stream to which the user has a right to play and then plays that song.

In another example, a user is staying in a hotel room or other facility including a local playback network. For example, a speaker and/or other playback device (e.g., a Sonos™ Play:3, Play: 5 and so on) in a hotel room can be utilized to play multimedia content to which the user has access from his or her playback network account, streaming audio source, third party application, and so on. Content can be output to one or more devices based on availability, access, configuration, priority, preference, and so on. In certain embodiments, a playback network includes a plurality of nodes, and each node has a capability to play sound in response to an input. Requested output is provided to a most logical connection, for example.

In certain embodiments, a phone device, a television device, and so on can be used to play music, audio, video and/or other multimedia content. In an example, a push button on a microphone or household intercom system to tell the kids dinner is ready is provided over the local playback network.

FIG. **8** shows a flow diagram for a method **800** to provide audio content to a local playback system. In the example method **800** of FIG. **8**, a third party application acts as a "virtual line-in" to the local playback system. At block **810**, streaming of music or other content from a third party application to a local content playback system is triggered. For example, a "Play to Sonos" button is pressed on a Rhapsody™ application. At block **820**, content is streamed to one or more components in a household playback network. The music may be streamed to predetermined zones or players in a household, for example. The music may be further directed to be played in different zones or players throughout the household. Playback on the local network can be facilitated to one or more zones/players based on a configuration (e.g., a zone scene, theme, and so on). Thus, certain embodiments allow a large degree of flexibility in where the music is actually played. For example, the music can be played in the kitchen, the family room, the patio, and so on. Further, the music may be redirected to different zones.

At block **830**, the incoming content (e.g., audio) stream is provided directly from a third party application or other external source to the local playback network for playback. For example, rather than passing track identifiers, an audio stream is provided to a Sonos household system for playback to one or more configured zones. At block **840**, the local playback system consumes the stream and plays it as it would other content on the local playback (e.g., Sonos™) network (e.g., via zones and so on). At block **850**, a playback device (e.g., a zone player, Play:3™, Play:5™, and so on) adds timing information to the streaming content signal (e.g., the device takes the streaming audio signal and repackages it for local synchronized playback). In some embodiments, timing information is not added to the signal unless two or more playback devices are configured to play the audio in synchrony.

FIG. **9** shows a flow diagram for a method **900** to provide audio content to a local playback system. In the example method **900** of FIG. **9**, a uniform resource indicator (URI) handler approach is provided for content output. At block **910**, a link or other reference is embedded in a third party application (e.g., Facebook™ or Twitter). At block **920**, when the link is selected (e.g., clicked), a local playback (e.g., Sonos™) controller, if available, is launched. At block **930**, the application (e.g., accessed on a phone, tablet, computer, and so on) passes a URI for associated content (e.g., an audio track and so on) to a local playback system (e.g., Sonos™) controller. At block **940**, the local controller outputs the associated content (e.g., plays the music) via the URI. For example, music is streamed from the cloud to one or more playback devices on the local playback network.

In certain embodiments, an application associated with the operating system can register to handle all URIs (URLs) that start with a certain prefix and can define how data is encoded into those URLs so a local playback system application can generate a link (e.g., "sonos:") and put that link into a message (e.g., email, text message, instant message (IM), etc.). The local playback application registered to handle such URLs can parse the URLs to determine what song, playlist, streaming radio station, etc., to play. This launches the controller application. For example, if a first listener likes a song and tweets that song, Twitter™ can include a clickable link which launches a playback application and starts the music playing on a local playback system if the local system can find the song (e.g., if have the application, if have rights/access to the song, etc.). In certain embodiments, the system knows to trigger the receiving user's system rather than the sending user's system to play associated content based on the transmitted link/identifier.

For example, an application can register with the system to handle all URLs that start with a custom prefix (e.g., an HTTP "scheme"). For instance, Sonos controller apps can register to handle any URL that begins with "sonos:" or "x-sonos:". In certain embodiments, a playback system provider can define and publish the format of its URLs so

that any third party application can create a link or reference to content. A large amount of data can be encoded into a URL using query parameters, for example.

In an example, when an application tries to "open" or "browse" to a URL, the system checks to see if the scheme of the URL matches the "sonos:" scheme that has been registered with the application. If a URL handler application is found, the system launches that application (e.g., the application can but does not need to be running in the background) and passes the URL to the application. The application then parses the URL and executes functionality based on the data in the URL. For example, the URL can contain the name of a music service and a playlist identifier from that service, plus the name of a Sonos™ Zone Player, causing the Sonos controller to start that playlist playing on that zone.

FIG. **10** shows a flow diagram for a method **1000** to provide audio content to a local playback system. In the example method **1000** of FIG. **10**, at block **1010**, a link or other reference is embedded in a third party application (e.g., Facebook™). At block **1020**, when the link is selected, a playback system (e.g., Sonos™) server is contacted and provided with information regarding selected content for playback. For example, rather than launching a local controller application, a server is contacted regarding music for playback on a local network. At block **1030**, using the provided information, the server identifies and provides the content locally on a user's local playback system. For example, the server can then start playing the music directly on the user's Sonos™ system (e.g., without going through a Sonos™ controller application).

In certain embodiments, a "single sign-on" technology is provided so that the user does not need to re-enter a username and password in order to authenticate to the playback server. Example single sign-on technologies include Facebook Connect™, Windows Live ID™, etc.

In certain embodiments, instead of using a specialized link, such as a "sonos:" link, a normal URL can be used to point to a playback system (e.g., Sonos™) webserver, which generates links with special data embedded in the link. A playback system is identified, and content identified by the URL can be playing at via the local playback network (e.g., mesh network configured for home, hotel room, etc.). Parameters such as authentication, security, location, and so on can be configured for local playback of remote content.

FIG. **11** shows a flow diagram for a method **1100** to provide audio content to a local playback system. The example method **1100** of FIG. **11** provides a "throw it over the wall" approach to content delivery to a local playback system. At block **1110**, a third party application provides a multimedia playback device (e.g., a Sonos™ zone player (ZP)) with enough information about content (e.g., an audio track) so that, at block **1120**, the local playback system (e.g., SonosNet™) can directly access a source of the content and, at block **1130**, play the content directly off the network (e.g., the Internet) or cloud.

In certain embodiments, a local playback controller application is not involved. Information passed over to the local playback device may include an identifier for a single track, a playlist, a streaming radio station, a programmed radio station, and so on. This information can also include a current play position within a list to enable near-seamless "handoff" of music from a portable device to a local playback system. Once the music information is handed from the third-party application to the local playback system, there is no further synchronization between the two systems.

A connection between the third-party application and the local playback device (e.g., Sonos ZonePlayer™) can be direct over a local area network (LAN), remote through a proxy server in the cloud, and so on. A LAN delivery approach may be easier to integrate into "native" applications (e.g., applications written for iOS or Android), and a proxy server approach may be easier for third party applications that are browser-based, for example.

In certain embodiments, information is provided from a third party application to a local playback system without being routed through or by a controller application. Here, the third party application is communicating with the multimedia playback device (e.g., a Sonos ZonePlayer™). Information can be passed locally, rather than through the Internet, for example. The local playback device accesses the Internet to find content to stream, and the third party application takes the place of the controller application (e.g., throw it over the wall—the application passes information and the local playback system runs it).

Certain embodiments provide an approach similar to the "throw it over the wall" or one way communication approach of FIG. **11** except that the third party application not only tells the local playback system what to play, but also maintains two-way communication with the local playback (e.g., Sonos™) system. Two-way communication helps enable features such as keeping a local playback queue synchronized with a queue that the user is editing/managing in the third party application; allow the third party application to know what is currently playing on the local playback system; allow integrated transport control between the third party application and the local playback system; and so on.

In certain embodiments, a local playback system can pass information back to a third party application to indicate a current point of playback (e.g., now playing a third song in a playlist, fourth song in the playlist, and so on). The local playback system can pass parameter information, such as a change in volume, from a local multimedia playback device to the third party application so the application can reflect the change in volume to the user via its graphical user interface. The third party application can instruct the local playback system to skip a song, go to a certain location, and so on.

Certain embodiments provide a third party mode that allows users to select from any local playback network (e.g., Sonos™) controller to listen to audio from one or more third party applications on their smartphones or tablets (e.g., Android™ devices). For example, a user may be using a local playback network controller application and now wants a third party application to appear as an audio source within the controller application. The user can then select the controller application that he or she wishes to play audio from the third party application, for example.

Certain embodiments provide queue management to allow a third party application to control a local playback queue. That is, the local playback system has a queue, but the third party application allows users to add, delete and so on from the queue, for example. Rather than switch from content that the user is currently playing, the local playback system allows a user to create a playlist on the fly. For example, if last.fm users vote that they do not like a song and it should be skipped, then the local playback system will skip it.

Certain embodiments allow a third party application to override a local playback queue with its own application-specific queue. The local playback system periodically fetches a short list of tracks to play next. The list of tracks to play is determined by the third-party application, for

example. In certain embodiments, a shared queue is provided between the local playback system and the third party application to keep the local system and application synchronized.

Certain embodiments allow control of playback system functions and/or settings via an external (e.g., third party) application. For example, a local playback system can allow volume control, play/pause, and so on and can interact with an application running on a given platform/operating system (OS). Certain embodiments provide a Web API that can be used to access functionality.

Certain embodiments facilitate control of a local playback system from outside a household or other location at which the local playback network is configured. For example, a user can queue up music while away from his or her house. The application can facilitate setup and/or configuration. For example, a third party application may ask the user to enter a Sonos customer email address and password. The application can then make a request to a Sonos server in the cloud to determine the zone groups on which music can be played.

Various inventions have been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts can be resorted without departing from the spirit and scope of the present disclosure as claimed. While the embodiments discussed herein can appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the embodiments have applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present disclosure is defined by the appended claims rather than the forgoing description of embodiments.

The invention claimed is:

1. A method comprising:

causing, via a control device, a graphical interface to display a control interface including one or more transport controls to control playback by the control device;

after connecting to a local area network via a network interface, identifying, via the control device, playback devices connected to the local area network;

causing, via the control device, the graphical interface to display a selectable option for transferring playback from the control device;

detecting, via the control device, a set of inputs to transfer playback from the control device to a particular playback device, wherein the set of inputs comprises: (i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network;

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the particular playback device comprises:

(a) causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;

(b) causing playback at the control device to be stopped; and

(c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

2. The method of claim **1**, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone of a media playback system that includes the particular playback device as a first channel of a stereo pair and an additional playback device as a second channel of the stereo pair, wherein modifying the one or more transport controls of the control interface to control playback by the particular playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the additional playback device, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the additional playback device playing back the multimedia content as the stereo pair.

3. The method of claim **1**, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone group of a media particular playback system that includes a first zone and a second zone, wherein the first zone includes the particular playback device and the second zone includes at least one additional playback device, wherein modifying the one or more transport controls of the control interface to control playback by the playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the at least one additional playback device in synchrony, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the at least one additional playback device playing back the multimedia content in synchrony.

4. The method of claim **1**, wherein the control interface is displayed by an application associated with the streaming content service, and wherein the set of inputs further comprises detecting an input to select a link in the application associated with the streaming content service and wherein selection of the link launches a second application to facilitate retrieving the multimedia content by the particular playback device from a particular source indicated by a resource locator.

5. The method of claim **1**, wherein the control interface is displayed by an application associated with the streaming content service, and wherein the set of inputs further comprises detecting an input to select a link in the application associated with the streaming content service and wherein selection of the link causes the control device to transmit information to the one or more first cloud servers to add multimedia content to the local playback queue on the particular playback device.

6. The method of claim **1**, further comprising detecting, via the control device, a set of inputs to transfer playback

from the playback device back to the control device, wherein transferring playback from the playback device back to the control device comprises:

causing playback at the playback device to be stopped; and

modifying the one or more transport controls of the control interface to control playback by the control device.

7. The method of claim **1**, wherein causing the graphical interface to display the control interface including one or more transport controls to control playback by the control device comprises causing the graphical interface to display a control interface that includes the one or more transport controls in a particular arrangement on the graphical interface, and wherein modifying the one or more transport controls of the control interface to control playback by the particular playback device comprises causing the graphical interface to display the one or more transport controls to control playback by the particular playback device in the particular arrangement.

8. The method of claim **1**, wherein causing the one or more first cloud servers to add multimedia content to the local playback queue comprises causing an identifier of the multimedia content to be added to the local playback queue, wherein the identifier indicates a particular source of the multimedia content at the one or more second cloud servers of the streaming content service, wherein the particular playback device receives the multimedia content from the particular source at the one or more second cloud servers of the streaming content service.

9. The method of claim **1**, wherein causing one or more first cloud servers to add the multimedia content to the local playback queue on the particular playback device comprises sending a message to the streaming content service that causes the one or more first cloud servers to add the multimedia content to the local playback queue on the particular playback device.

10. The method of claim **1**, wherein detecting the set of inputs comprises detecting a selection of the multimedia content.

11. The method of claim **1**, wherein detecting the set of inputs comprises detecting an input that causes playback at the control device to be stopped.

12. The method of claim **1**, wherein detecting the set of inputs comprises detecting selection of a button on the control interface.

13. A tangible, non-transitory computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause a control device to implement a method comprising:

causing a graphical interface to display a control interface including one or more transport controls to control playback by the control device;

after connecting to a local area network via a network interface, identifying playback devices connected to the local area network;

causing the graphical interface to display a selectable option for transferring playback from the control device;

detecting a set of inputs to transfer playback from the control device to a particular playback device, wherein the set of inputs comprises: (i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network:

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the particular playback device comprises:

(a) causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;

(b) causing playback at the control device to be stopped; and

(c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

14. The tangible, non-transitory computer readable medium of claim **13**, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone of a media playback system that includes the particular playback device as a first channel of a stereo pair and an additional playback device as a second channel of the stereo pair, wherein modifying the one or more transport controls of the control interface to control playback by the particular playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the additional playback device, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the additional playback device playing back the multimedia content as the stereo pair.

15. The tangible, non-transitory computer readable medium of claim **13**, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone group of a media particular playback system that includes a first zone and a second zone, wherein the first zone includes the particular playback device and the second zone includes at least one additional playback device, wherein modifying the one or more transport controls of the control interface to control playback by the playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the at least one additional playback device in synchrony, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the at least one additional playback device playing back the multimedia content in synchrony.

16. The tangible, non-transitory computer readable medium of claim **13**, wherein the control interface is displayed by an application associated with the streaming content service, and wherein the set of inputs further com-

prises detecting an input to select a link in the application associated with the streaming content service and wherein selection of the link launches a second application to facilitate retrieving the multimedia content by the particular playback device from a particular source indicated by a resource locator.

17. The tangible, non-transitory computer readable medium of claim **13**, wherein the control interface is displayed by an application associated with the streaming content service, and wherein the set of inputs further comprises detecting an input to select a link in the application associated with the streaming content service and wherein selection of the link causes the control device to transmit information to the one or more first cloud servers to add multimedia content to the local playback queue on the particular playback device.

18. The tangible, non-transitory computer readable medium of claim **13**, wherein the method further comprises detecting a set of inputs to transfer playback from the playback device back to the control device, wherein transferring playback from the playback device back to the control device comprises:

causing playback at the playback device to be stopped; and

modifying the one or more transport controls of the control interface to control playback by the control device.

19. The tangible, non-transitory computer readable medium of claim **13**, wherein causing the graphical interface to display the control interface including one or more transport controls to control playback by the control device comprises causing the graphical interface to display a control interface that includes the one or more transport controls in a particular arrangement on the graphical interface, and wherein modifying the one or more transport controls of the control interface to control playback by the playback device comprises causing the graphical interface to display the one or more transport controls to control playback by the playback device in the particular arrangement.

20. The tangible, non-transitory computer readable medium of claim **13**, wherein causing the one or more first cloud servers to add multimedia content to the local playback queue on the particular playback device comprises causing an identifier of the multimedia content to be added to the local playback queue, wherein the identifier indicates a particular source of the multimedia content at the one or more second cloud servers of the streaming content service, wherein the particular playback device receives the multimedia content from the particular source at the one or more second cloud servers of the streaming content service.

21. The tangible, non-transitory computer readable medium of claim **13**, wherein causing one or more first cloud servers to add the multimedia content to the local playback queue on the particular playback device comprises sending a message to the streaming content service that causes the one or more first cloud servers to add the multimedia content to the local playback queue on the particular playback device.

22. The tangible, non-transitory computer readable medium of claim **13**, wherein detecting the set of inputs comprises detecting a selection of the multimedia content.

23. The tangible, non-transitory computer readable medium of claim **13**, wherein detecting the set of inputs comprises detecting an input that causes playback at the control device to be stopped.

24. The tangible, non-transitory computer readable medium of claim **13**, wherein detecting the set of inputs comprises detecting selection of a button on the control interface.

25. A control device comprising:

a graphical interface;

a wireless communication interface to communicate with a playback device;

one or more processors;

tangible non-transitory computer-readable media having instructions encoded therein, wherein the instructions, when executed by the one or more processors, cause the control device to perform functions comprising:

causing the graphical interface to display a control interface including one or more transport controls to control playback by the control device;

after connecting to a local area network via the wireless communication interface, identifying playback devices connected to the local area network;

causing the graphical interface to display a selectable option for transferring playback from the control device;

detecting a set of inputs to transfer playback from the control device to a particular playback device, wherein the set of inputs comprises: (i) a selection of the selectable option for transferring playback from the control device and (ii) a selection of the particular playback device from the identified playback devices connected to the local area network:

after detecting the set of inputs to transfer playback from the control device to the particular playback device, causing playback to be transferred from the control device to the particular playback device, wherein transferring playback from the control device to the particular playback device comprises:

(a) causing one or more first cloud servers to add multimedia content to a local playback queue on the particular playback device, wherein adding the multimedia content to the local playback queue comprises the one or more first cloud servers adding, to the local playback queue, one or more resource locators corresponding to respective locations of the multimedia content at one or more second cloud servers of a streaming content service;

(b) causing playback at the control device to be stopped; and

(c) modifying the one or more transport controls of the control interface to control playback by the playback device; and

causing the particular playback device to play back the multimedia content, wherein the particular playback device playing back the multimedia content comprises the particular playback device retrieving the multimedia content from one or more second cloud servers of a streaming content service and playing back the retrieved multimedia content.

26. The control device of claim **25**, wherein detecting the set of inputs to transfer playback from the control device to the particular playback device comprises detecting a set of inputs to transfer playback from the control device to a particular zone group of a media particular playback system that includes a first zone and a second zone, wherein the first zone includes the particular playback device and the second zone includes at least one additional playback device, wherein modifying the one or more transport controls of the

control interface to control playback by the playback device comprises causing the one or more transport controls of the control interface to control playback by the particular playback device and the at least one additional playback device in synchrony, and wherein the particular playback device playing back the retrieved multimedia content comprises the particular playback device and the at least one additional playback device playing back the multimedia content in synchrony.

27. The control device of claim **25**, wherein detecting the set of inputs comprises detecting a selection of the multimedia content.

28. The control device of claim **25**, wherein detecting the set of inputs comprises detecting an input that causes playback at the control device to be stopped.

29. The control device of claim **25**, wherein detecting the set of inputs comprises detecting selection of a button on the control interface.

* * * * *

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(54) **SYSTEMS AND METHODS FOR NETWORKED MUSIC PLAYBACK**

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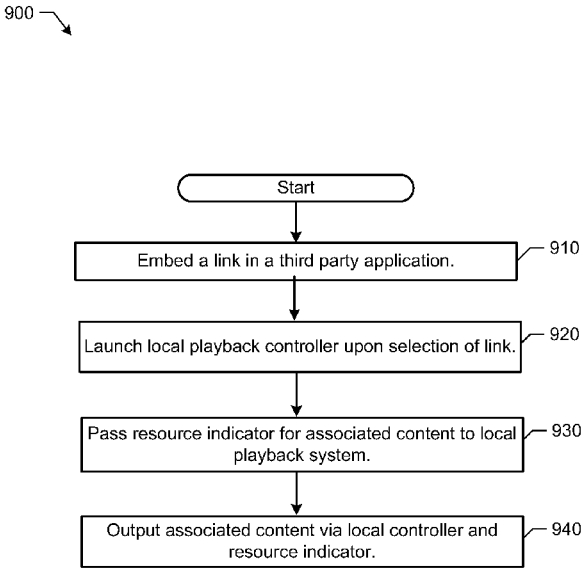
(57) **ABSTRACT**

An example computing device in a first mode is configured for playback of given audio content. While in the first mode, the computing device displays a representation of one or more playback devices in a media playback system that are available to accept playback responsibility for the given audio content and receives user input indicating a selection of a given playback device. The computing device transmits an instruction for playback responsibility to be transferred to the given playback device such that i) an identifier of the given audio content and a playback position for the given audio content are provided to the given playback device and ii) the given playback device becomes configured for playback of the given audio content. The computing device transitions from the first mode to a second mode in which the computing device is configured to control the given playback device's playback of the given audio content.

16 Claims, 11 Drawing Sheets



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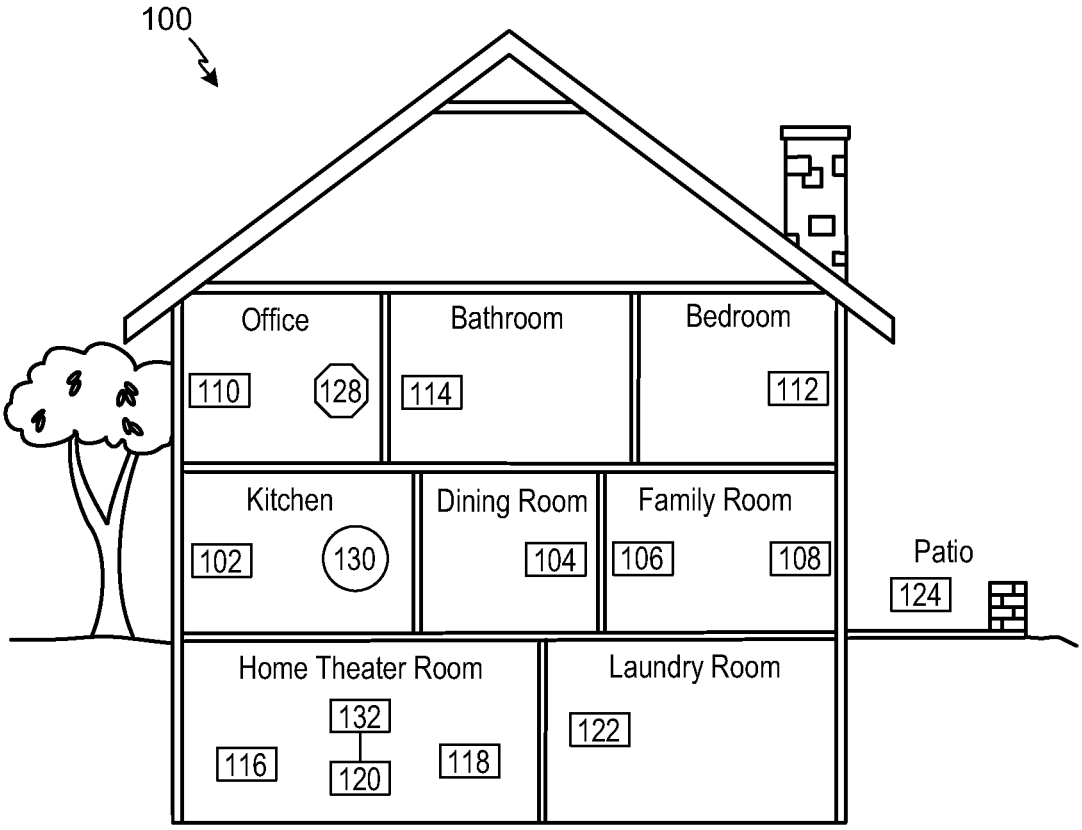
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Office
110
128
Bathroom
114
Bedroom
112
Kitchen
102
130
Dining Room
104
Family Room
106
108
Patio
124
Home Theater Room
132
116
120
118
Laundry Room
122

FIGURE 1

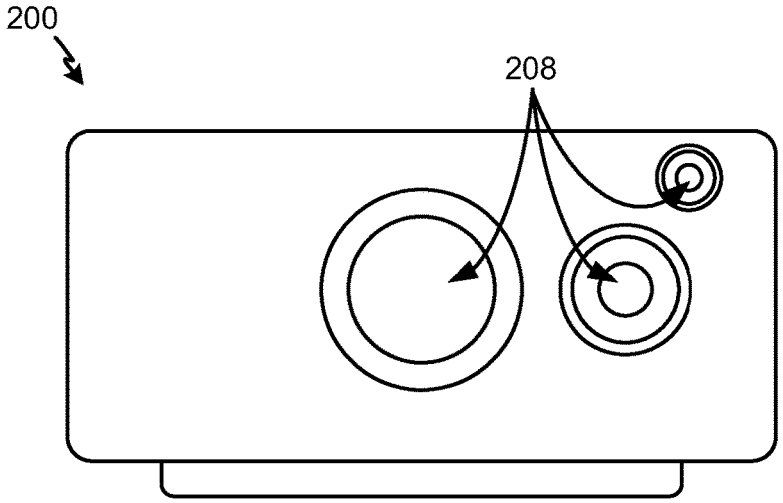

FIGURE 2A

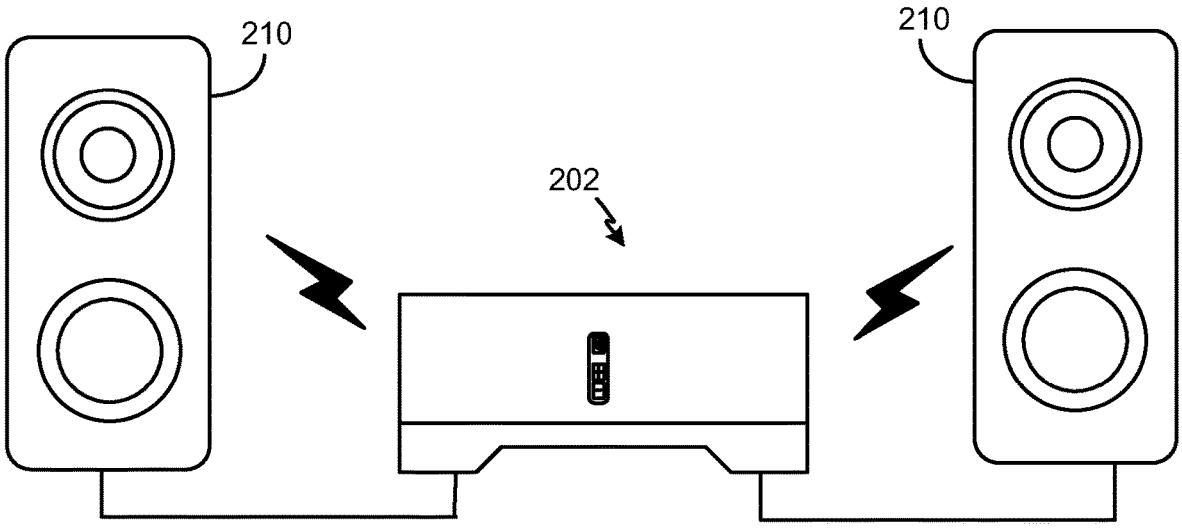

FIGURE 2B

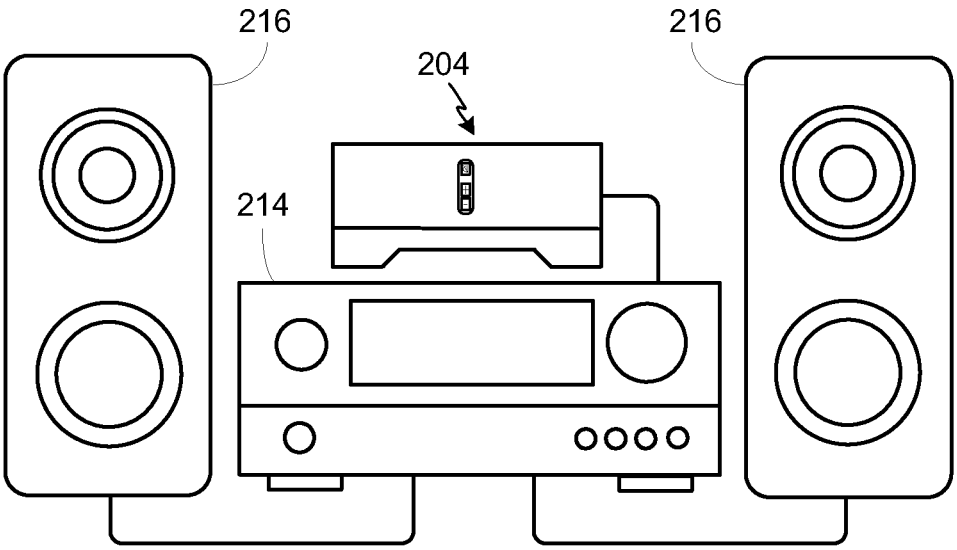

FIGURE 2C

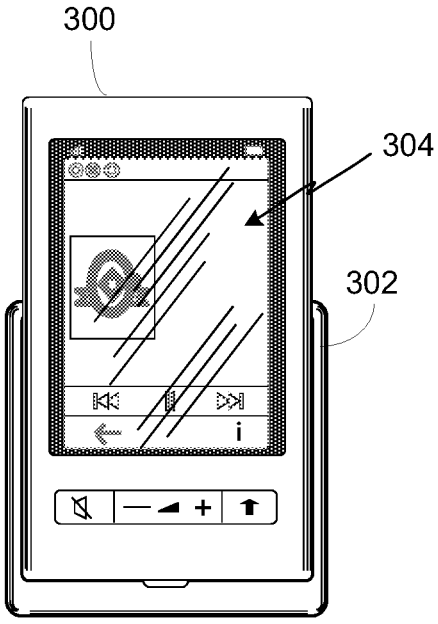

FIGURE 3

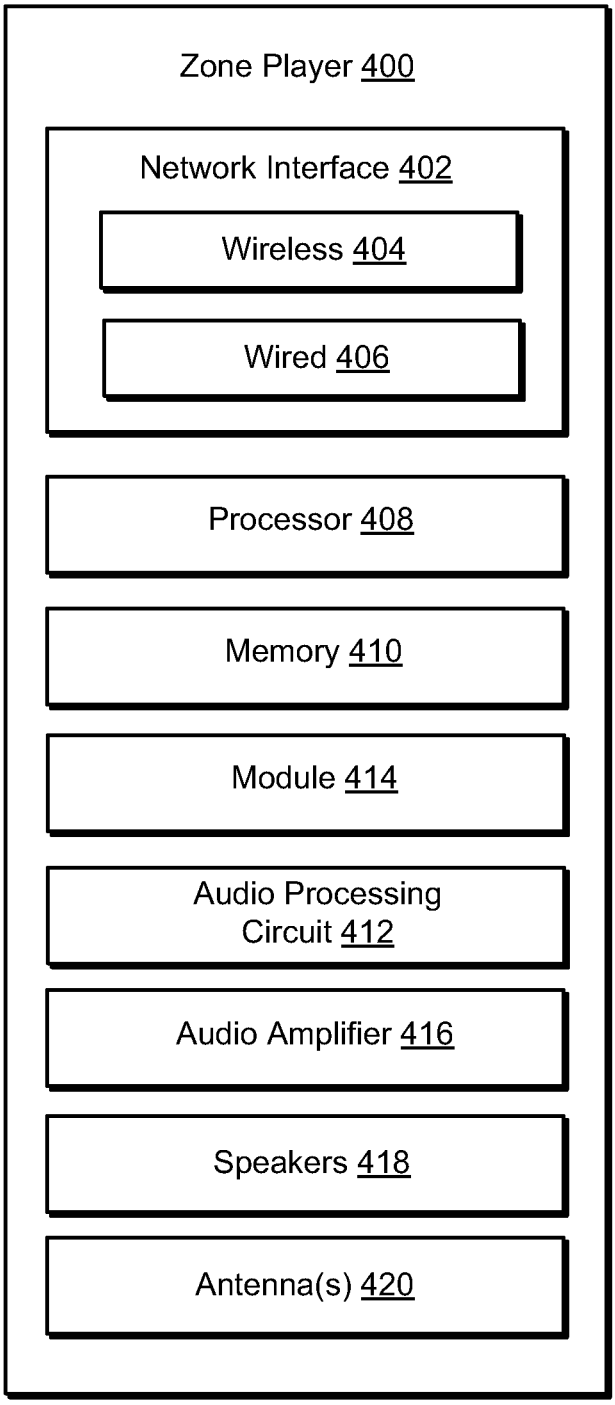
Zone Player 400
Network Interface 402
Wireless 404
Wired 406
Processor 408
Memory 410
Module 414
Audio Processing Circuit 412
Audio Amplifier 416
Speakers 418
Antenna(s) 420

FIGURE 4

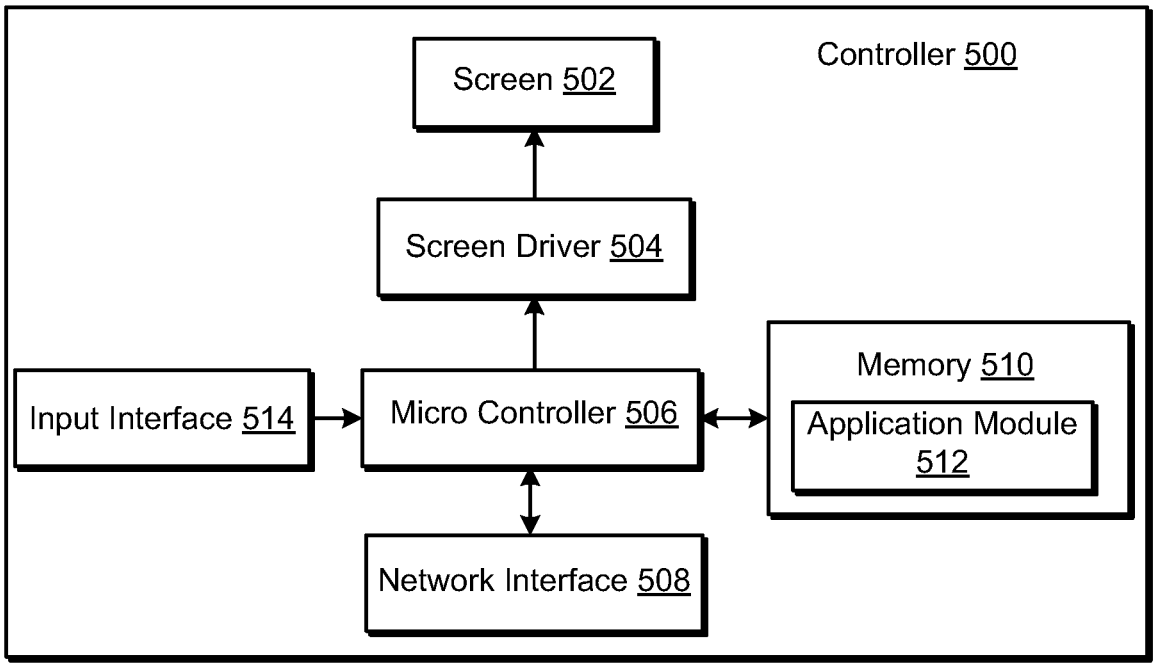
Controller 500
Screen 502
Screen Driver 504
Memory 510
Application Module 512
Input Interface 514
Micro Controller 506
Network Interface 508

FIGURE 5

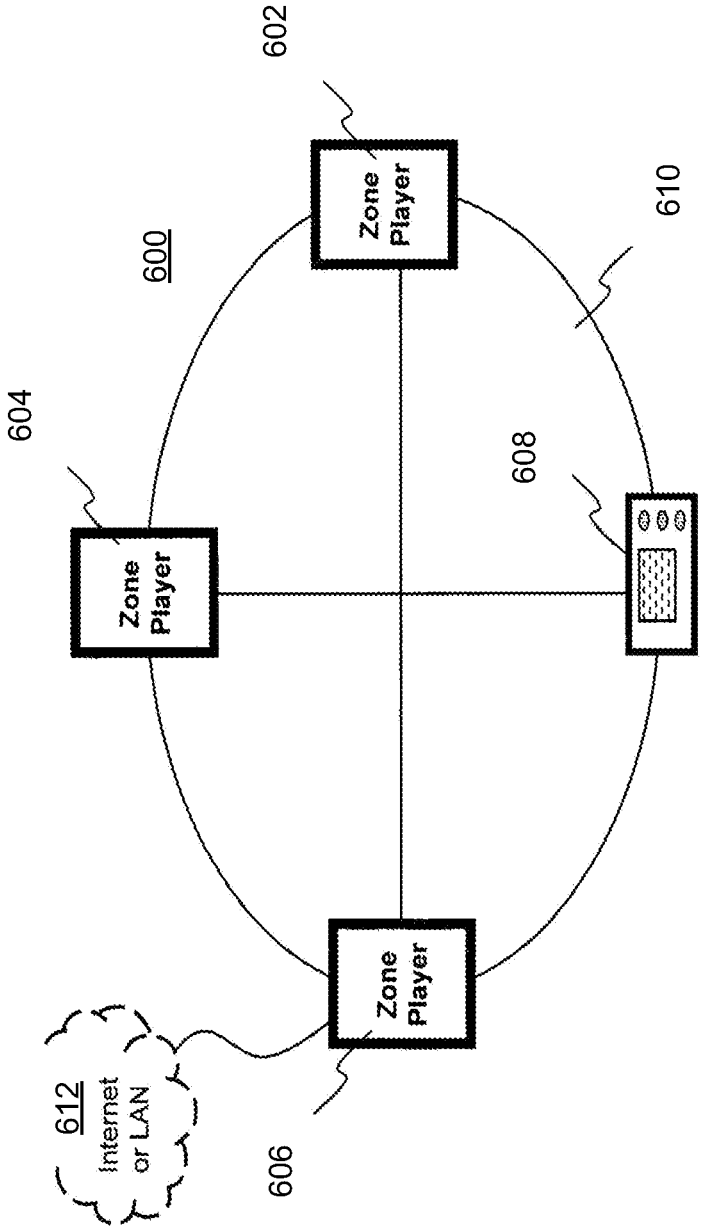
602
600
610
604
608
Zone Player
Zone Player
Zone Player
612
Internet or LAN
606

FIGURE 6

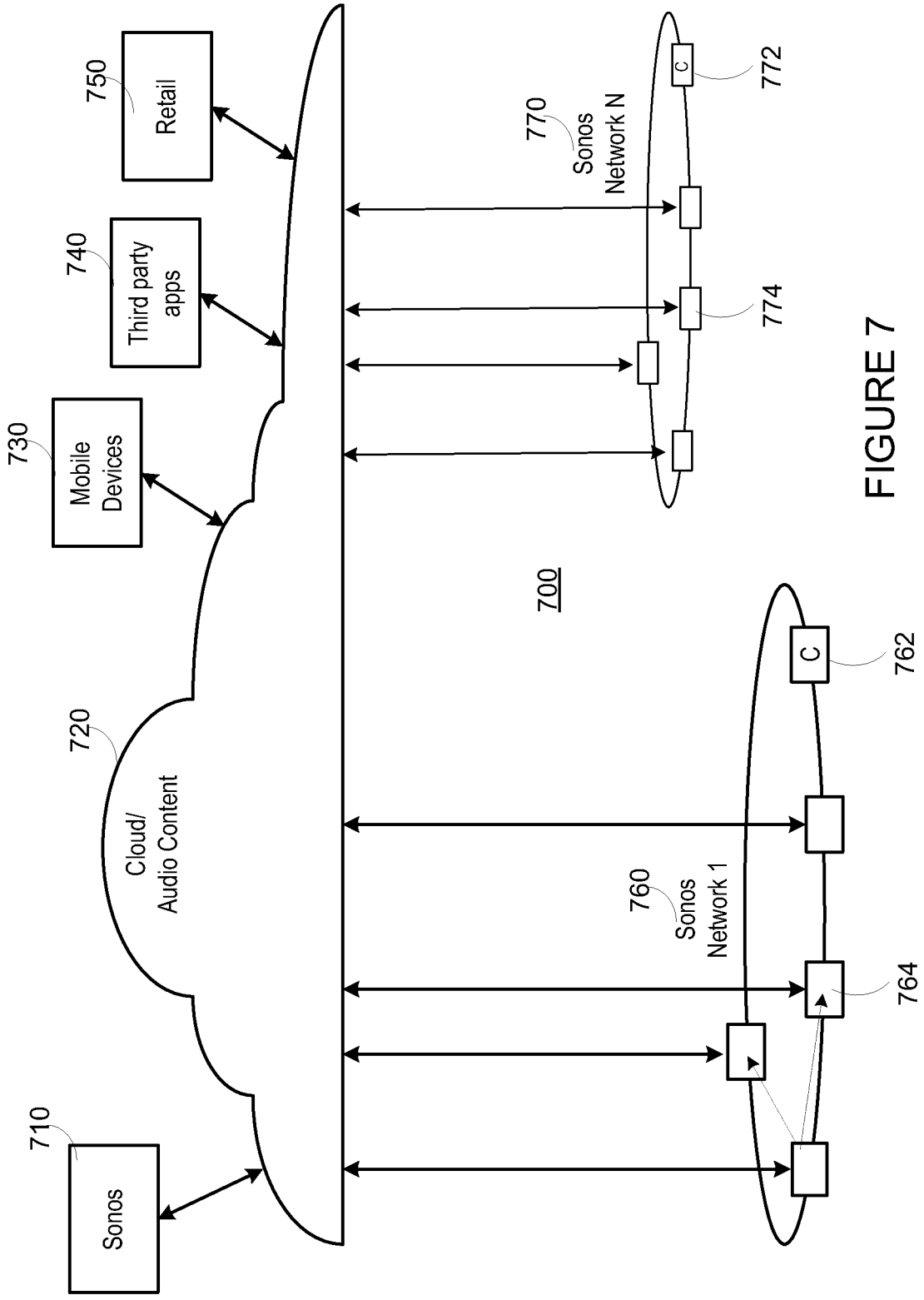
750
Retail
740
Third party apps
730
Mobile Devices
720
Cloud/ Audio Content
710
Sonos
700
770
Sonos Network N
772
774
760
Sonos Network 1
762
764

FIGURE 7

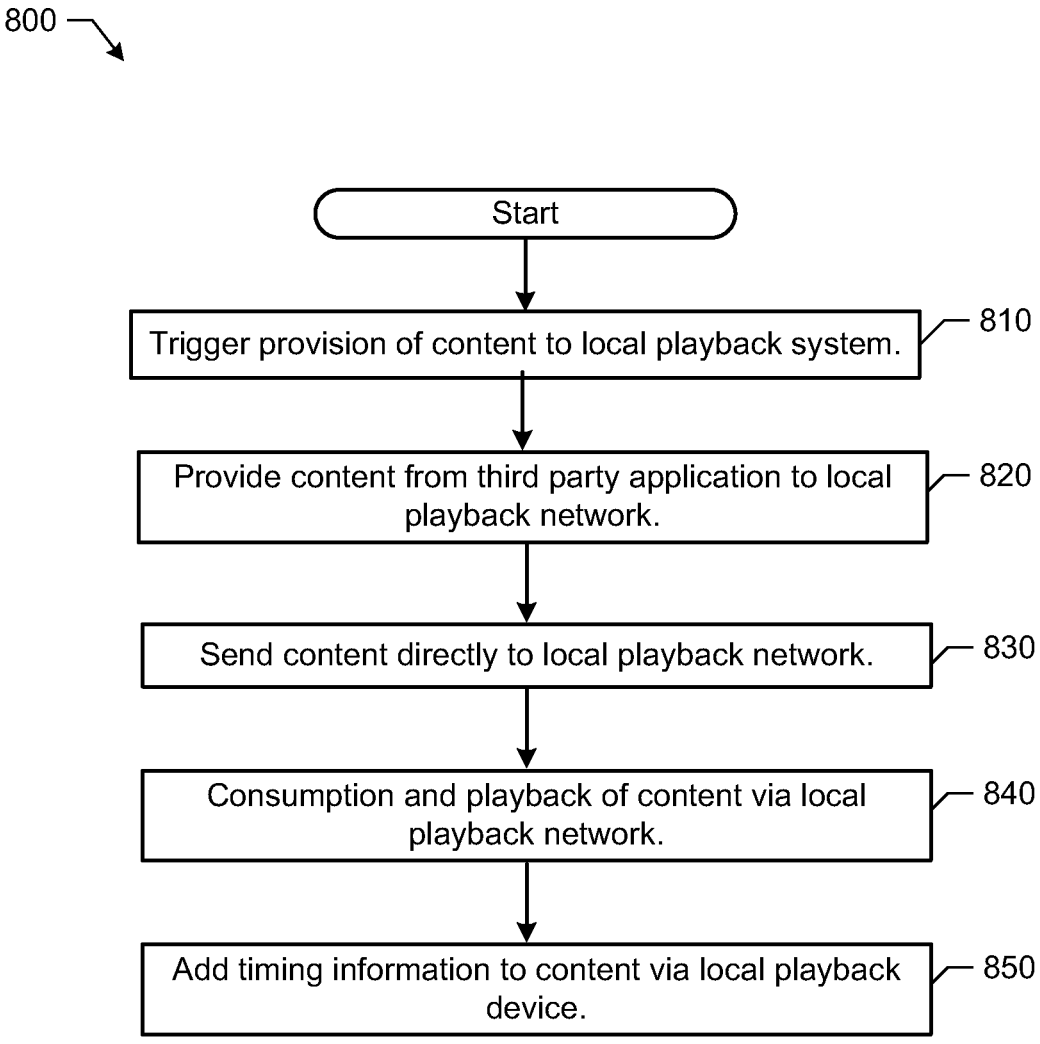
800
Start
Trigger provision of content to local playback system.
810
Provide content from third party application to local playback network.
820
Send content directly to local playback network.
830
Consumption and playback of content via local playback network.
840
Add timing information to content via local playback device.
850

FIGURE 8

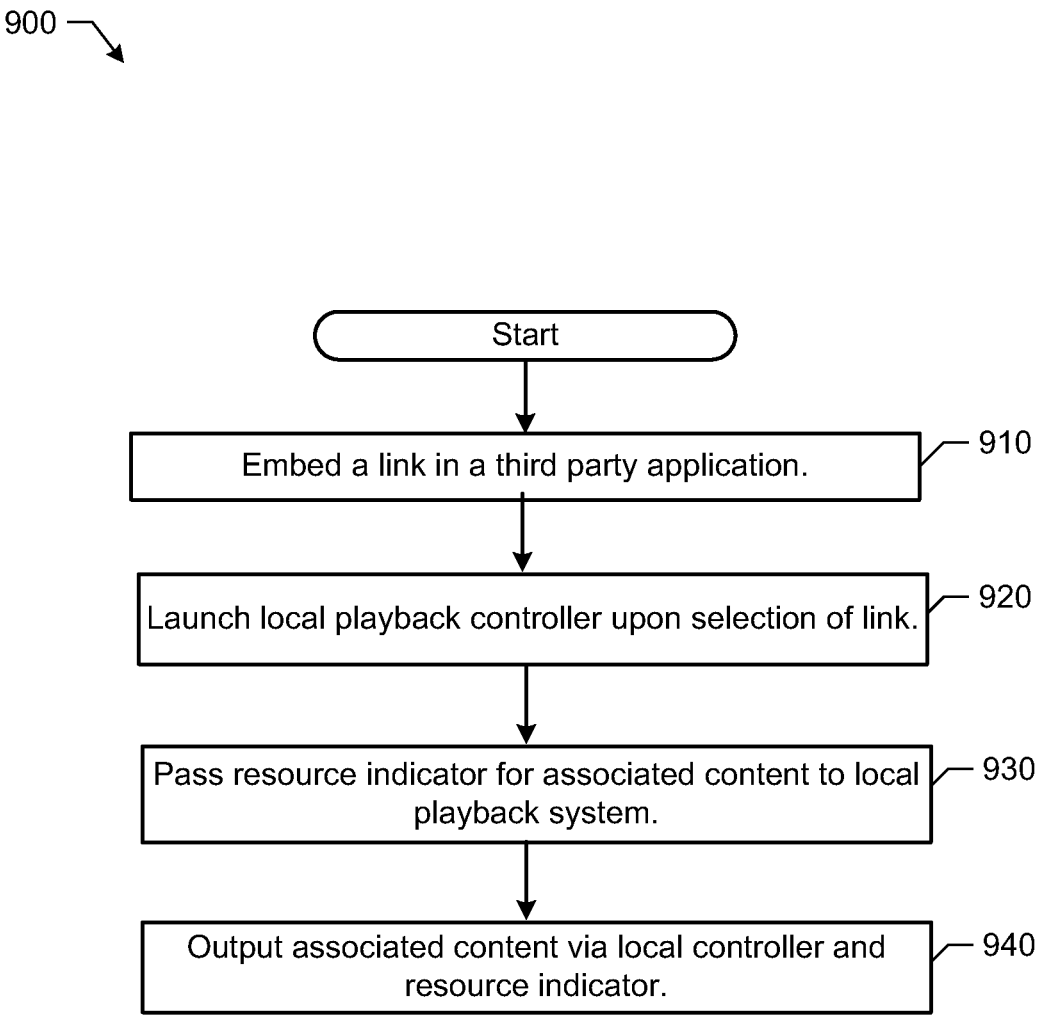
900
Start
Embed a link in a third party application.
910
Launch local playback controller upon selection of link.
920
Pass resource indicator for associated content to local playback system.
930
Output associated content via local controller and resource indicator.
940

FIGURE 9

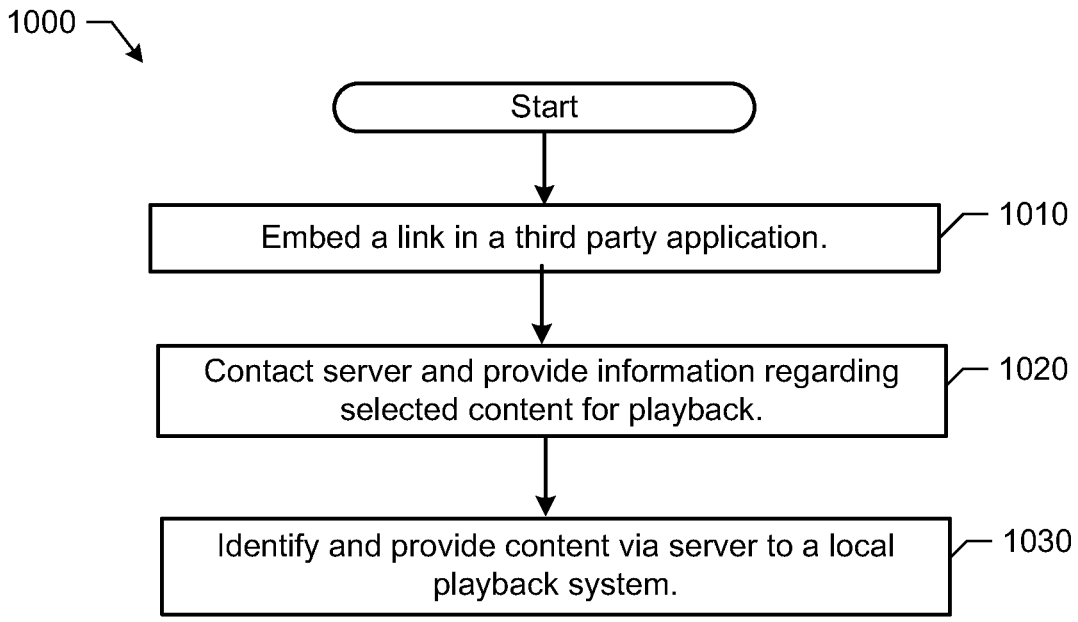
1000
Start
Embed a link in a third party application.
1010
Contact server and provide information regarding selected content for playback.
1020
Identify and provide content via server to a local playback system.
1030

FIGURE 10

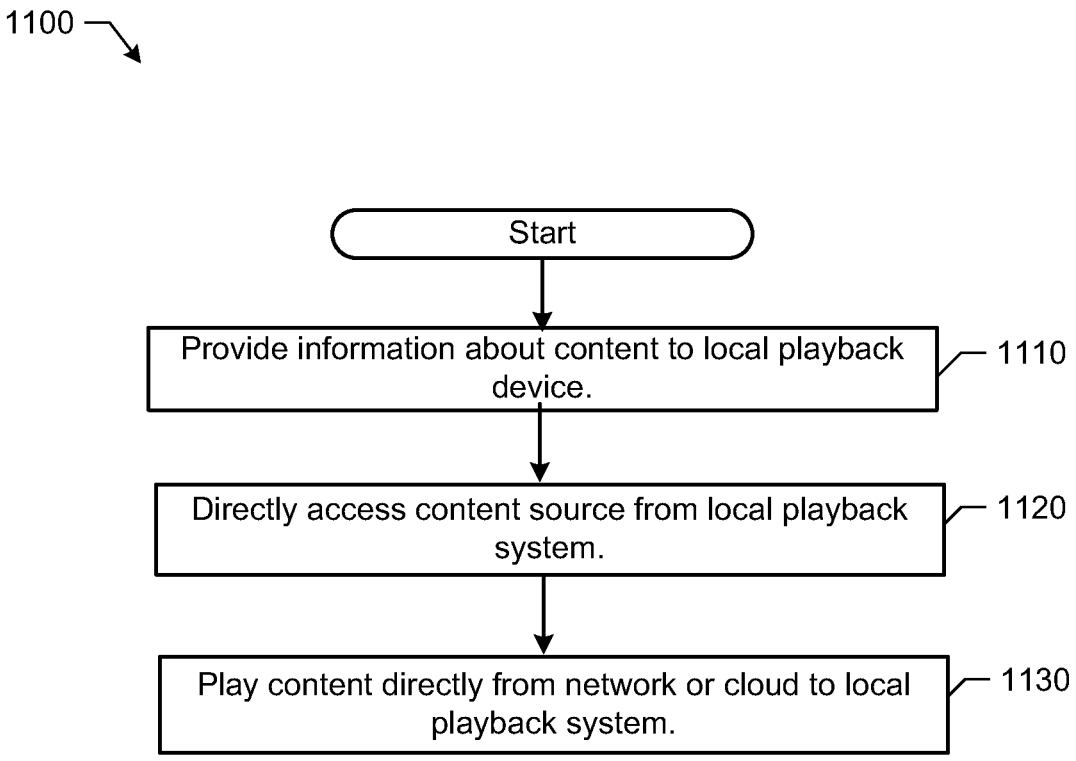
1100
Start
Provide information about content to local playback device.
1110
Directly access content source from local playback system.
1120
Play content directly from network or cloud to local playback system.
1130

FIGURE 11

SYSTEMS AND METHODS FOR NETWORKED MUSIC PLAYBACK

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. non-provisional patent application Ser. No. 15/872,500, filed on Jan. 16, 2018, entitled "Systems and Methods for Networked Music Playback," which is a continuation of U.S. non-provisional patent application Ser. No. 14/520,578, filed on Oct. 22, 2014, entitled "Systems and Methods for Networked Music Playback," which is a continuation of U.S. non-provisional patent application Ser. No. 13/341,237, filed on Dec. 30, 2011, entitled "Systems and Methods for Networked Music Playback," all of which are incorporated herein by reference in their entirety.

FIELD OF THE DISCLOSURE

The disclosure is related to consumer electronics and, more particularly, to providing music for playback via one or more devices on a playback data network.

BACKGROUND

Technological advancements have increased the accessibility of music content, as well as other types of media, such as television content, movies, and interactive content. For example, a user can access audio, video, or both audio and video content over the Internet through an online store, an Internet radio station, an online music service, an online movie service, and the like, in addition to the more traditional avenues of accessing audio and video content. Demand for such audio and video content continues to surge. Given the high demand, technology used to access and play such content has likewise improved.

BRIEF DESCRIPTION OF THE DRAWINGS

Features, aspects, and advantages of the presently disclosed technology are better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. **1** shows an illustration of an example system in which embodiments of the methods and apparatus disclosed herein can be implemented;

FIG. **2**A shows an illustration of an example zone player having a built-in amplifier and speakers;

FIG. **2**B shows an illustration of an example zone player having a built-in amplifier and connected to external speakers;

FIG. **2**C shows an illustration of an example zone player connected to an A/V receiver and speakers;

FIG. **3** shows an illustration of an example controller;

FIG. **4** shows an internal functional block diagram of an example zone player;

FIG. **5** shows an internal functional block diagram of an example controller;

FIG. **6** shows an example ad-hoc playback network;

FIG. **7** shows a system including a plurality of networks including a cloud-based network and at least one local playback network; and

FIGS. **8-11** show flow diagrams for methods to provide audio content to a local playback system.

In addition, the drawings are for the purpose of illustrating example embodiments, but it is understood that the present disclosure is not limited to the arrangements and instrumentality shown in the drawings.

DETAILED DESCRIPTION

I. Overview

Wired or wireless networks can be used to connect one or more multimedia playback devices for a home or other location playback network (e.g., a home music system). Certain examples provide automatic configuration of parameters of a playback device to be coupled to a network with reduced or minimum human intervention. For example, a wired and/or wireless ad-hoc network is established to facilitate communications among a group of devices. Music and/or other multimedia content can be shared among devices and/or groups of devices (also referred to herein as zones) associated with a playback network.

Certain embodiments facilitate streaming or otherwise providing music from a music-playing application (e.g., browser-based application, native music player, other multimedia application, and so on) to a multimedia content playback (e.g., Sonos™) system. Certain embodiments provide simple, easy-to-use and secure systems and methods for multimedia content playback across a plurality of systems and locations. Certain embodiments facilitate integration between content partners and a playback system as well as supporting maintenance of such content and system.

Although the following discloses example systems, methods, apparatus, and articles of manufacture including, among other components, firmware and/or software executed on hardware, it should be noted that such systems, methods, apparatus, and/or articles of manufacture are merely illustrative and should not be considered as limiting. For example, it is contemplated that any or all of these firmware, hardware, and/or software components could be embodied exclusively in hardware, exclusively in software, exclusively in firmware, or in any combination of hardware, software, and/or firmware. Accordingly, while the following describes example systems, methods, apparatus, and/or articles of manufacture, the examples provided are not the only way(s) to implement such systems, methods, apparatus, and/or articles of manufacture.

When any of the appended claims are read to cover a purely software and/or firmware implementation, at least one of the elements in at least one example is hereby expressly defined to include a tangible medium such as a memory, DVD, CD, Blu-ray, and so on, storing the software and/or firmware.

Reference herein to "embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one example embodiment of the invention. The appearances of this phrase in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. As such, the embodiments described herein, explicitly and implicitly understood by one skilled in the art, can be combined with other embodiments.

Certain embodiments provide a method to provide content to a local playback network. The example method includes identifying multimedia content from a content provider. The example method includes passing information regarding the multimedia content to a local playback system including one or more multimedia playback devices in response to a trigger. The example method includes facilitating play of the

multimedia content via a local playback network associated with the local playback system.

Certain embodiments provide a computer readable storage medium including instructions for execution by a processor, the instructions, when executed, cause the processor to implement a method to provide content to a local playback network. The example method includes identifying multimedia content from a content provider. The example method includes passing information regarding the multimedia content to a local playback system including one or more multimedia playback devices in response to a trigger. The example method includes facilitating play of the multimedia content via a local playback network associated with the local playback system.

Certain embodiments provide a multimedia playback device including a wireless communication interface to communicate with a local playback network and a multimedia content source and a processor. The process is to identify multimedia content from the multimedia content source; pass information regarding the multimedia content to device on the local playback network in response to a trigger; and facilitate play of the multimedia content via the devices on the local playback network.

II. Example Environment

Referring now to the drawings, in which like numerals can refer to like parts throughout the figures, FIG. **1** shows an example system configuration **100** in which one or more of the method and/or apparatus disclosed herein can be practiced or implemented. By way of illustration, the system configuration **100** represents a home with multiple zones. Each zone, for example, represents a different room or space, such as an office, bathroom, bedroom, kitchen, dining room, family room, home theater room, utility or laundry room, and patio. While not shown here, a single zone can cover more than one room or space. One or more of zone players **102-124** are shown in each respective zone. A zone player **102-124**, also referred to as a playback device, multimedia unit, speaker, and so on, provides audio, video, and/or audiovisual output. A controller **130** (e.g., shown in the kitchen for purposes of illustration) provides control to the system configuration **100**. The system configuration **100** illustrates an example whole house audio system, though it is understood that the technology described herein is not limited to its particular place of application or to an expansive system like a whole house audio system **100** of FIG. **1**.

FIGS. **2**A, **2**B, and **2**C show example illustrations of zone players **200-204**. The zone players **200-204** of FIGS. **2**A, **2**B, and **2**C, respectively, can correspond to any of the zone players **102-124** of FIG. **1**. While certain embodiments provide multiple zone players, an audio output can be generated using only a single zone player. FIG. **2**A illustrates a zone player **200** including sound producing equipment **208** capable of generating sound or an audio output corresponding to a signal received (e.g., wirelessly and/or via a wired interface). The sound producing equipment **208** of the zone player **200** of FIG. **2**A includes a built-in amplifier (not shown in this illustration) and speakers (e.g., a tweeter, a mid-range driver, and/or a subwoofer). In certain embodiments, the zone player **200** of FIG. **2**A can be configured to play stereophonic audio or monaural audio. In some embodiments, the zone player **200** of FIG. **2**A can be configured as a component in a combination of zone players to play stereophonic audio, monaural audio, and/or surround audio. As described in greater detail below, in some embodiments, the example zone player **200** of FIG. **2**A can also transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on. Transmission of the second signal can be part of, for example, a system in which multiple zone players, speakers, receivers, and so on, form a network to, for example, present media content in a synchronization or distributed manner.

The example zone player **202** of FIG. **2**B includes a built-in amplifier (not shown in this illustration) to power a set of detached speakers **210**. The speakers **210** of FIG. **2**B can include, for example, any type of loudspeaker. The zone player **202** of FIG. **2**B can communicate a signal corresponding to audio content to the detached speakers **210** via wired and/or wireless channels. Instead of receiving and generating audio content as in FIG. **2**A, the zone player **202** of FIG. **2**B receives the audio content and transmits the same (e.g., after processing the received signal) to the detached speakers **210**. Similar to the example zone player **200** of FIG. **2**A, in some embodiments the zone player **202** can transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

The example zone player **204** of FIG. **2**C does not include an amplifier, but allows a receiver **214**, or another audio and/or video type device with built-in amplification, to connect to a data network **128** of FIG. **1** and to play audio received over the data network **128** viathe receiver **214** and a set of detached speakers **216**. In addition to the wired couplings shown in FIG. **2**C, the detached speakers **216** can receive audio content via a wireless communication channel between the detached speakers **216** and, for example, the zone player **204** and/or the receiver **214**. In some embodiments the zone player **202** can transmit a second signal to, for example, other zone player(s) in the same or different zone(s), speaker(s), receiver(s), and so on.

Example zone players include a "Sonos® S5," "Sonos Play:5," "Sonos Play:3," "ZonePlayer 120," and "ZonePlayer 90," which are offered by Sonos, Inc. of Santa Barbara, Calif. Any other past, present, and/or future zone players can additionally or alternatively be used to implement the zone players of example embodiments disclosed herein. A zone player can also be referred to herein as a playback device, and a zone player is not limited to the particular examples illustrated in FIGS. **2**A, **2**B, and **2**C. For example, a zone player can include a wired or wireless headphone. In other examples, a zone player might include a subwoofer. In yet other examples, a zone player can include a sound bar. In an example, a zone player can include or interact with a docking station for an Apple iPod™ or similar device. In some embodiments, a zone player can relay one or more signals received from, for example, a first zone player to another playback device. In some embodiments, a zone player can receive a first signal and generate an output corresponding to the first signal and, simultaneously or separately, can receive a second signal and transmit or relay the second signal to another zone player(s), speaker(s), receiver(s), and so on. Thus, an example zone player described herein can act as a playback device and, at the same time, operate as a hub in a network of zone players. In such instances, media content corresponding to the first signal can be different from the media content corresponding to the second signal.

FIG. **3** shows an example illustration of a wireless controller **300** in a docking station **302**. The controller **300** can correspond to the controlling device **130** of FIG. **1**. The controller **300** is provided with a touch screen **304** that allows a user to interact with the controller **300**, for example, to retrieve and navigate a playlist of audio items, control operations of one or more zone players, and provide overall

control of the system configuration **100**. In certain embodiments, any number of controllers can be used to control the system configuration **100**. In certain embodiments, there can be a limit on the number of controllers that can control the system configuration **100**. The controllers might be wireless like wireless controller **300** or wired to the data network **128**. Furthermore, an application running on any network-enabled portable devices, such as an iPhone™, iPad™, Android™ powered phone, or any other smart phone or network-enabled device can be used as a controller by connecting to the data network **128**. An application running on a laptop or desktop PC or Mac can also be used as a controller. Example controllers include a "Sonos® Controller **200**," "Sonos® Controller for iPhone," "Sonos® Controller for iPad," "Sonos® Controller for Android, "Sonos® Controller for Mac or PC," which are offered by Sonos, Inc. of Santa Barbara, Calif. The flexibility of such an application and its ability to be ported to a new type of portable device is advantageous.

Referring back to the system configuration **100** of FIG. **1**, a particular zone can contain one or more zone players. For example, the family room of FIG. **1** contains two zone players **106** and **108**, while the kitchen is shown with one zone player **102**. Zones can be dynamically configured by positioning a zone player in a room or space and assigning via the controller **130** the zone player to a new or existing zone. As such, zones can be created, combined with another zone, removed, and given a specific name (e.g., "Kitchen"), if so programmed. The zone players **102** to **124** are coupled directly or indirectly to a data network, such as the data network **128** shown in FIG. **1**. The data network **128** is represented by an octagon in the figure to stand out from other components shown in the figure. While the data network **128** is shown in a single location, it is understood that such a network can be distributed in and around the system configuration **100**.

Particularly, the data network **128** can be a wired network, a wireless network, or a combination of both. In some embodiments, one or more of the zone players **102-124** are wirelessly coupled to the data network **128** based on a proprietary mesh network. In some embodiments, one or more of the zone players **102-124** are wirelessly coupled to the data network **128** using a non-mesh topology. In some embodiments, one or more of the zone players **102-124** are coupled via a wire to the data network **128** using Ethernet or similar technology. In addition to the one or more zone players **102-124** connecting to the data network **128**, the data network **128** can further allow access to a wide area network, such as the Internet.

In certain embodiments, the data network **128** can be created by connecting any of the zone players **102-124**, or some other connecting device, to a broadband router. Other zone players **102-124** can then be added wired or wirelessly to the data network **128**. For example, a zone player (e.g., any of zone players **102-124**) can be added to the system configuration **100** by simply pressing a button on the zone player itself, which enables a connection to be made to the data network **128**. The broadband router can be connected to an Internet Service Provider (ISP), for example. The broadband router can be used to form another data network within the system configuration **100**, which can be used in other applications (e.g., web surfing). The data network **128** can also be used in other applications, if so programmed. Further, in certain embodiments, the data network **128** is the same network used for other applications in the household.

In certain embodiments, each zone can play from the same audio source as another zone or each zone can play from a different audio source. For example, someone can be grilling on the patio and listening to jazz music via zone player **124**, while someone is preparing food in the kitchen and listening to classical music via zone player **102**. Further, someone can be in the office listening to the same jazz music via zone player **110** that is playing on the patio via zone player **124**. In some embodiments, the jazz music played via zone players **110** and **124** is played in synchrony. Synchronizing playback amongst zones allows for someone to pass through zones while seamlessly listening to the audio. Further, zones can be put into a "party mode" such that all associated zones will play audio in synchrony.

In certain embodiments, a zone contains two or more zone players. For example, the family room contains two zone players **106** and **108**, and the home theater room contains at least zone players **116**, **118**, and **120**. A zone can be configured to contain as many zone players as desired, and for example, the home theater room might contain additional zone players to play audio from a 5.1 channel or greater audio source (e.g., a movie encoded with 5.1 or greater audio channels). If a zone contains two or more zone players, such as the two zone players **106** and **108** in the family room, then the two zone players **106** and **108** can be configured to play the same audio source in synchrony, or the two zone players **106** and **108** can be paired to play two separate sounds in left and right channels, for example. In other words, the stereo effects of a sound can be reproduced or enhanced through the two zone players **106** and **108**, one for the left sound and the other for the right sound. In certain embodiments, paired zone players can play audio in synchrony with other zone players.

In certain embodiments, three or more zone players can be configured to play various channels of audio that is encoded with three channels or more sound. For example, the home theater room shows zone players **116**, **118**, and **120**. If the sound is encoded as 2.1 channel audio, then the zone player **116** can be configured to play left channel audio, the zone player **118** can be configured to play right channel audio, and the zone player **120** can be configured to play bass frequencies. Other configurations are possible and depend on the number of zone players and the type of audio. Further, a particular zone can be configured to play a 5.1 channel audio in one instance, such as when playing audio from a movie, and then dynamically switch to play stereo, such as when playing audio from a two channel source.

In certain embodiments, two or more zone players can be sonically consolidated to form a single, consolidated zone player. A consolidated zone player (though made up of multiple, separate devices) can be configured to process and reproduce sound differently than an unconsolidated zone player or zone players that are paired, because a consolidated zone player will have additional speaker drivers from which sound can be passed. The consolidated zone player can further be paired with a single zone player or yet another consolidated zone player. Each playback device of a consolidated playback device is preferably set in a consolidated mode.

According to some embodiments, one can continue to do any of: group, consolidate, and pair zone players, for example, until a desired configuration is complete. The actions of grouping, consolidation, and pairing are preferably performed through a control interface, such as using controller **130**, and not by physically connecting and reconnecting speaker wire, for example, to individual, discrete speakers to create different configurations. As such, certain

embodiments described herein provide a more flexible and dynamic platform through which sound reproduction can be offered to the end-user.

Sources of audio content to be played by zone players **102-124** are numerous. Music from a personal library stored on a computer or networked-attached storage (NAS) can be accessed via the data network **128** and played. Internet radio stations, shows, and podcasts can be accessed via the data network **128**. Music services that let a user stream and download music and audio content can be accessed via the data network **128**. Further, music can be obtained from traditional sources, such as a turntable or CD player, via a line-in connection to a zone player, for example. Audio content can also be accessed through AirPlay™ wireless technology by Apple, Inc., for example. Audio content received from one or more sources can be shared amongst the zone players **102** to **124** via the data network **128** and/or the controller **130**. The above-disclosed sources of audio content are referred to herein as network-based audio information sources. However, network-based audio information sources are not limited thereto.

The example home theater zone players **116**, **118**, **120** are coupled to an audio information source such as a television **132**. In some examples, the television **132** is used as a source of audio for the home theater zone players **116**, **118**, **120**, while in other examples audio information from the television **132** can be shared with any of the zone players **102-124** in the audio system **100**.

III. Example Playback Device

Referring now to FIG. **4**, there is shown an example functional block diagram of a zone player **400** in accordance with an embodiment. The zone player **400** of FIG. **4** includes a network interface **402**, a processor **408**, a memory **410**, an audio processing component **412**, a module **414**, an audio amplifier **416**, and a speaker unit **418** coupled to the audio amplifier **416**. FIG. **2**A shows an example illustration of such a zone player. Other types of zone players can not include the speaker unit **418** (e.g., such as shown in FIG. **2**B) or the audio amplifier **416** (e.g., such as shown in FIG. **2**C). Further, it is contemplated that the zone player **400** can be integrated into another component. For example, the zone player **400** could be constructed as part of a lamp for indoor or outdoor use.

Referring back to FIG. **4**, the network interface **402** facilitates a data flow between zone players and other devices on a data network (e.g., the data network **128** of FIG. **1**) and the zone player **400**. In some embodiments, the network interface **402** can manage the assembling of an audio source or file into smaller packets that are to be transmitted over the data network or reassembles received packets into the original source or file. In some embodiments, the network interface **402** can further handle the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **400**. Accordingly, in certain embodiments, each of the packets includes an Internet Protocol (IP)-based source address as well as an IP-based destination address.

In some embodiments, the network interface **402** can include one or both of a wireless interface **404** and a wired interface **406**. The wireless interface **404**, also referred to as an RF interface, provides network interface functions for the zone player **400** to wirelessly communicate with other devices (e.g., other zone player(s), speaker(s), receiver(s), component(s) associated with the data network **128**, and so on) in accordance with a communication protocol (e.g., any of the wireless standards IEEE 802.11a, 802.11b, 802.11g, 802.11n, or 802.15). To receive wireless signals and to provide the wireless signals to the wireless interface **404** and to transmit wireless signals, the zone player **400** of FIG. **4** includes one or more antennas **420**. The wired interface **406** provides network interface functions for the zone player **400** to communicate over a wire with other devices in accordance with a communication protocol (e.g., IEEE 802.3). In some embodiments, a zone player includes both of the interfaces **404** and **406**. In some embodiments, a zone player **400** includes only the wireless interface **404** or the wired interface **406**.

In some embodiments, the processor **408** is a clock-driven electronic device that is configured to process input data according to instructions stored in memory **410**. The memory **410** is data storage that can be loaded with one or more software modules **414**, which can be executed by the processor **408** to achieve certain tasks. In the illustrated embodiment, the memory **410** is a tangible machine readable medium storing instructions that can be executed by the processor **408**. In some embodiments, a task might be for the zone player **400** to retrieve audio data from another zone player or a device on a network. In some embodiments, a task might be for the zone player **400** to send audio data to another zone player or device on a network. In some embodiments, a task might be for the zone player **400** to synchronize playback of audio with one or more additional zone players. In some embodiments, a task might be to pair the zone player **400** with one or more zone players to create a multi-channel audio environment. Additional or alternative tasks can be achieved via the one or more software modules **414** and the processor **408**.

The audio processing component **412** can include one or more digital-to-analog converters (DAC), an audio preprocessing component, an audio enhancement component or a digital signal processor, and so on. In certain embodiments, the audio that is retrieved via the network interface **402** is processed and/or intentionally altered by the audio processing component **412**. Further, the audio processing component **412** can produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier **416** for play back through speakers **418**. In addition, the audio processing component **412** can include necessary circuitry to process analog or digital signals as inputs to play from zone player **400**, send to another zone player on a network, or both play and send to another zone player on the network. An example input includes a line-in connection (e.g., an auto-detecting 3.5 mm audio line-in connection).

The audio amplifier **416** is a device that amplifies audio signals to a level for driving one or more speakers **418**. The one or more speakers **418** can include an individual transducer (e.g., a "driver") or a complete speaker system that includes an enclosure including one or more drivers. A particular driver can be a subwoofer (for low frequencies), a mid-range driver (middle frequencies), and a tweeter (high frequencies), for example. An enclosure can be sealed or ported, for example.

A zone player **400** can also be referred to herein as a playback device. An example playback device includes a Sonos® Play:5, which is manufactured by Sonos, Inc. of Santa Barbara, Calif. The Play:5 is an example zone player with a built-in amplifier and speakers. In particular, the Play:5 is a five-driver speaker system that includes two tweeters, two mid-range drivers, and one subwoofer. When playing audio content via the Play:5, the left audio data of a track is sent out of the left tweeter and left mid-range driver, the right audio data of a track is sent out of the right tweeter and the right mid-range driver, and mono bass is sent out of the subwoofer. Further, both mid-range drivers and

both tweeters have the same equalization (or substantially the same equalization). That is, they are both sent the same frequencies, just from different channels of audio. Audio from Internet radio stations, online music and video services, downloaded music, analog audio inputs, television, DVD, and so on, can be played from a Sonos® Play:5. While the Play:5 is an example of a zone player with speakers, it is understood that a zone player with speakers is not limited to one with a certain number of speakers (e.g., five speakers as in the Play:5), but rather can contain one or more speakers. Further, a zone player can be part of another device, which might even serve a purpose different than audio (e.g., a lamp).

IV. Example Controller

Referring now to FIG. **5**, there is shown an example controller **500**, which can correspond to the controlling device **130** in FIG. **1**. The controller **500** can be used to facilitate the control of multi-media applications, automation and others in a system. In particular, the controller **500** is configured to facilitate a selection of a plurality of audio sources available on the network and enable control of one or more zone players (e.g., the zone players **102-124** in FIG. **1**) through a wireless network interface **508**. According to one embodiment, the wireless communications is based on an industry standard (e.g., infrared, radio, wireless standards IEEE 802.11a, 802.11b 802.11g, 802.11n, or 802.15). Further, when a particular audio is being accessed via the controller **500** or being played via a zone player, a picture (e.g., album art) or any other data, associated with the audio source can be transmitted from a zone player or other electronic device to the controller **500** for display.

The controller **500** is provided with a screen **502** and an input interface **514** that allows a user to interact with the controller **500**, for example, to navigate a playlist of many multimedia items and to control operations of one or more zone players. The screen **502** on the controller **500** can be an LCD screen, for example. The screen **500** communicates with and is commanded by a screen driver **504** that is controlled by a microcontroller (e.g., a processor) **506**. The memory **510** can be loaded with one or more application modules **512** that can be executed by the microcontroller **506** with or without a user input via the user interface **514** to achieve certain tasks. In some embodiments, an application module **512** is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for audio play back. In some embodiments, an application module **512** is configured to control the audio sounds (e.g., volume) of the zone players in a zone group. In operation, when the microcontroller **506** executes one or more ofthe application modules **512**, the screen driver **504** generates control signals to drive the screen **502** to display an application specific user interface accordingly.

The controller **500** includes a network interface **508** that facilitates wireless communication with a zone player. In some embodiments, the commands such as volume control and audio playback synchronization are sent via the network interface **508**. In some embodiments, a saved zone group configuration is transmitted between a zone player and a controller via the network interface **508**. The controller **500** can control one or more zone players, such as **102-124** of FIG. **1**. There can be more than one controller for a particular system. Further, a controller can be integrated into a zone player.

It should be noted that other network-enabled devices such as an iPhone®, iPad® or any other smart phone or network-enabled device (e.g., a networked computer such as a PC or Mac®) can also be used as a controller to interact or control zone players in a particular environment. In some embodiments, a software application or upgrade can be downloaded onto a network enabled device to perform the functions described herein.

In certain embodiments, a user can create a zone group including at least two zone players from the controller **500**. The zone players in the zone group can play audio in a synchronized fashion, such that all of the zone players in the zone group play back an identical audio source or a list of identical audio sources in a synchronized manner such that no (or substantially no) audible delays or hiccups could be heard. Similarly, in some embodiments, when a user increases the audio volume of the group from the controller **500**, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume.

A user via the controller **500** can group zone players into a zone group by activating a "Link Zones" or "Add Zone" soft button, or de-grouping a zone group by activating an "Unlink Zones" or "Drop Zone" button. For example, one mechanism for 'joining' zone players together for audio play back is to link a number of zone players together to form a group. To link a number of zone players together, a user can manually link each zone player or room one after the other. For example, assume that there is a multi-zone system that includes the following zones: Bathroom, Bedroom, Den, Dining Room, Family Room, and Foyer.

In certain embodiments, a user can link any number of the six zone players, for example, by starting with a single zone and then manually linking each zone to that zone.

In certain embodiments, a set of zones can be dynamically linked together using a command to create a zone scene or theme (subsequent to first creating the zone scene). For instance, a "Morning" zone scene command can link the Bedroom, Office, and Kitchen zones together in one action. Without this single command, the user would need to manually and individually link each zone. The single command might include a mouse click, a double mouse click, a button press, a gesture, or some other programmed action. Other kinds of zone scenes can be programmed.

In certain embodiments, a zone scene can be triggered based on time (e.g., an alarm clock function). For instance, a zone scene can be set to apply at 8:00 am. The system can link appropriate zones automatically, set specific music to play, and then stop the music after a defined duration. Although any particular zone can be triggered to an "On" or "Off" state based on time, for example, a zone scene enables any zone(s) linked to the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time and/or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed Universal Plug and Play (UPnP), no Internet connection for an Internet Radio station, and so on), a backup buzzer can be programmed to sound. The buzzer can include a sound file that is stored in a zone player, for example.

V. Example Ad-Hoc Network

Certain particular examples will now be provided in connection with FIGS. **6-8**B to describe, for purposes of illustration only, certain base systems and methods to provide and facilitate connection to a playback network. FIG. **6** shows that there are three zone players **602**, **604** and **606** and a controller **608** that form a network branch that is also referred to as an Ad-Hoc network **610**. The network **610** may be wireless, wired, or a combination of wired and wireless. In general, an Ad-Hoc (or "spontaneous") network is a local

area network or other small network in which there is no one access point for all traffic. With an established Ad-Hoc network **610**, the devices **602**, **604**, **606** and **608** can all communicate with each other in a "peer-to-peer" style of communication, for example. Furthermore, devices may come/and go from the network **610**, and the network **610** will automatically reconfigure itself without needing the user to reconfigure the network **610**.

Using the Ad-Hoc network **610**, the devices **602**, **604**, **606**, and **608** can share or exchange one or more audio sources and be grouped to play the same or different audio sources. For example, the devices **602** and **604** are grouped to playback one piece of music, and at the same time, the device **606** plays back another piece of music. In other words, the devices **602**, **604**, **606** and **608**, as shown in FIG. **6**, form a HOUSEHOLD that distributes audio and/or reproduces sound. As used herein, the term HOUSEHOLD (provided in uppercase letters to disambiguate from the user's domicile) is used to represent a collection of networked devices that are cooperating to provide an application or service. An instance of a HOUSEHOLD is identified with a household **10** (or household identifier).

In certain embodiments, a household identifier (HHID) is a short string or an identifier that is computer-generated to help ensure that it is unique. Accordingly, the network **610** can be characterized by a unique HHID and a unique set of configuration variables or parameters, such as channels (e.g., respective frequency bands), SSID (a sequence of alphanumeric characters as a name of a wireless network), and WEP keys (wired equivalent privacy or other security keys). In certain embodiments, SSID is set to be the same as HHID.

In certain embodiments, each HOUSEHOLD includes two types of network nodes: a control point (CP) and a zone player (ZP). The control point controls an overall network setup process and sequencing, including an automatic generation of required network parameters (e.g., WEP keys). In an embodiment, the CP also provides the user with a HOUSEHOLD configuration user interface. The CP function can be provided by a computer running a CP application module, or by a handheld controller (e.g., the controller **308**) also running a CP application module, for example. The zone player is any other device on the network that is placed to participate in the automatic configuration process. The ZP, as a notation used herein, includes the controller **308** or a computing device, for example.

In certain embodiments, configuration of a HOUSEHOLD involves multiple CPs and ZPs that rendezvous and establish a known configuration such that they can use a standard networking protocol (e.g., IP over Wired or Wireless Ethernet) for communication. In an embodiment, two types of networks/protocols are employed: Ethernet 802.3 and Wireless 802.11g. Interconnections between a CP and a ZP can use either of the networks/protocols. A device in the system as a member of a HOUSEHOLD can connect to both networks simultaneously. In an environment that has both networks in use, it is assumed that at least one device in a system is connected to both as a bridging device, thus providing bridging services between wired/wireless networks for others. The zone player **606** in FIG. **6** is shown to be connected to both networks, for example. The connectivity to the network **612** is based on Ethernet while the connectivity to other devices **602**, **604** and **608** is based on Wireless. It is understood, however, that in some embodiments each zone player **606**, **604**, **602** may access the Internet when retrieving media from the cloud (e.g., Internet) via the bridging device. For example, zone player **602** may contain a uniform resource locator (URL) that specifies an address to a particular audio track in the cloud. Using the URL, the zone player **602** may retrieve the audio track from the cloud, and ultimately play the audio out of one or more zone players.

VI. Example Music Sharing and Playback Configuration

Certain embodiments enable a user to stream music from a music-playing application (e.g., browser-based application, native music player, other multimedia application, and so on) to a local multimedia content playback (e.g., Sonos™) system. Certain embodiments provide secure systems and methods for multimedia content playback across a plurality of systems and locations. Certain embodiments facilitate integration between content partners and a playback system as well as supporting maintenance of such content and system.

FIG. **7** shows a system including a plurality of networks including a cloud-based network and at least one local playback network. The network includes a plurality of playback devices or players, though it is understood that the network may contain only one playback device. In certain embodiments, each player has an ability to retrieve its content for playback. Control and content retrieval can be distributed or centralized, for example. Input can include streaming content provider input, third party application input, mobile device input, user input, and/or other playback network input into the cloud for local distribution and playback.

As illustrated by the example system **700** of FIG. **7**, a plurality of content providers **720-750** can be connected to one or more local playback networks **760-770** via a cloud and/or other network **710**. Using the cloud **710**, a multimedia playback system **720** (e.g., Sonos™) a mobile device **730**, a third party application **740**, a retail location **750**, and so on can provide multimedia content (requested or otherwise) to local playback networks **760**, **770**. Within each local network **760**, **770**, a controller **762**, **772** and/or playback device **764**, **774** can provide a song identifier, song name, playlist identifier, playlist name, genre, preference, and so on, and/or simply receive content from a connected system via the cloud.

For example, a user listens to a third party music application (e.g., Pandora™ Rhapsody™, Spotify™, and so on) on her smart phone while commuting. She's enjoying the current channel and, as she walks in the door to her home, selects an option to continue playing that channel on her household music playback system (e.g., Sonos™). The playback system picks up from the same spot on the selected channel that was on her phone and outputs that content (e.g., that song) on speakers and/or other playback devices connected to the household playback system. A uniform resource indicator (URI) (e.g., a uniform resource locator (URL)) can be passed to a playback device to fetch content from a cloud and/or other networked source, for example. A playback device, such as a zone player, can fetch content on its own without use of a controller, for example. Once the zone player has a URL (or some other identification or address) for a song and/or playlist, the zone player can run on its own to fetch the content. Songs and/or other multimedia content can be retrieved from the Internet rather than a local device (e.g., a compact disc (CD)), for example. A third party application can open or utilize an application programming interface (API) to pass music to the household playback system without tight coupling to that household playback system.

In another example of an application determining a playlist and/or other content for playback, a user enjoys listening to music on an online music service (e.g., turntable.fm or

other virtual room that a user can enter to choose from a plurality of online disc jockeys (DJs) deciding what to play next) using his Mac Book Pro™ at home. He likes the unique user experience the service offers, and he frequently hops from room to room discovering new music. To maximize sound quality, he plays the music on his household playback system (e.g., Sonos™). A button or other indicator can be added to the turntable.fm Web application to switch the content being played to the playback system for output (e.g., to the Sonos™ system rather than or in addition to the Mac Book™). While Web-based applications typically do not have access to items on a local network, certain embodiments enable a third-party Web-based application (e.g., Turntable.fm) to talk to a playback system (e.g., Sonos™) in a certain way (e.g., may have to log in with a usemame and password), and the identified user has the website send audio or audio and video down to a playback device (e.g., a zone player) on the playback system local network to play music there (or some other media).

In another example, a first user creates a playlist (e.g., a Spotify™ playlist). The first user visits a second user's house, pulls out her smart phone and shares her playlist by playing it on the second user's household playback (e.g., Sonos™) system using her third party (e.g., Spotify™) application. The first user may also go to the third party content provider's (e.g., Spotify's™) website and share her playlist on the second user's playback system.

Thus, certain embodiments provide cross-service linking such that a song identifier can be passed from one user and/or service to another to be fetched and played. A user having a playlist on his or her phone can visit a friend and, using her account on her friend's system, play a song to which she has an access right. A retrieved song can streamed locally to a user's phone, or an application can pass a song identifier to a local playback system which looks up the song identifier and finds an available audio stream to which the user has a right to play and then plays that song.

In another example, a user is staying in a hotel room or other facility including a local playback network. For example, a speaker and/or other playback device (e.g., a Sonos™ Play:3, Play:5 and so on) in a hotel room can be utilized to play multimedia content to which the user has access from his or her playback network account, streaming audio source, third party application, and so on. Content can be output to one or more devices based on availability, access, configuration, priority, preference, and so on. In certain embodiments, a playback network includes a plurality of nodes, and each node has a capability to play sound in response to an input. Requested output is provided to a most logical connection, for example.

In certain embodiments, a phone device, a television device, and so on can be used to play music, audio, video and/or other multimedia content. In an example, a push button on a microphone or household intercom system to tell the kids dinner is ready is provided over the local playback network.

FIG. **8** shows a flow diagram for a method **800** to provide audio content to a local playback system. In the example method **800** of FIG. **8**, a third party application acts as a "virtual line-in" to the local playback system. At block **810**, streaming of music or other content from a third party application to a local content playback system is triggered. For example, a "Play to Sonos" button is pressed on a Rhapsody™ application. At block **820**, content is streamed to one or more components in a household playback network. The music may be streamed to predetermined zones or players in a household, for example. The music may be further directed to be played in different zones or players throughout the household. Playback on the local network can be facilitated to one or more zones/players based on a configuration (e.g., a zone scene, theme, and so on). Thus, certain embodiments allow a large degree of flexibility in where the music is actually played. For example, the music can be played in the kitchen, the family room, the patio, and so on. Further, the music may be redirected to different zones.

At block **830**, the incoming content (e.g., audio) stream is provided directly from a third party application or other external source to the local playback network for playback. For example, rather than passing track identifiers, an audio stream is provided to a Sonos household system for playback to one or more configured zones. At block **840**, the local playback system consumes the stream and plays it as it would other content on the local playback (e.g., Sonos™) network (e.g., via zones and so on). At block **850**, a playback device (e.g., a zone player, Play:3™, Play:5™, and so on) adds timing information to the streaming content signal (e.g., the device takes the streaming audio signal and repackages it for local synchronized playback). In some embodiments, timing information is not added to the signal unless two or more playback devices are configured to play the audio in synchrony.

FIG. **9** shows a flow diagram for a method **900** to provide audio content to a local playback system. In the example method **900** of FIG. **9**, a uniform resource indicator (URI) handler approach is provided for content output. At block **910**, a link or other reference is embedded in a third party application (e.g., Facebook™ or Twitter). At block **920**, when the link is selected (e.g., clicked), a local playback (e.g., Sonos™) controller, if available, is launched. At block **930**, the application (e.g., accessed on a phone, tablet, computer, and so on) passes a URI for associated content (e.g., an audio track and so on) to a local playback system (e.g., Sonos™) controller. At block **940**, the local controller outputs the associated content (e.g., plays the music) via the URI. For example, music is streamed from the cloud to one or more playback devices on the local playback network.

In certain embodiments, an application associated with the operating system can register to handle all URIs (URLs) that start with a certain prefix and can define how data is encoded into those URLs so a local playback system application can generate a link (e.g., "sonos:") and put that link into a message (e.g., email, text message, instant message (IM), etc.). The local playback application registered to handle such URLs can parse the URLs to determine what song, playlist, streaming radio station, etc., to play. This launches the controller application. For example, if a first listener likes a song and tweets that song, Twitter™ can include a clickable link which launches a playback application and starts the music playing on a local playback system if the local system can find the song (e.g., if have the application, if have rights/access to the song, etc.). In certain embodiments, the system knows to trigger the receiving user's system rather than the sending user's system to play associated content based on the transmitted link/identifier.

For example, an application can register with the system to handle all URLs that start with a custom prefix (e.g., an HTTP "scheme"). For instance, Sonos controller apps can register to handle any URL that begins with "sonos:" or "x-sonos:". In certain embodiments, a playback system provider can define and publish the format of its URLs so that any third party application can create a link or reference to content. A large amount of data can be encoded into a URL using query parameters, for example.

In an example, when an application tries to "open" or "browse" to a URL, the system checks to see if the scheme of the URL matches the "sonos:" scheme that has been registered with the application. If a URL handler application is found, the system launches that application (e.g., the application can but does not need to be running in the background) and passes the URL to the application. The application then parses the URL and executes functionality based on the data in the URL. For example, the URL can contain the name of a music service and a playlist identifier from that service, plus the name of a Sonos™ Zone Player, causing the Sonos controller to start that playlist playing on that zone.

FIG. **10** shows a flow diagram for a method **1000** to provide audio content to a local playback system. In the example method **1000** of FIG. **10**, at block **1010**, a link or other reference is embedded in a third party application (e.g., Facebook™). At block **1020**, when the link is selected, a playback system (e.g., Sonos™) server is contacted and provided with information regarding selected content for playback. For example, rather than launching a local controller application, a server is contacted regarding music for playback on a local network. At block **1030**, using the provided information, the server identifies and provides the content locally on a user's local playback system. For example, the server can then start playing the music directly on the user's Sonos™ system (e.g., without going through a Sonos™ controller application).

In certain embodiments, a "single sign-on" technology is provided so that the user does not need to re-enter a username and password in order to authenticate to the playback server. Example single sign-on technologies include Facebook Connect™, Windows Live ID™, etc.

In certain embodiments, instead of using a specialized link, such as a "sonos:" link, a normal URL can be used to point to a playback system (e.g., Sonos™) webserver, which generates links with special data embedded in the link. A playback system is identified, and content identified by the URL can be playing at via the local playback network (e.g., mesh network configured for home, hotel room, etc.). Parameters such as authentication, security, location, and so on can be configured for local playback of remote content.

FIG. **11** shows a flow diagram for a method **1100** to provide audio content to a local playback system. The example method **1100** of FIG. **11** provides a "throw it over the wall" approach to content delivery to a local playback system. At block **1110**, a third party application provides a multimedia playback device (e.g., a Sonos™ zone player (ZP)) with enough information about content (e.g., an audio track) so that, at block **1120**, the local playback system (e.g., SonosNet™) can directly access a source of the content and, at block **1130**, play the content directly off the network (e.g., the Internet) or cloud.

In certain embodiments, a local playback controller application is not involved. Information passed over to the local playback device may include an identifier for a single track, a playlist, a streaming radio station, a programmed radio station, and so on. This information can also include a current play position within a list to enable near-seamless "handoff" of music from a portable device to a local playback system. Once the music information is handed from the third-party application to the local playback system, there is no further synchronization between the two systems.

A connection between the third-party application and the local playback device (e.g., Sonos ZonePlayer™) can be direct over a local area network (LAN), remote through a proxy server in the cloud, and so on. A LAN delivery approach may be easier to integrate into "native" applications (e.g., applications written for iOS or Android), and a proxy server approach may be easier for third party applications that are browser-based, for example.

In certain embodiments, information is provided from a third party application to a local playback system without being routed through or by a controller application. Here, the third party application is communicating with the multimedia playback device (e.g., a Sonos ZonePlayer™). Information can be passed locally, rather than through the Internet, for example. The local playback device accesses the Internet to find content to stream, and the third party application takes the place of the controller application (e.g., throw it over the wall—the application passes information and the local playback system runs it).

Certain embodiments provide an approach similar to the "throw it over the wall" or one way communication approach of FIG. **11** except that the third party application not only tells the local playback system what to play, but also maintains two-way communication with the local playback (e.g., Sonos™) system. Two-way communication helps enable features such as keeping a local playback queue synchronized with a queue that the user is editing/managing in the third party application; allow the third party application to know what is currently playing on the local playback system; allow integrated transport control between the third party application and the local playback system; and so on.

In certain embodiments, a local playback system can pass information back to a third party application to indicate a current point of playback (e.g., now playing a third song in a playlist, fourth song in the playlist, and so on). The local playback system can pass parameter information, such as a change in volume, from a local multimedia playback device to the third party application so the application can reflect the change in volume to the user via its graphical user interface. The third party application can instruct the local playback system to skip a song, go to a certain location, and so on.

Certain embodiments provide a third party mode that allows users to select from any local playback network (e.g., Sonos™) controller to listen to audio from one or more third party applications on their smartphones or tablets (e.g., Android™ devices). For example, a user may be using a local playback network controller application and now wants a third party application to appear as an audio source within the controller application. The user can then select the controller application that he or she wishes to play audio from the third party application, for example.

Certain embodiments provide queue management to allow a third party application to control a local playback queue. That is, the local playback system has a queue, but the third party application allows users to add, delete and so on from the queue, for example. Rather than switch from content that the user is currently playing, the local playback system allows a user to create a playlist on the fly. For example, if last.fm users vote that they do not like a song and it should be skipped, then the local playback system will skip it.

Certain embodiments allow a third party application to override a local playback queue with its own application-specific queue. The local playback system periodically fetches a short list of tracks to play next. The list of tracks to play is determined by the third-party application, for example. In certain embodiments, a shared queue is provided between the local playback system and the third party application to keep the local system and application synchronized.

Certain embodiments allow control of playback system functions and/or settings via an external (e.g., third party) application. For example, a local playback system can allow volume control, play/pause, and so on and can interact with an application running on a given platform/operating system (OS). Certain embodiments provide a Web API that can be used to access functionality.

Certain embodiments facilitate control of a local playback system from outside a household or other location at which the local playback network is configured. For example, a user can queue up music while away from his or her house. The application can facilitate setup and/or configuration. For example, a third party application may ask the user to enter a Sonos customer email address and password. The application can then make a request to a Sonos server in the cloud to determine the zone groups on which music can be played.

Various inventions have been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts can be resorted without departing from the spirit and scope of the present disclosure as claimed. While the embodiments discussed herein can appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the embodiments have applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present disclosure is defined by the appended claims rather than the forgoing description of embodiments.

The invention claimed is:

1. A computing device comprising:

at least one processor;

a non-transitory computer-readable medium; and

program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

operating in a first mode in which the computing device is configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service;

while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the remote playback queue;

while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

based on receiving the user input, transmitting an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the remote playback queue from the cloud-based media service; and (iii) play back the retrieved at least one media item;

detecting an indication that playback responsibility for the remote playback queue has been successfully transferred from the computing device to the at least one given playback device; and

after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the remote playback queue to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the remote playback queue and the computing device is no longer configured for playback of the remote playback queue.

2. The computing device of claim **1**, wherein the instruction comprises an instruction for the cloud-based computing system associated with the media service to provide the data identifying the next one or more media items to the given playback device for use in retrieving the at least one media item from the cloud-based computing system associated with the cloud-based media service.

3. The computing device of claim **1**, wherein the instruction comprises an instruction for the cloud-based computing system associated with the cloud-based media service to provide the at least one media item to the given playback device.

4. The computing device of claim **1**, wherein the representation of the one or more playback devices comprises at least one selectable indicator for a group of playback devices that includes the given playback device and one or more other playback devices that are to be configured for synchronous playback of the remote playback queue, and wherein the user input indicating the selection of at least one given playback device from the one or more playback devices comprises user input indicating a selection of the group of playback devices.

5. The computing device of claim **1**, wherein operating in a first mode in which the computing device is configured for playback of the remote playback queue comprises operating in the first mode in which the computing device has received user input indicating a selection of the remote playback queue for playback by the computing device but the computing device has not yet begun playback of the remote playback queue.

6. The computing device of claim **1**, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

beginning to operate in the first mode after i) launching a media application associated with the cloud-based media service and ii) receiving user input indicating a selection of the remote playback queue.

7. The computing device of claim **1**, wherein:

operating in the first mode further involves providing a control interface comprising one or more selectable control icons that are configured to control playback of the remote playback queue by the computing device;

transitioning from the first mode to the second mode further involves modifying the control interface such that the one or more selectable control icons are configured to control playback of the remote playback queue by the at least one playback device instead of the computing device.

8. The computing device of claim **7**, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

after transitioning to the second mode, receiving user input indicating a selection of a given control icon of

the one or more selectable control icons, wherein the given control icon corresponds to a given transport control operation; and

based on receiving the user input indicating the selection of the given control icon, causing the corresponding transport control operation to be executed by the given playback device.

9. The computing device of claim **8**, wherein the transport control operation comprises one of a play operation, a pause operation, a skip forward operation, or a skip back operation.

10. The computing device of claim **1**, wherein the cloud-based computing system associated with the cloud-based media service includes one or more cloud servers.

11. The computing device of claim **1**, wherein displaying the representation of the one or more playback devices comprises:

displaying the representation of the one or more playback devices in response to receiving a selection of a displayed icon indicating that playback responsibility for the remote playback queue can be transferred.

12. A non-transitory computer-readable medium having stored thereon program instructions that, when executed by at least one processor, cause a computing device to perform functions comprising:

operating in a first mode in which the computing device is configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service;

while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the remote playback queue;

while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

based on receiving the user input, transmitting an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the remote playback queue from the cloud-based media service; and (iii) play back the retrieved at least one media item;

detecting an indication that playback responsibility for the remote playback queue has been successfully transferred from the computing device to the at least one given playback device; and

after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the remote playback queue to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the remote playback queue and the computing device is no longer configured for playback of the remote playback queue.

13. The non-transitory computer-readable medium of claim **12**, wherein the instruction comprises an instruction for the cloud-based computing system associated with the cloud-based media service to provide the data identifying the next one or more media items to the given playback device for use in obtaining the at least one media item from the cloud-based computing system associated with the cloud-based media service.

14. The non-transitory computer-readable medium of claim **12**, wherein the instruction comprises an instruction for the cloud-based computing system associated with the media service to provide the at least one media item to the given playback device.

15. A method carried out by a computing device, the method comprising:

operating in a first mode in which the computing device is configured for playback of a remote playback queue provided by a cloud-based computing system associated with a cloud-based media service;

while operating in the first mode, displaying a representation of one or more playback devices in a media playback system that are each i) communicatively coupled to the computing device over a data network and ii) available to accept playback responsibility for the remote playback queue;

while displaying the representation of the one or more playback devices, receiving user input indicating a selection of at least one given playback device from the one or more playback devices;

based on receiving the user input, transmitting an instruction for the at least one given playback device to take over responsibility for playback of the remote playback queue from the computing device, wherein the instruction configures the at least one given playback device to (i) communicate with the cloud-based computing system in order to obtain data identifying a next one or more media items that are in the remote playback queue, (ii) use the obtained data to retrieve at least one media item in the remote playback queue from the cloud-based media service; and (iii) play back the retrieved at least one media item;

detecting an indication that playback responsibility for the remote playback queue has been successfully transferred from the computing device to the at least one given playback device; and

after detecting the indication, transitioning from i) the first mode in which the computing device is configured for playback of the remote playback queue to ii) a second mode in which the computing device is configured to control the at least one given playback device's playback of the remote playback queue and the computing device is no longer configured for playback of the remote playback queue.

16. The computing device of claim **1**, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the at least one processor, cause the computing device to perform functions comprising:

before displaying the representation of the one or more playback devices, receiving an indication that the one or more playback devices in the media playback system are available to accept playback responsibility for the remote playback queue.

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(54) **ZONE SCENE MANAGEMENT**

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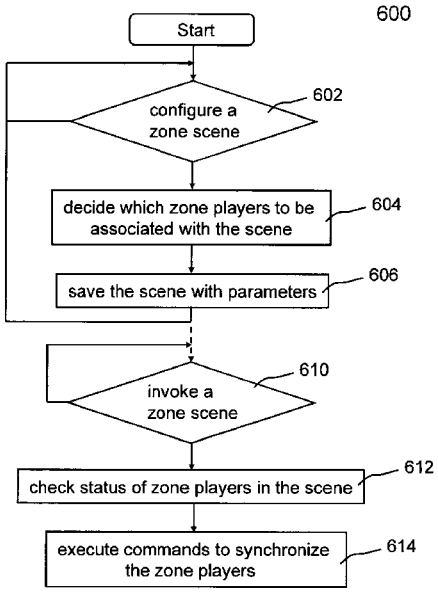
(57) **ABSTRACT**

An example computing device in a media playback system receives a first request to create a first zone scene including a first preconfigured grouping of zones including a first zone and a second zone, and based on the first request, causes creation and storage of the first zone scene. The computing device receives a second request to create a second zone scene including a second preconfigured grouping of zones including the first zone and a third zone, and based on the second request, causes creation and storage of the second zone scene. While displaying a representation of the first zone scene and a representation of the second zone scene, the computing devices receives a third request to invoke the first zone scene, and based on the third request, causes the first zone scene to be invoked such that the first zone and the second zone become configured for synchronous playback of media.

20 Claims, 13 Drawing Sheets



Related U.S. Application Data

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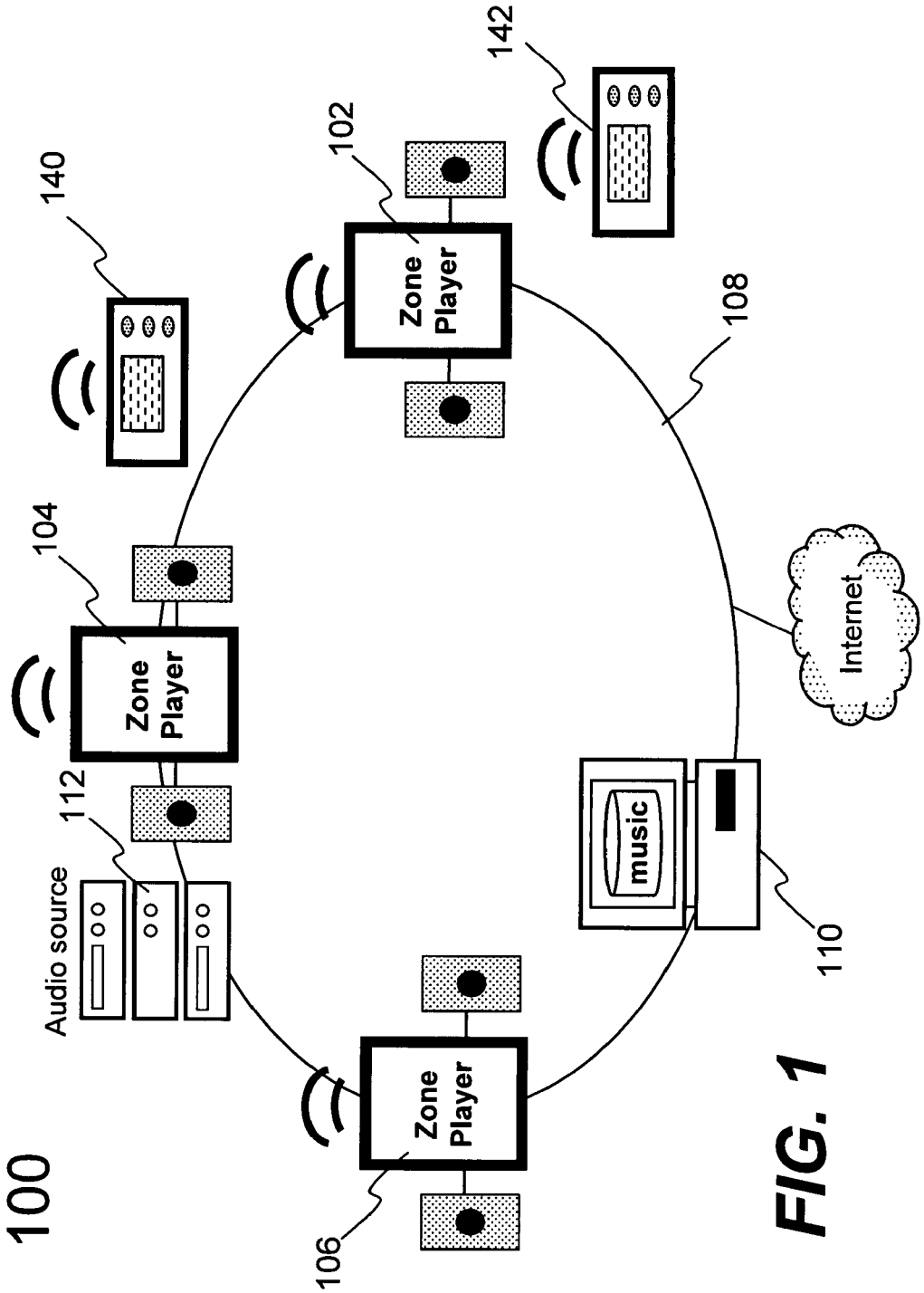

100
Zone Player
102
Zone Player
104
Zone Player
106
140
142
108
Internet
music
110
112
Audio source

FIG. 1

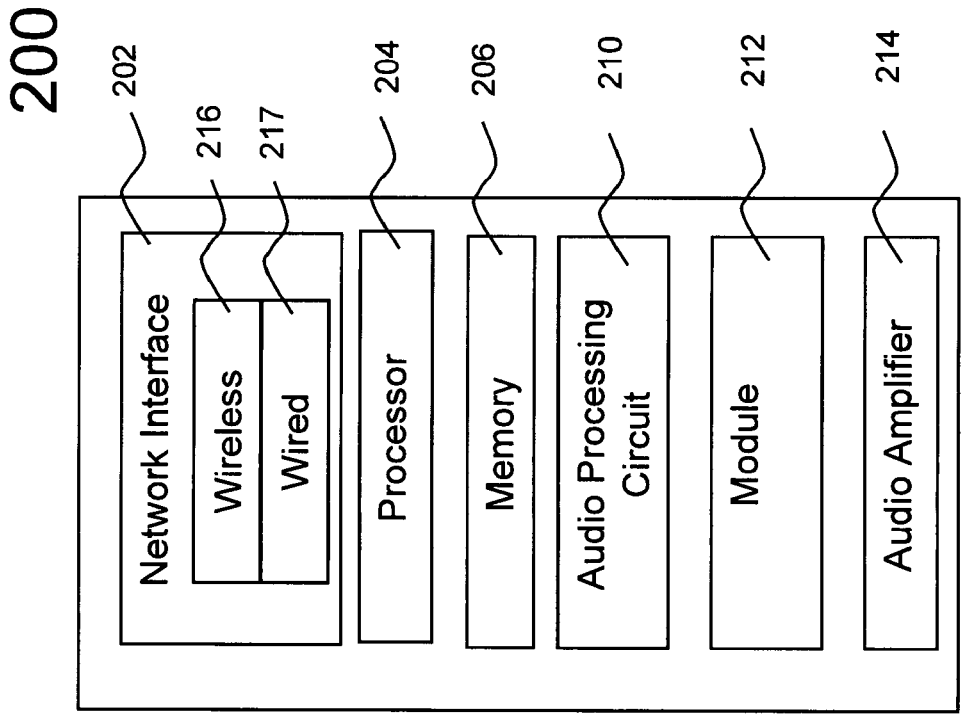

200
202
216
217
204
206
210
212
214
Network Interface
Wireless
Wired
Processor
Memory
Audio Processing Circuit
Module
Audio Amplifier

FIG. 2A

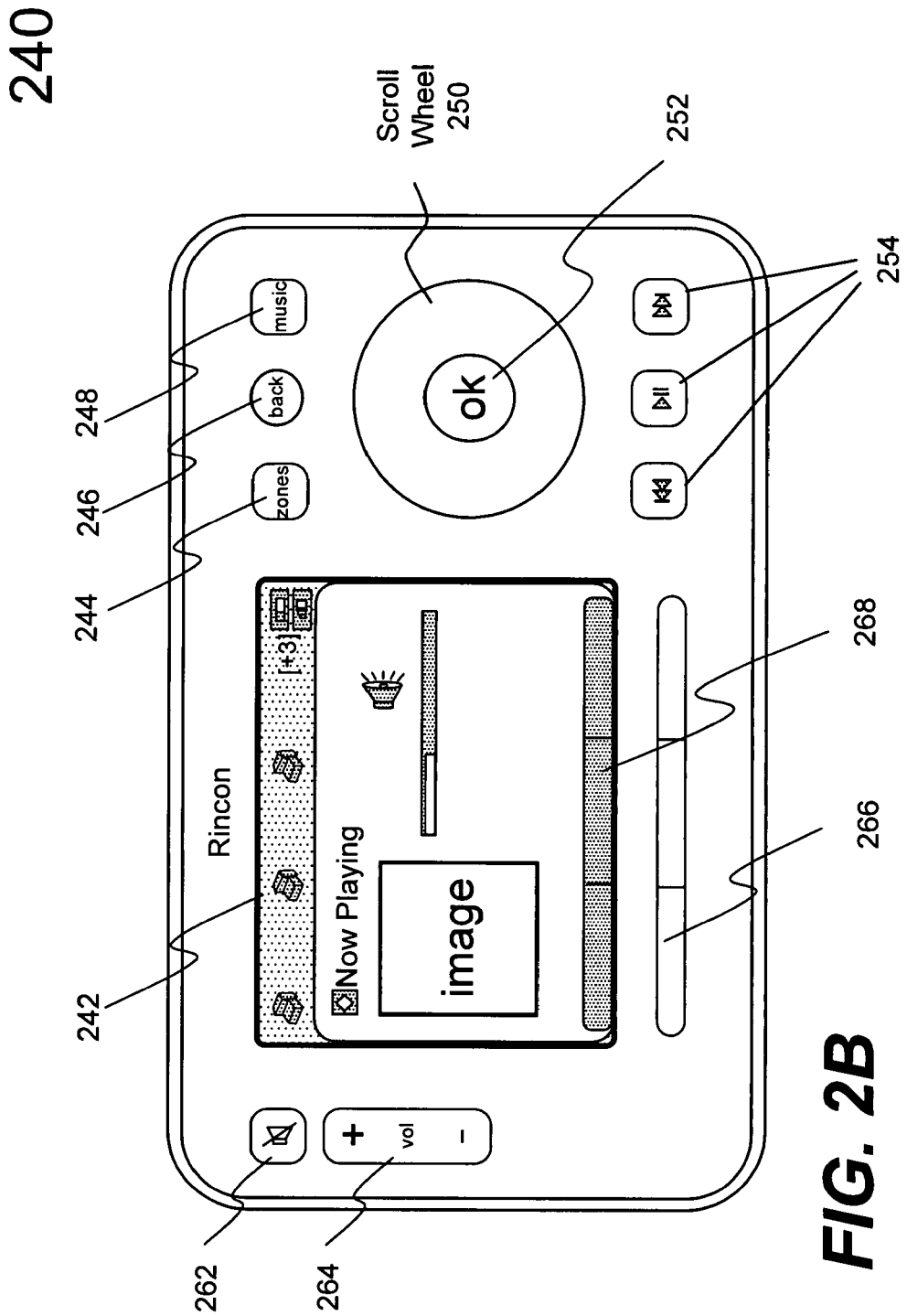

240
Scroll Wheel 250
252
254
248
246
244
242
262
264
266
268
music
back
zones
ok
Rincon
Now Playing
image
vol
+
-

FIG. 2B

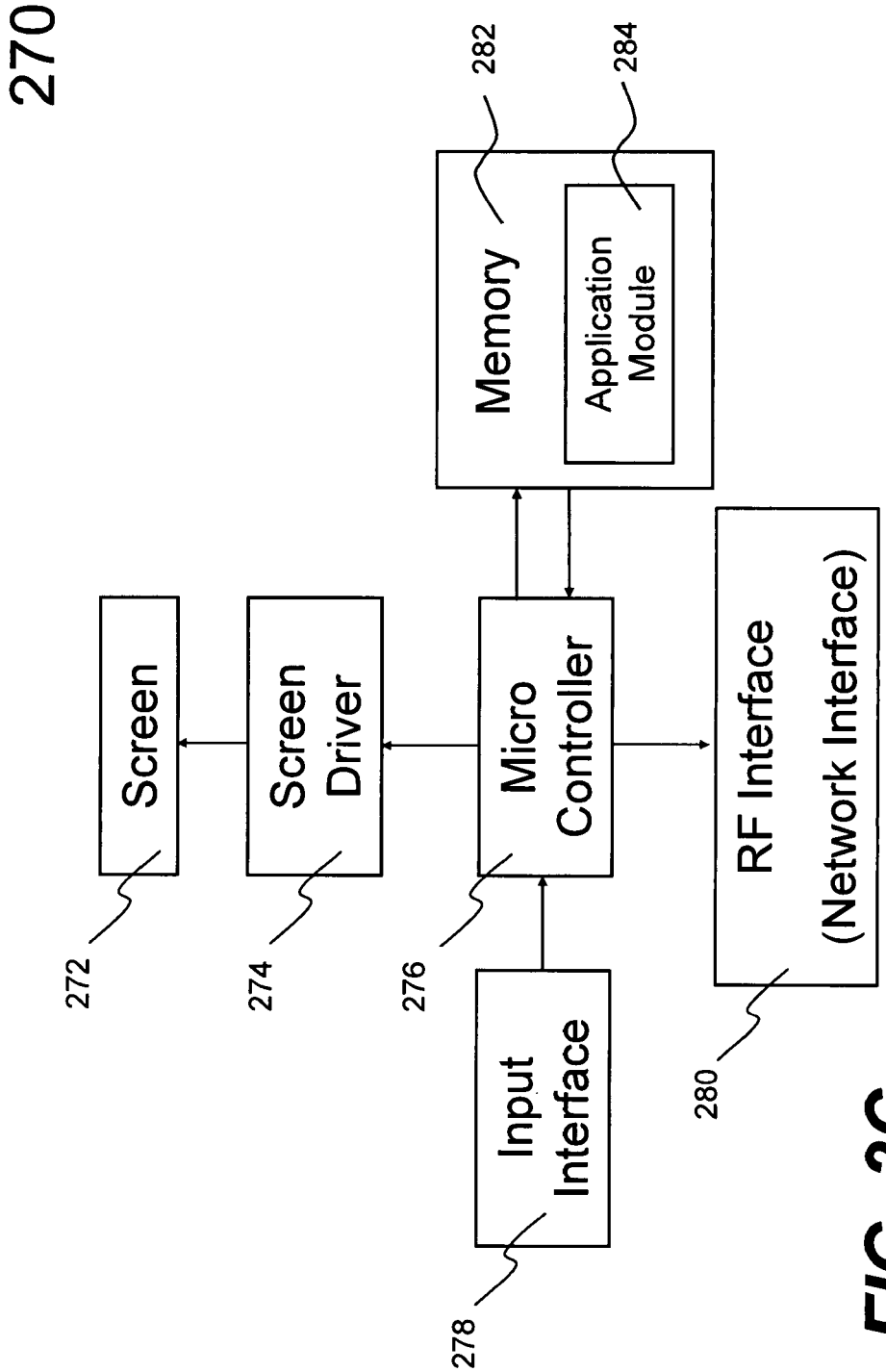

270
282
284
Memory
Application Module
Screen
Screen Driver
Micro Controller
RF Interface (Network Interface)
Input Interface
272
274
276
278
280

FIG. 2C

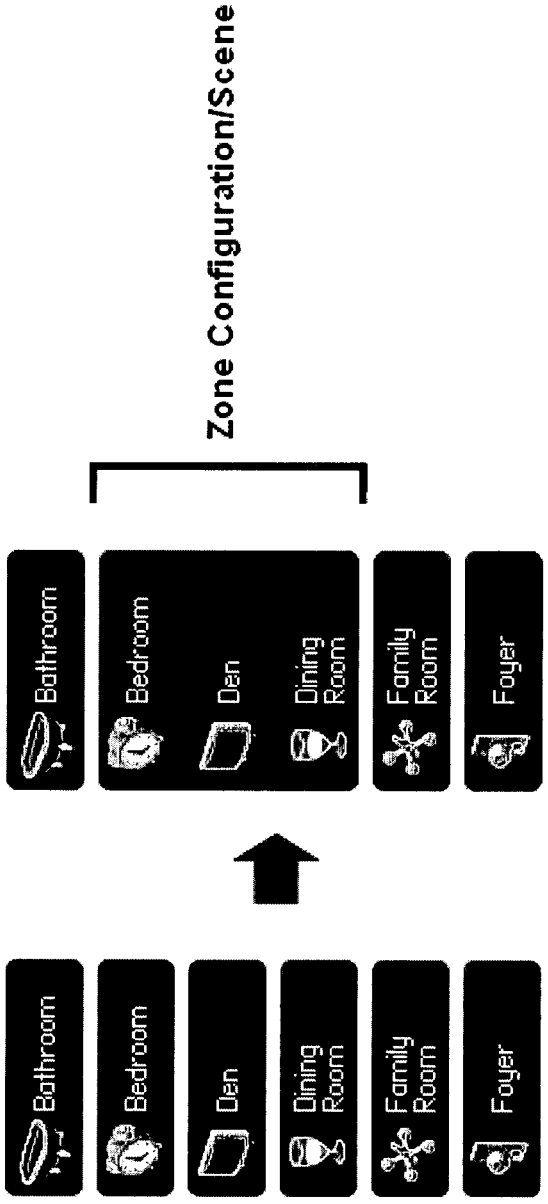
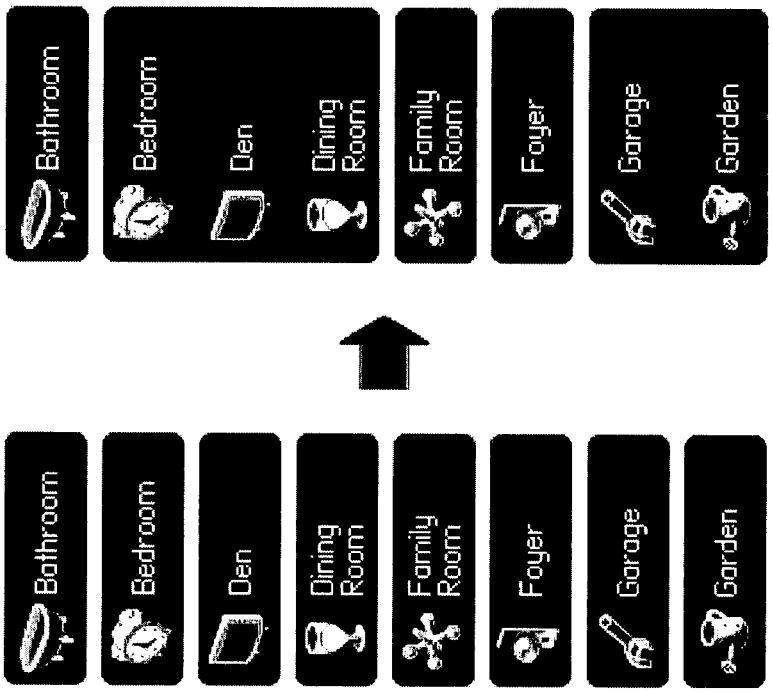

Zone Configuration/Scene
Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer
Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer

FIG. 3A

FIG. 3B


Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer
Garage
Garden
Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer
Garage
Garden

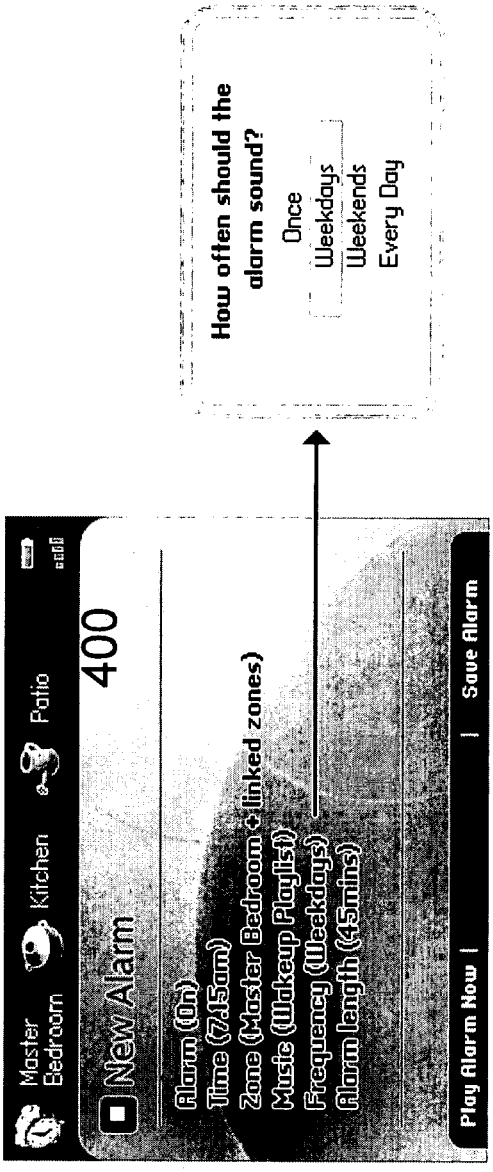

How often should the alarm sound?
Once
Weekdays
Weekends
Every Day
Master Bedroom
Kitchen
Patio
400
New Alarm
Alarm (On)
Time (7:15am)
Zone (Master Bedroom + linked zones)
Music (Wakeup Playlist)
Frequency (Weekdays)
Alarm length (45mins)
Play Alarm Now
Save Alarm

FIG. 4

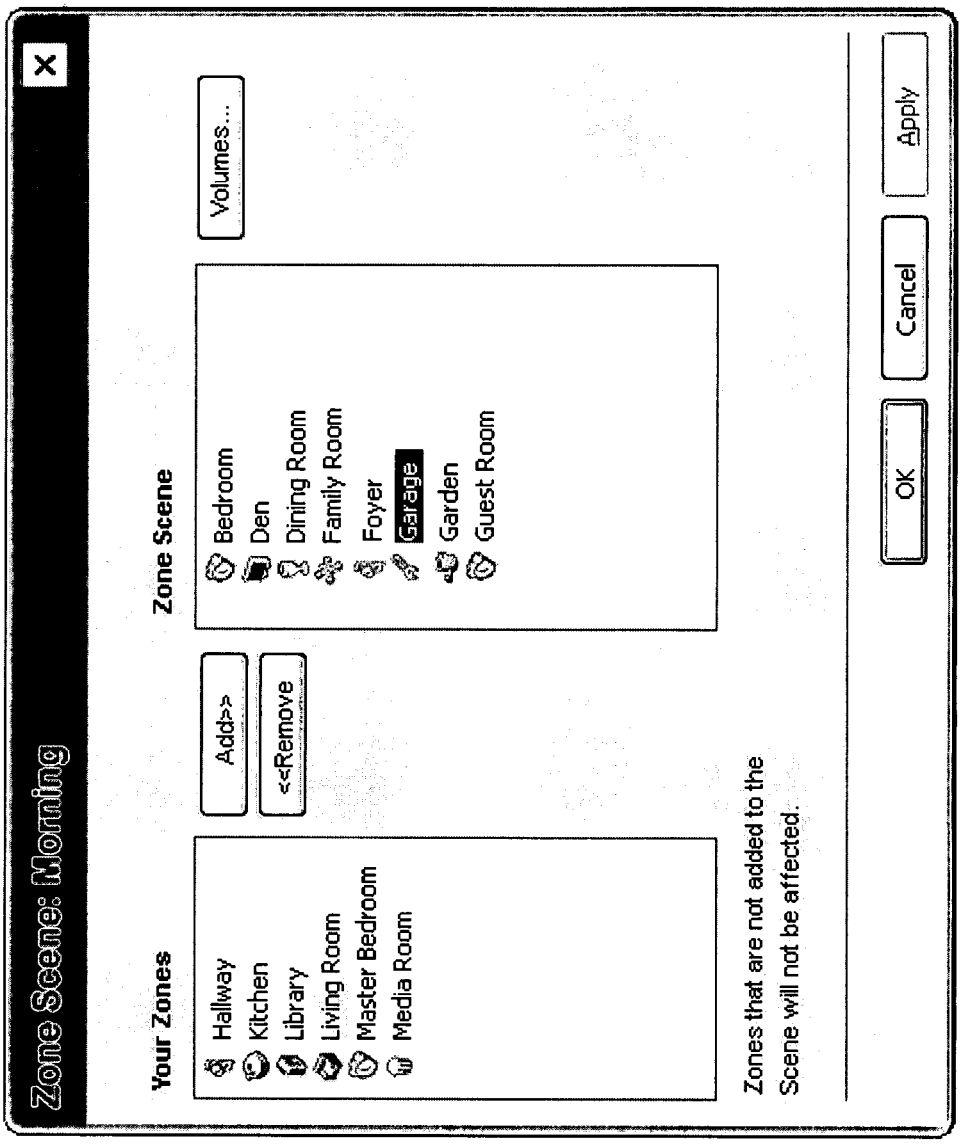

500
Zone Scene: Morning
Your Zones
Hallway
Kitchen
Library
Living Room
Master Bedroom
Media Room
Add>>
<<Remove
Zone Scene
Bedroom
Den
Dining Room
Family Room
Foyer
Garage
Garden
Guest Room
Volumes...
Zones that are not added to the Scene will not be affected.
OK
Cancel
Apply

FIG. 5A

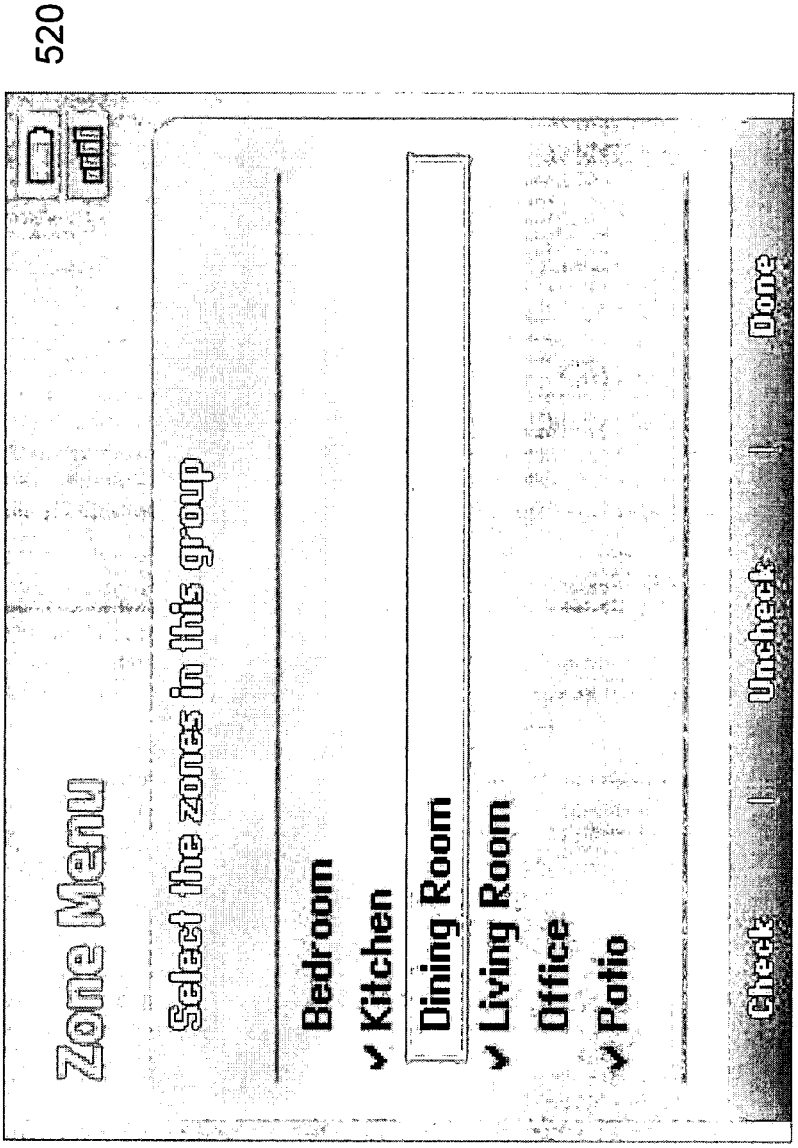

520
Zone Menu
Select the zones in this group
Bedroom
Kitchen
Dining Room
Living Room
Office
Patio
Check
Uncheck
Done

FIG. 5B

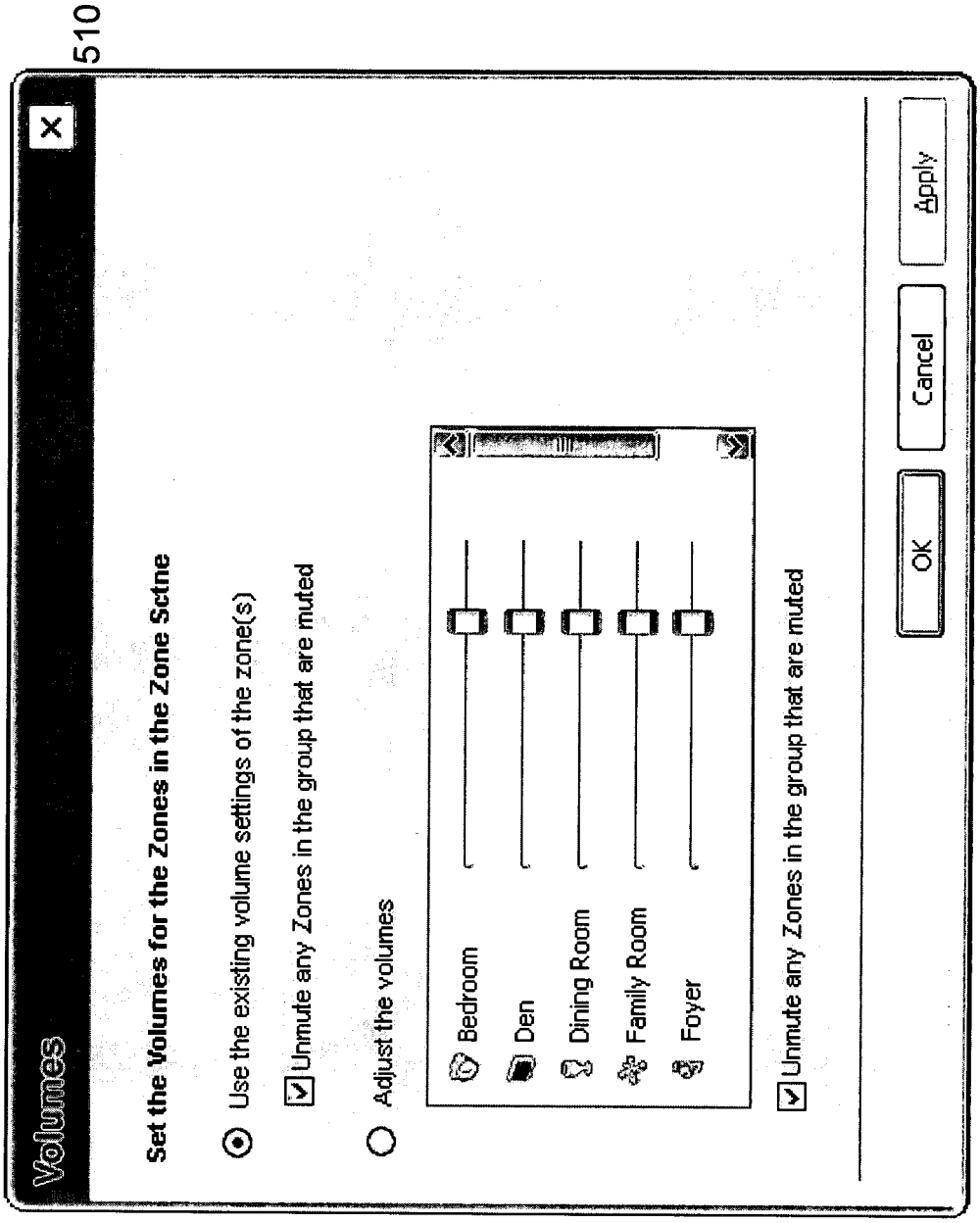

510
Volumes
Set the Volumes for the Zones in the Zone Sctne
Use the existing volume settings of the zone(s)
Unmute any Zones in the group that are muted
Adjust the volumes
Bedroom
Den
Dining Room
Family Room
Foyer
Unmute any Zones in the group that are muted
OK
Cancel
Apply

FIG. 5C

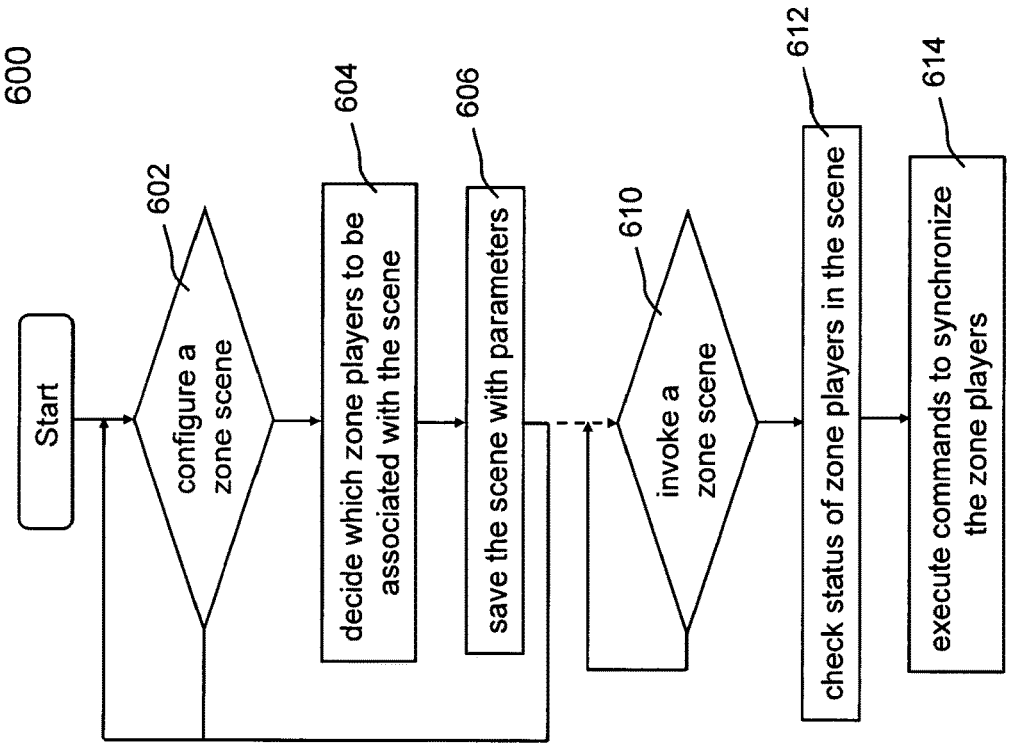

600
Start
602
configure a zone scene
604
decide which zone players to be associated with the scene
606
save the scene with parameters
610
invoke a zone scene
612
check status of zone players in the scene
614
execute commands to synchronize the zone players

FIG. 6

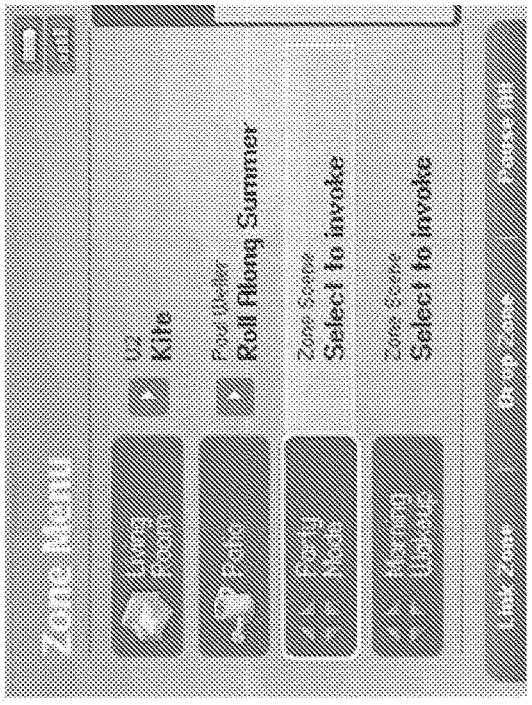

Zone Menu
Kite
Roll Along Summer
Select to invoke
Select to invoke

FIG. 7

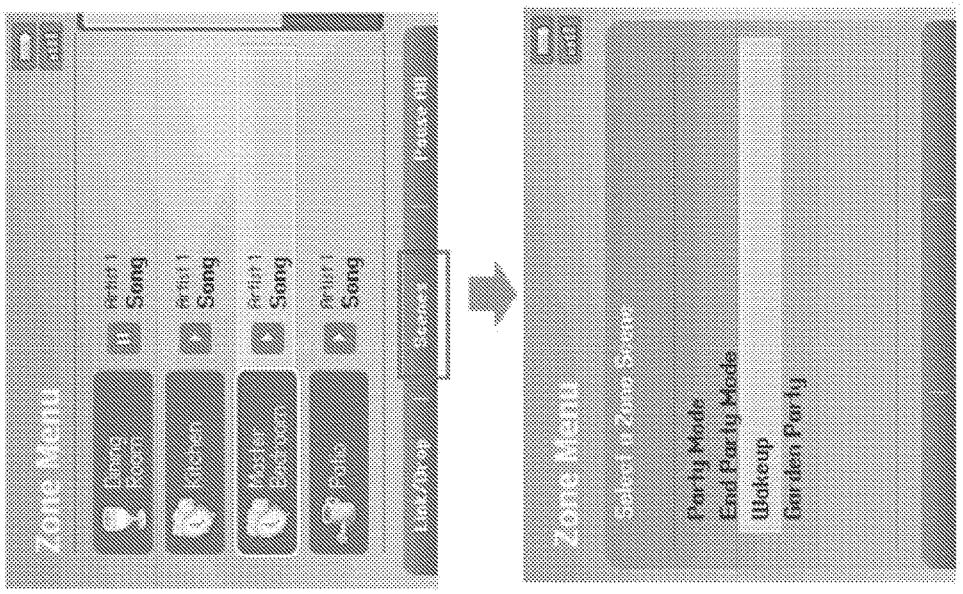

Zone Mgmt
Artist
Song
Artist
Song
Artist
Song
Artist
Song
Zone Mgmt
Party Mode
End Party Mode
Wakeup
Garden Party

FIG. 8

ZONE SCENE MANAGEMENT

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of and claims priority to U.S. patent application Ser. No. 15/130,919, filed on Apr. 15, 2016, entitled "ZONE SCENE ACTIVATION," which is a continuation of U.S. patent application Ser. No. 14/465,457, filed on Aug. 21, 2014, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 13/896,829, filed on May 17, 2013, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 11/853,790, filed Sep. 11, 2007, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," which claims priority to U.S. Provisional Application No. 60/825,407 filed on Sep. 12, 2006, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," each of which is hereby incorporated by reference in its entirety for all purposes.

BACKGROUND OF THE INVENTION

Field of the Invention

The invention is generally related to the area of consumer electronics and human-computer interaction. In particular, the invention is related to method and apparatus for controlling or manipulating a plurality of multimedia players in a multi-zone system.

An enduring passion for quality audio reproduction or system is continuing to drive demands from users. One of the demands includes an audio system in a house in which, for example, one could grill to classic rock on a patio while another one may cook up his/her own music selections in a kitchen. This is all at the same time while a teenager catches a ballgame in a family room, and another one blasts pop in a bedroom. And the best part of such audio system is that each family member does not need his or her own stereo system—one system gives everyone access to all the music sources.

Currently, one of the systems that can meet part of such demand is a conventional multi-zone audio system that usually includes a number of audio players. Each of the audio players has its own amplifier(s) and a set of speakers and typically installed in one place (e.g., a room). In order to play an audio source at one location, the audio source must be provided locally or from a centralized location. When the audio source is provided locally, the multi-zone audio system functions as a collection of many stereo systems, making source sharing difficult. When the audio source is provided centrally, the centralized location may include a juke box, many compact discs, an AM or FM radio, tapes, or others. To send an audio source to an audio player demanding such source, a cross-bar type of device is used to prevent the audio source from going to other audio players that may be playing other audio sources.

In order to achieve playing different audio sources in different audio players, the traditional multi-zone audio system is generally either hard-wired or controlled by a pre-configured and pre-programmed controller. While the pre-programmed configuration may be satisfactory in one situation, it may not be suitable for another situation. For

example, a person would like to listen to broadcast news from his/her favorite radio station in a bedroom, a bathroom and a den while preparing to go to work in the morning. The same person may wish to listen in the den and the living room to music from a compact disc in the evening. In order to satisfy such requirements, two groups of audio players must be established. In the morning, the audio players in the bedroom, the bathroom and the den need to be grouped for the broadcast news. In the evening, the audio players in the den and the living room are grouped for the music. Over the weekend, the audio players in the den, the living room, and a kitchen are grouped for party music. Because the morning group, the evening group and the weekend group contain the den, it can be difficult for the traditional system to accommodate the requirement of dynamically managing the ad hoc creation and deletion of groups.

There is a need for dynamic control of the audio players as a group. With a minimum manipulation, the audio players may be readily grouped. In a traditional multi-zone audio system, the audio players have to be adjusted one at a time, resulting in an inconvenient and non-homogenous audio environment. Further, there is a need to individually or systematically adjust the audio volume of the audio players.

SUMMARY OF THE INVENTION

This section is for the purpose of summarizing some aspects of the present invention and to briefly introduce some preferred embodiments. Simplifications or omissions in this section as well as in the abstract or the title of this description may be made to avoid obscuring the purpose of this section, the abstract and the title. Such simplifications or omissions are not intended to limit the scope of the present invention.

In general, the present invention pertains to controlling a plurality of multimedia players, or simply players, in groups. According to one aspect of the present invention, a mechanism is provided to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone. When the scene is activated, the players in the scene react in a synchronized manner. For example, the players in the scene are all caused to play an audio source or music in a playlist, wherein the audio source may be located anywhere on a network.

According to another aspect of the present invention, the scene may be activated at any time or a specific time. A user may activate the scene at any time so that only some selected zones in an entertainment system facilitate a playback of an audio source. When the scene is activated at a specific time, the scene may be used as an alarm or buzzer.

According to still another aspect of the present invention, a controlling device (also referred to herein as controller) is provided to facilitate a user to select any of the players in the system to form respective groups each of which is set up per a scene. Although various scenes may be saved in any of the members in a group, commands are preferably sent from the controller to the rest of the members when one of the scenes is executed. Depending on implementation, the commands include parameters pertaining to identifiers of the players, volumes settings, audio source and etc.

According to yet another aspect of the present invention, a configurable module is implemented in the controlling device that provides interactive graphic user interface for forming, managing and controlling groups in the system, de-grouping a group or adjusting audio volume of individual players or a group of players.

The present invention may be implemented in many forms including software, hardware or a combination of both. According to one embodiment, the present invention is directed to a method for groupings in a multi-zone media system, the method comprises providing a mechanism to allow a user to determine which players in the system to be associated with a theme representing a group; and configuring the theme with parameters pertaining to the players, wherein the theme is activated at anytime or a specific time so that the players react in a synchronized manner. The players in a scene are synchronized to play a multimedia file when the scene is activated.

According to another embodiment, the present invention is directed to an entertainment system for grouping players, the system comprises: a plurality of players, each located in one zone; and a controller providing a mechanism to allow a user to select which of the players to be associated with a theme representing a group; and configure the theme with parameters pertaining to the selected players, wherein the theme is activated at anytime or a specific time so that the selected players react in a synchronized manner. As a result, the selected players are synchronized to play a multimedia that is in a digital format and retrieved from a source over a network.

One of the objects, features, and advantages of the present invention is to remotely control a plurality of multimedia players in a multi-zone system, playing and controlling the audio source synchronously if the players are grouped together, or playing and controlling the audio source individually if the players are disassociated with each other.

Other objects, features, and advantages of the present invention will become apparent upon examining the following detailed description of an embodiment thereof, taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. **1** shows an exemplary configuration in which the present invention may be practiced;

FIG. **2**A shows an exemplary functional block diagram of a player in accordance with the present invention;

FIG. **2**B shows an example of a controller that may be used to remotely control one of more players of FIG. **2**A;

FIG. **2**C shows an exemplary internal functional block diagram of a controller in accordance with one embodiment of the present invention;

FIG. **3**A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after "Morning";

FIG. **3**B shows that a user defines multiple groups to be gathered at the same time;

FIG. **4** shows an exemplary user interface that may be displayed on a controller or a computer of FIG. **1**;

FIG. **5**A shows a user interface to allow a user to form a scene;

FIG. **5**B shows another user interface **520** to allow a user to form a scene;

FIG. **5**C shows a user interface to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively;

FIG. **6** shows a flowchart or process of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone; and

FIG. **7** shows an example user interface for invoking a zone scene; and

FIG. **8** shows another example user interface for invoking a zone scene.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The detailed description of the invention is presented largely in terms of procedures in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will become obvious to those skilled in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuitry have not been described in detail to avoid unnecessarily obscuring aspects of the present invention.

Reference herein to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of the invention do not inherently indicate any particular order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views. FIG. **1** shows an exemplary configuration **100** in which the present invention may be practiced. The configuration may represent, but not be limited to, a part of a residential home, a business building or a complex with multiple zones. There are a number of multimedia players of which three examples **102**, **104** and **106** are shown as audio devices. Each of the audio devices may be installed or provided in one particular area or zone and hence referred to as a zone player herein.

As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital format and can be transported or streamed over a data network. To facilitate the understanding of the present invention, it is assumed that the configuration **100** represents a home. Thus, the zone player **102** and **104** may be located in two of the bedrooms respectively while the zone player **106** may be installed in a living room. All of the zone players **102**, **104** and **106** are coupled directly or indirectly to a data network **108**. In addition, a computing device **110** is shown to be coupled on the network **108**. In reality, any other devices such as a home gateway device, a storage device, or an MP3 player may be coupled to the network **108** as well.

The network **108** may be a wired network, a wireless network or a combination of both. In one example, all devices including the zone players **102**, **104** and **106** are coupled to the network **108** by wireless means based on an industry standard such as IEEE 802.11. In yet another example, all devices including the zone players **102**, **104** and

106 are part of a local area network that communicates with a wide area network (e.g., the Internet).

Many devices on the network **108** are configured to download and store audio sources. For example, the computing device **110** can download audio sources from the Internet and store the downloaded sources locally for sharing with other devices on the Internet or the network **108**. The computing device **110** or any of the zone players can also be configured to receive streaming audio. Shown as a stereo system, the device **112** is configured to receive an analog audio source (e.g., from broadcasting) or retrieve a digital audio source (e.g., from a compact disk). The analog audio sources can be converted to digital audio sources. In accordance with the present invention, the audio source may be shared among the devices on the network **108**.

Two or more zone players may be grouped together to form a new zone group. Any combinations of zone players and an existing zone group may be grouped together. In one instance, a new zone group is formed by adding one zone player to another zone player or an existing zone group.

Referring now to FIG. **2**A, there is shown an exemplary functional block diagram of a zone player **200** in accordance with the present invention. The zone player **200** includes a network interface **202**, a processor **204**, a memory **206**, an audio processing circuit **210**, a module **212**, and optionally, an audio amplifier **214** that may be internal or external. The network interface **202** facilitates a data flow between a data network (i.e., the data network **108** of FIG. **1**) and the zone player **200** and typically executes a special set of rules (i.e., a protocol) to send data back and forth. One of the common protocols used in the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol). In general, a network interface manages the assembling of an audio source or file into smaller packets that are transmitted over the data network or reassembles received packets into the original source or file. In addition, the network interface **202** handles the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **200**.

The network interface **202** may include one or both of a wireless interface **216** and a wired interface **217**. The wireless interface **216**, also referred to as a RF interface, provides network interface functions by a wireless means for the zone player **200** to communicate with other devices in accordance with a communication protocol (such as the wireless standard IEEE 802.11a, 802.11b or 802.11g). The wired interface **217** provides network interface functions by a wired means (e.g., an Ethernet cable). In one embodiment, a zone player includes both of the interfaces **216** and **217**, and other zone players include only a RF or wired interface. Thus these other zone players communicate with other devices on a network or retrieve audio sources via the zone player. The processor **204** is configured to control the operation of other parts in the zone player **200**. The memory **206** may be loaded with one or more software modules that can be executed by the processor **204** to achieve desired tasks. According to one aspect of the present invention, a software module implementing one embodiment of the present invention is executed, the processor **204** operates in accordance with the software module in reference to a saved zone group configuration characterizing a zone group created by a user, the zone player **200** is caused to retrieve an audio source from another zone player or a device on the network.

According to one embodiment of the present invention, the memory **206** is used to save one or more saved zone configuration files that may be retrieved for modification at any time. Typically, a saved zone group configuration file is transmitted to a controller (e.g., the controlling device **140** or **142** of FIG. **1**, a computer, a portable device, or a TV) when a user operates the controlling device. The zone group configuration provides an interactive user interface so that various manipulations or control of the zone players may be performed.

The audio processing circuit **210** resembles most of the circuitry in an audio playback device and includes one or more digital-to-analog converters (DAC), an audio preprocessing part, an audio enhancement part or a digital signal processor and others. In operation, when an audio source is retrieved via the network interface **202**, the audio source is processed in the audio processing circuit **210** to produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier **214** for playback on speakers. In addition, the audio processing circuit **210** may include necessary circuitry to process analog signals as inputs to produce digital signals for sharing with other devices on a network.

Depending on an exact implementation, the module **212** may be implemented as a combination of hardware and software. In one embodiment, the module **212** is used to save a scene. The audio amplifier **214** is typically an analog circuit that powers the provided analog audio signals to drive one or more speakers.

Referring now to FIG. **2**B, there is shown an exemplary controller **240**, which may correspond to the controlling device **140** or **142** of FIG. **1**. The controller **240** may be used to facilitate the control of multi-media applications, automation and others in a complex. In particular, the controller **240** is configured to facilitate a selection of a plurality of audio sources available on the network, controlling operations of one or more zone players (e.g., the zone player **200**) through a RF interface corresponding to the RF interface **216** of FIG. **2**A. According to one embodiment, the wireless means is based on an industry standard (e.g., infrared, radio, wireless standard IEEE 802.11a, 802.11b or 802.11g). When a particular audio source is being played in the zone player **200**, a picture, if there is any, associated with the audio source may be transmitted from the zone player **200** to the controller **240** for display. In one embodiment, the controller **240** is used to synchronize more than one zone players by grouping the zone players in a group. In another embodiment, the controller **240** is used to control the volume of each of the zone players in a zone group individually or together.

The user interface for the controller **240** includes a screen **242** (e.g., a LCD screen) and a set of functional buttons as follows: a "zones" button **244**, a "back" button **246**, a "music" button **248**, a scroll wheel **250**, "ok" button **252**, a set of transport control buttons **254**, a mute button **262**, a volume up/down button **264**, a set of soft buttons **266** corresponding to the labels **268** displayed on the screen **242**.

The screen **242** displays various screen menus in response to a user's selection. In one embodiment, the "zones" button **244** activates a zone management screen or "Zone Menu", which is described in more details below. The "back" button **246** may lead to different actions depending on the current screen. In one embodiment, the "back" button triggers the current screen display to go back to a previous one. In another embodiment, the 'back" button negates the user's erroneous selection. The "music" button **248** activates a music menu, which allows the selection of an audio source (e.g., a song) to be added to a zone player's music queue for playback.

The scroll wheel **250** is used for selecting an item within a list, whenever a list is presented on the screen **242**. When the items in the list are too many to be accommodated in one screen display, a scroll indicator such as a scroll bar or a scroll arrow is displayed beside the list. When the scroll indicator is displayed, a user may rotate the scroll wheel **250** to either choose a displayed item or display a hidden item in the list. The "ok" button **252** is used to confirm the user selection on the screen **242**.

There are three transport buttons **254**, which are used to control the effect of the currently playing song. For example, the functions of the transport buttons may include play/pause and forward/rewind a song, move forward to a next song track, or move backward to a previous track. According to one embodiment, pressing one of the volume control buttons such as the mute button **262** or the volume up/down button **264** activates a volume panel. In addition, there are three soft buttons **266** that can be activated in accordance with the labels **268** on the screen **242**. It can be understood that, in a multi-zone system, there may be multiple audio sources being played respectively in more than one zone players. The music transport functions described herein shall apply selectively to one of the sources when a corresponding one of the zone players or zone groups is selected.

FIG. **2**C illustrates an internal functional block diagram of an exemplary controller **270**, which may correspond to the controller **240** of FIG. **2**B. The screen **272** on the controller **270** may be a LCD screen. The screen **272** communicates with and is commanded by a screen driver **274** that is controlled by a microcontroller (e.g., a processor) **276**. The memory **282** may be loaded with one or more application modules **284** that can be executed by the microcontroller **276** with or without a user input via the user interface **278** to achieve desired tasks. In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source. In another embodiment, an application module is configured to control together the audio volumes of the zone players in a zone group. In operation, when the microcontroller **276** executes one of the application modules **284**, the screen driver **274** generates control signals to drive the screen **272** to display an application specific user interface accordingly, more of which will be described below.

The controller **270** includes a network interface **280** referred to as a RF interface **280** that facilitates wireless communication with a zone player via a corresponding RF interface thereof. In one embodiment, the commands such as volume control and audio playback synchronization are sent via the RF interfaces. In another embodiment, a saved zone group configuration is transmitted between a zone player and a controller via the RF interfaces. The controller **270** may control one or more zone players, such as **102**, **104** and **106** of FIG. **1**. Nevertheless, there may be more than one controllers, each preferably in a zone (e.g., a room) and configured to control any one and all of the zone players.

In one embodiment, a user creates a zone group including at least two zone players from the controller **240** that sends signals or data to one of the zone players. As all the zone players are coupled on a network, the received signals in one zone player can cause other zone players in the group to be synchronized so that all the zone players in the group playback an identical audio source or a list of identical audio sources in a timely synchronized manner. Similarly, when a user increases the audio volume of the group from the controller, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume and in scale.

According to one implementation, an application module is loaded in memory **282** for zone group management. When a predetermined key (e.g. the "zones" button **244**) is activated on the controller **240**, the application module is executed in the microcontroller **276**. The input interface **278** coupled to and controlled by the microcontroller **276** receives inputs from a user. A "Zone Menu" is then displayed on the screen **272**. The user may start grouping zone players into a zone group by activating a "Link Zones" or "Add Zone" soft button, or de-grouping a zone group by activating an "Unlink Zones" or "Drop Zone" button. The detail of the zone group manipulation will be further discussed below.

As described above, the input interface **278** includes a number of function buttons as well as a screen graphical user interface. It should be pointed out that the controller **240** in FIG. **2**B is not the only controlling device that may practice the present invention. Other devices that provide the equivalent control functions (e.g., a computing device, a hand-held device) may also be configured to practice the present invention. In the above description, unless otherwise specifically described, it is clear that keys or buttons are generally referred to as either the physical buttons or soft buttons, enabling a user to enter a command or data.

One mechanism for 'joining' zone players together for music playback is to link a number of zone players together to form a group. To link a number of zone players together, a user may manually link each zone player or room one after the other. For example, there is a multi-zone system that includes the following zones.

Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer

If the user wishes to link **5** of the **6** zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite time consuming. According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to herein as a theme or a zone scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes for the grouping are automatically effectuated.

For instance, a "Morning" zone scene/configuration command would link the Bedroom, Den and Dining Room together in one action. Without this single command, the user would need to manually and individually link each zone. FIG. **3**A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after "Morning".

Expanding this idea further, a Zone Scene can be set to create multiple sets of linked zones. For example, a scene creates **3** separate groups of zones, the downstairs zones would be linked together, the upstairs zones would be linked together in their own group, and the outside zones (in this case the patio) would move into a group of its own.

In one embodiment as shown in FIG. **3**B, a user defines multiple groups to be gathered at the same time. For example: an "Evening Scene" is desired to link the following zones:

Group 1
Bedroom
Den
Dining Room
Group 2
Garage
Garden

where Bathroom, Family Room and Foyer should be separated from any group if they were part of a group before the Zone Scene was invoked.

One important of the features, benefits and objects in the present invention is that zones do not need to be separated before a zone scene is invoked. In one embodiment, a command is provided and links all zones in one step, if invoked. The command is in a form of a zone scene. After linking the appropriate zones, a zone scene command could apply the following attributes:

Set volumes levels in each zones (each zone can have a different volume)

Mute/Unmute zones.

Select and play specific music in the zones.

Set the play mode of the music (Shuffle, Repeat, Shuffle-repeat)

Set the music playback equalization of each zone (e.g., bass treble).

A further extension of this embodiment is to trigger a zone scene command as an alarm clock function. For instance the zone scene is set to apply at 8:00 am. It could link appropriate zones automatically, set specific music to play and then stop the music after a defined duration. Although a single zone may be assigned to an alarm, a scene set as an alarm clock provides a synchronized alarm, allowing any zones linked in the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed UPnP, no Internet connection for an Internet Radio station), a backup buzzer will sound. This buzzer will be a sound file that is stored in a zone player.

FIG. **4** shows an exemplary user interface **400** that may be displayed on a controller **142** or a computer **110** of FIG. **1**. The interface **400** shows a list of items that may be set up by a user to cause a scene to function at a specific time. In the embodiment shown in FIG. **4**, the list of items includes "Alarm", "Time", "Zone", "Music", "Frequency" and "Alarm length". "Alarm" can be set on or off. When "Alarm" is set on, "Time" is a specific time to set off the alarm. "Zone" shows which zone players are being set to play a specified audio at the specific time. "Music" shows what to be played when the specific time arrives. "Frequency" allows the user to define a frequency of the alarm. "Alarm length" defines how long the audio is to be played. It should be noted that the user interface **400** is provided herein to show some of the functions associated with setting up an alarm. Depending on an exact implementation, other functions, such as time zone, daylight savings, time synchronization, and time/date format for display may also be provided without departing from the present invention.

According to one embodiment, each zone player in a scene may be set up for different alarms. For example, a "Morning" scene includes three zone players, each in a bedroom, a den, and a dining room. After selecting the scene, the user may set up an alarm for the scene as whole. As a result, each of the zone players will be activated at a specific time.

FIG. **5**A shows a user interface **500** to allow a user to form a scene. The panel on the left shows the available zones in a household. The panel on the right shows the zones that have been selected and be grouped as part of this scene. Depending on an exact implementation of a user interface, Add/Remove buttons may be provided to move zones between the panels, or zones may be dragged along between panels.

FIG. **5**B shows another user interface **520** to allow a user to form a scene. The user interface **520** that may be displayed on a controller or a computing device, lists available zones in a system. The list of zones in the user interface **520** includes ALL the zones in the system, including the zones that are already grouped. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

FIG. **5**C shows a user interface **510** to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively. As shown in the user interface **510**, the 'Volumes . . . ' button (shown as sliders, other forms are possible) allows the user to affect the volumes of the associated zone players when a zone scene is invoked. In one embodiment, the zone players can be set to retain whatever volume that they currently have when the scene is invoked. Additionally the user can decide if the volumes should be unmuted or muted when the scene is invoked.

FIG. **6** shows a flowchart or process **600** of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone. The process **600** is presented in accordance with one embodiment of the present invention and may be implemented in a module to be located in the memory **282** of FIG. **2**C.

The process **600** is initiated only when a user decides to proceed with a zone scene at **602**. The process **600** then moves to **604** where it allows a user to decide which zone players to be associated with the scene. For example, there are ten players in a household, and the scene is named after "Morning". The user may be given an interface to select four of the ten players to be associated with the scene. At **606**, the scene is saved. The scene may be saved in any one of the members in the scene. In the example of FIG. **1**, the scene is saved in one of the zone players and displayed on the controller **142**. In operation, a set of data pertaining to the scene includes a plurality of parameters. In one embodiment, the parameters include, but may not be limited to, identifiers (e.g., IP address) of the associated players and a playlist. The parameters may also include volume/tone settings for the associated players in the scene. The user may go back to **602** to configure another scene if desired.

Given a saved scene, a user may activate the scene at any time or set up a timer to activate the scene at **610**. The process **600** can continue when a saved scene is activated at **610**. At **612**, upon the activation of a saved scene, the process **600** checks the status of the players associated with the scene. The status of the players means that each of the players shall be in condition to react in a synchronized manner. In one embodiment, the interconnections of the players are checked to make sure that the players communicate among themselves and/or with a controller if there is such a controller in the scene.

It is assumed that all players associated with the scene are in good condition. At **614**, commands are executed with the parameters (e.g., pertaining to a playlist and volumes). In one embodiment, data including the parameters is trans-

ported from a member (e.g., a controller) to other members in the scene so that the players are caused to synchronize an operation configured in the scene. The operation may cause all players to play back a song in identical or different volumes or to play back a pre-stored file.

One of the features, benefits and advantages in the present invention is to allow sets of related devices (controllers and operating components) to exist as a group without interfering with other components that are potentially visible on the same wired or wireless network. Each of the sets is configured to a theme or a scene.

FIG. **7** shows an example user interface for invoking a zone scene. The user interface of FIG. **7** shows a Zone Menu that includes selectable indications of zone scenes.

FIG. **8** shows another example user interface for invoking a zone scene. FIG. **8** shows a Zone Menu that includes a softkey indicating a Scenes menu. Pressing the Scenes softkey will show the Scenes menu where all the available zone scenes are shown as selectable indications.

The present invention has been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts may be resorted without departing from the spirit and scope of the invention as claimed. While the embodiments discussed herein may appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the invention has applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present invention is defined by the appended claims rather than the forgoing description of embodiments.

I claim:

1. A computing device comprising: one or more processors;

a non-transitory computer-readable medium; and program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone player is operating in a standalone mode in which the first zone player is configured to play back media individually:

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked;

based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene; displaying a representation of the first zone scene and a representation of the second zone scene; and while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and

based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

2. The computing device of claim **1**, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

3. The computing device of claim **1**, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, and wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

4. The computing device of claim **3**, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

5. The computing device of claim **1**, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the computing device further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

based on the third request, causing the first zone player to coordinate with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

6. The computing device of claim **1**, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

7. The computing device of claim **1**, further comprising program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

before displaying the representation of the first zone scene and the representation of the second zone scene, receiving, from another device over a data network, data defining the first zone scene and data defining the second zone scene.

8. The computing device of claim **1**, wherein receiving the first request comprises receiving a first set of one or more inputs via a user interface of the computing device, wherein receiving the second request comprises receiving a second set of one or more inputs via the user interface, and wherein receiving the third request comprises receiving a third set of one or more inputs via the user interface.

9. A non-transitory computer-readable medium, wherein the non-transitory computer-readable medium is provisioned with program instructions that are executable to cause a computing device to perform functions comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone player is operating in a standalone mode in which the first zone player is configured to play back media individually:

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked;

based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene;

displaying a representation of the first zone scene and a representation of the second zone scene; and

while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and

based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

10. The non-transitory computer-readable medium of claim **9**, wherein the non-transitory computer-readable medium is also provisioned with program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

11. The non-transitory computer-readable medium of claim **9**, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, and wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

12. The non-transitory computer-readable medium of claim **11**, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

13. The non-transitory computer-readable medium of claim **9**, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the non-transitory computer-readable medium is also provisioned with program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

based on the third request, causing the first zone player to coordinate with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

14. The non-transitory computer-readable medium of claim **9**, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

15. The non-transitory computer-readable medium of claim **9**, wherein the non-transitory computer-readable medium further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the computing device to perform functions comprising:

before displaying the representation of the first zone scene and the representation of the second zone scene, receiving, from another device over a data network, data defining the first zone scene and data defining the second zone scene.

16. The non-transitory computer-readable medium of claim **9**, wherein receiving the first request comprises receiving a first set of one or more inputs via a user interface of the computing device, wherein receiving the second request comprises receiving a second set of one or more inputs via the user interface, and wherein receiving the third request comprises receiving a third set of one or more inputs via the user interface.

17. A method executed by a computing device, the method comprising:

while serving as a controller for a networked media playback system comprising a first zone player and at least two other zone players, wherein the first zone

player is operating in a standalone mode in which the first zone player is configured to play back media individually:

receiving a first request to create a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked;

based on the first request, i) causing creation of the first zone scene, ii) causing an indication of the first zone scene to be transmitted to the first zone player, and iii) causing storage of the first zone scene;

receiving a second request to create a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the third zone player is different than the second zone player;

based on the second request, i) causing creation of the second zone scene, ii) causing an indication of the second zone scene to be transmitted to the first zone player, and iii) causing storage of the second zone scene;

displaying a representation of the first zone scene and a representation of the second zone scene; and

while displaying the representation of the first zone scene and the representation of the second zone scene, receiving a third request to invoke the first zone scene; and based on the third request, causing the first zone player to transition from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

18. The method of claim **17**, further comprising:

while the first zone player is configured to coordinate with at least the second zone player to play back media in synchrony with at least the second zone player, receiving a fourth request to invoke the second zone scene; and

based on the fourth request, causing the first zone player to (a) cease to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) begin to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

19. The method of claim **17**, wherein causing storage of the first zone scene comprises causing storage of the first zone scene at a location other than the computing device, wherein causing storage of the second zone scene comprises causing storage of the second zone scene at the location other than the computing device.

20. The method of claim **19**, wherein the location other than the computing device comprises a zone player of the first predefined grouping of zone players.

* * * * *

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Lambourne

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(54) **ZONE SCENE MANAGEMENT**

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(58) **Field of Classification Search**
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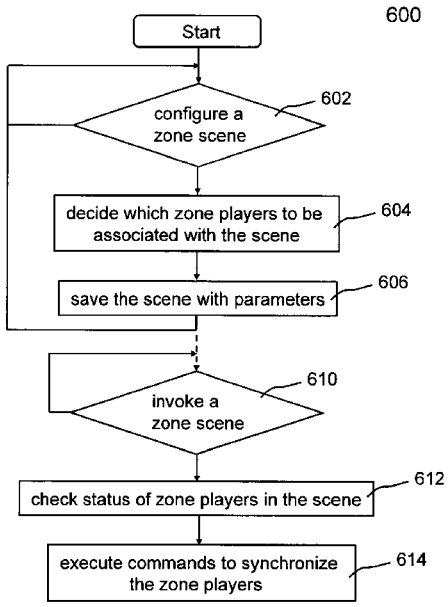
(57) **ABSTRACT**

An example playback device in a first zone of a media playback system receives a first indication that the first zone has been added to a first zone scene including a first preconfigured grouping of zones including the first zone and a second zone. The playback device receives a second indication that the first zone has been added to a second zone scene including a second preconfigured grouping of zones including the first zone and a third zone. After a given one of the first and second zone scenes has been selected for invocation, the playback device receives an instruction to operate in accordance with the given zone scene, and based on the instruction, begins operating in accordance with the given zone scene such that the playback device is configured to play back audio in synchrony with one or more other playback devices in the media playback system.

20 Claims, 11 Drawing Sheets



Related U.S. Application Data

No. 14/465,457, filed on Aug. 21, 2014, now Pat. No. 9,344,206, which is a continuation of application No. 13/896,829, filed on May 17, 2013, now Pat. No. 8,843,228, which is a continuation of application No. 11/853,790, filed on Sep. 11, 2007, now Pat. No. 8,483,853.

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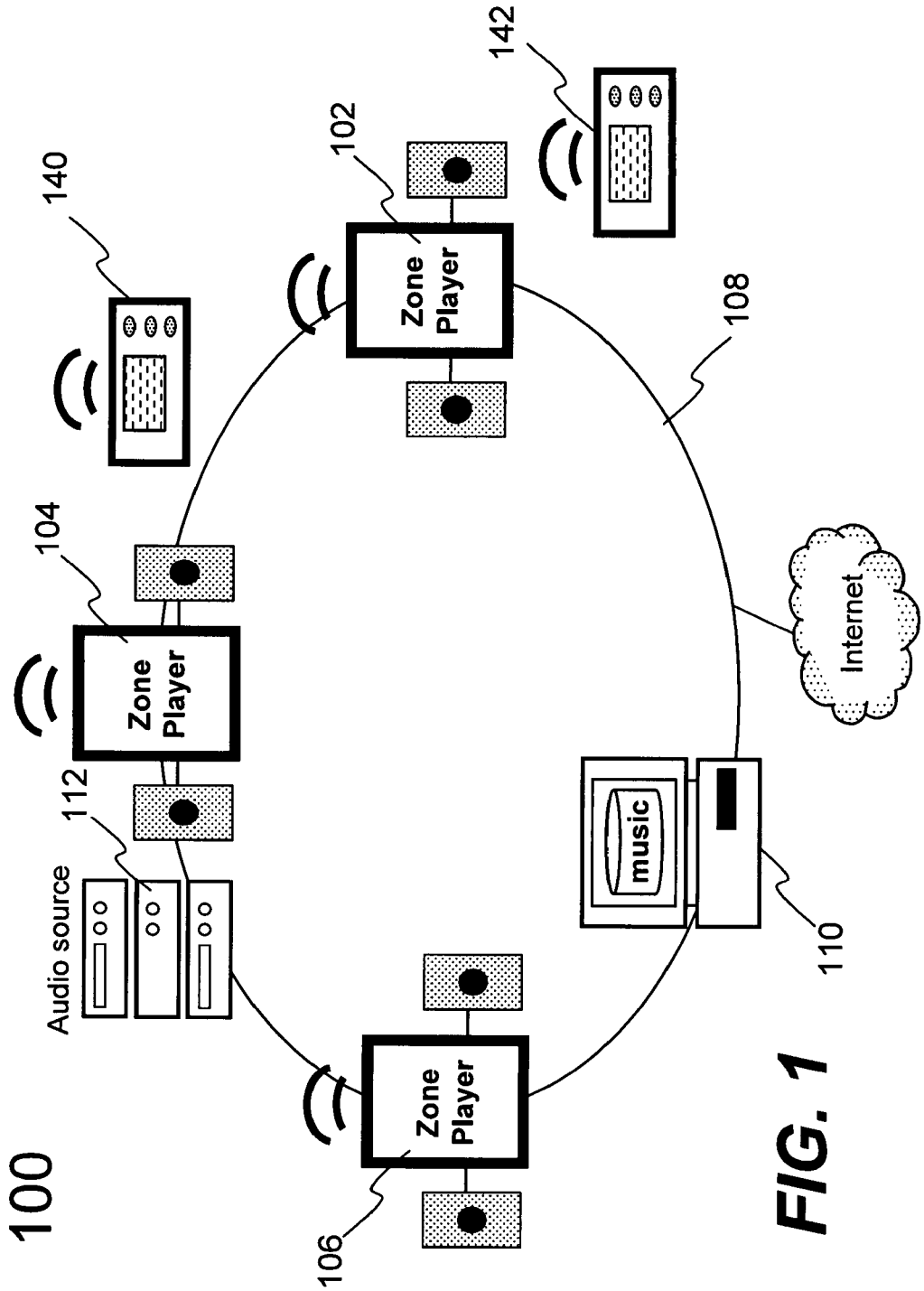


FIG. 1

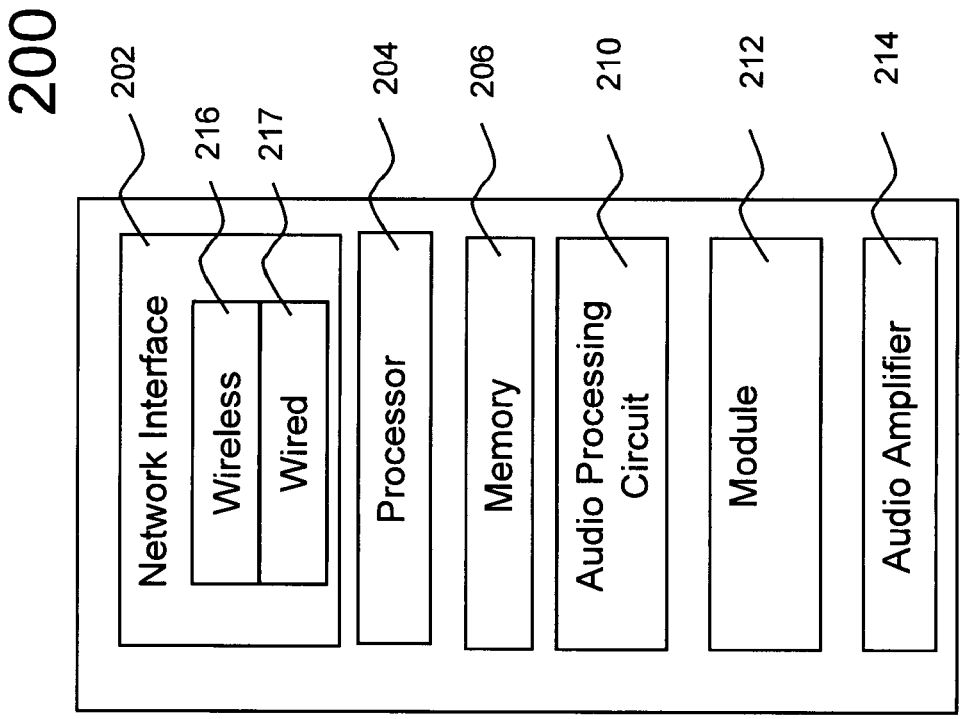


FIG. 2A

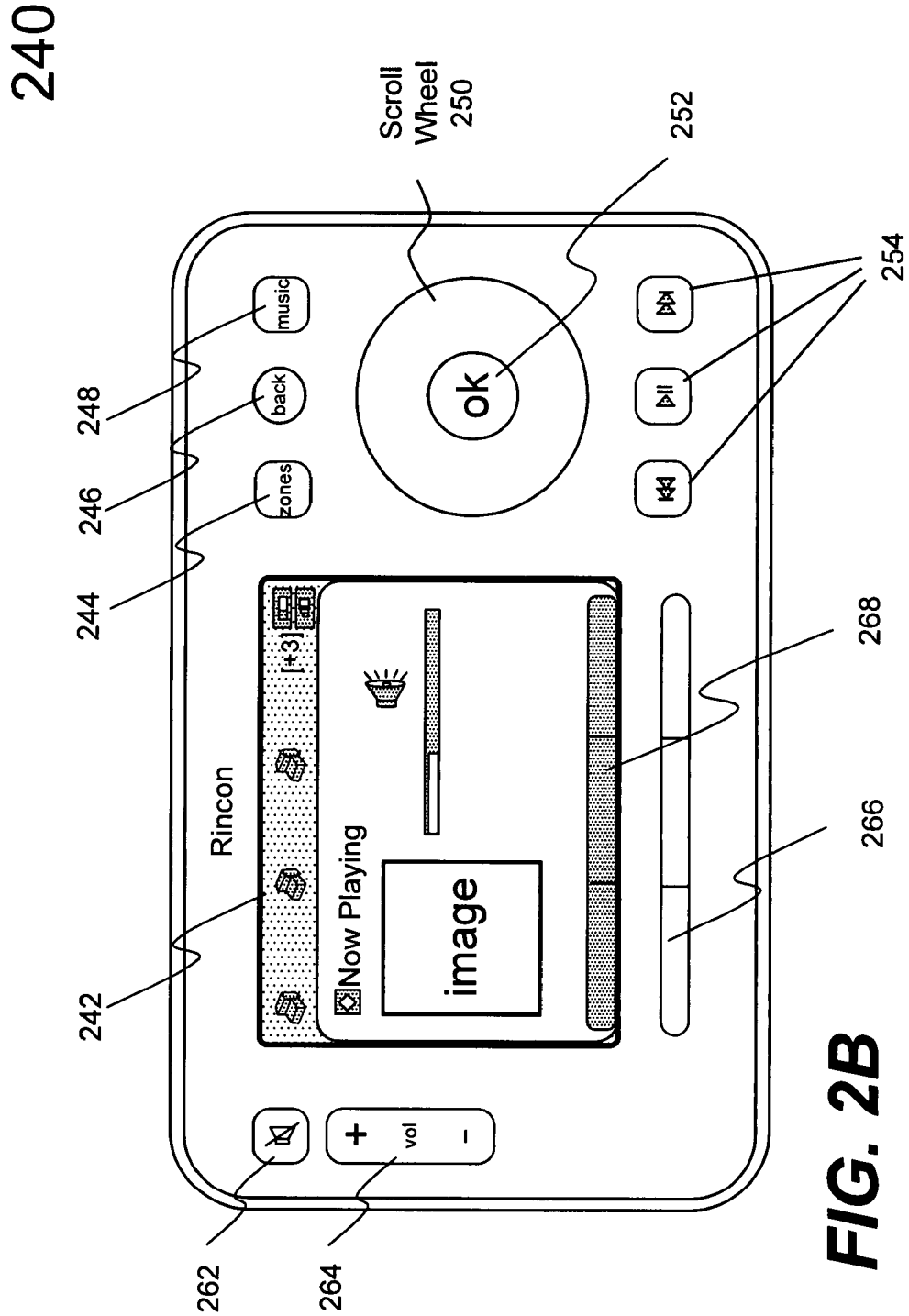


FIG. 2B

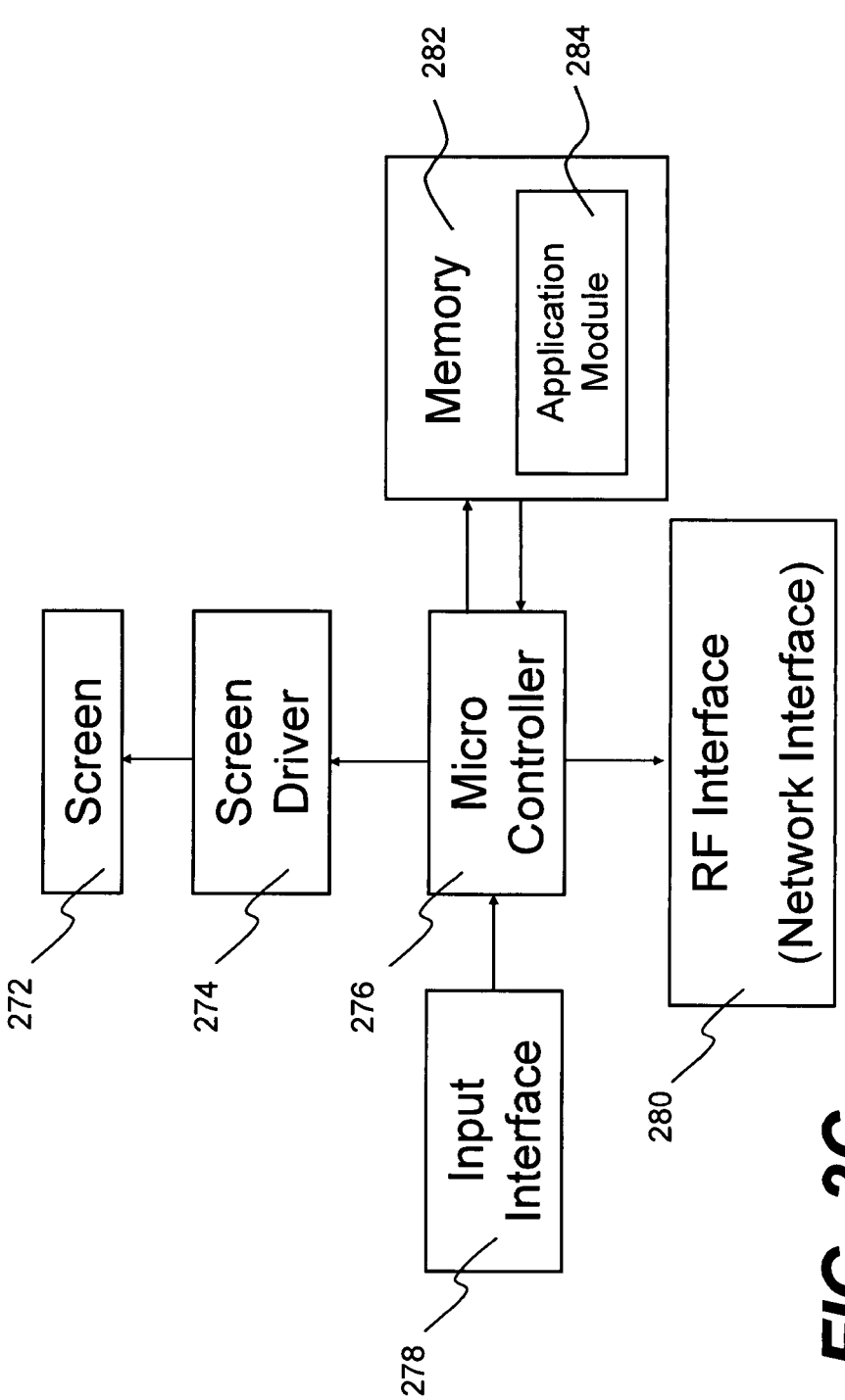


FIG. 2C

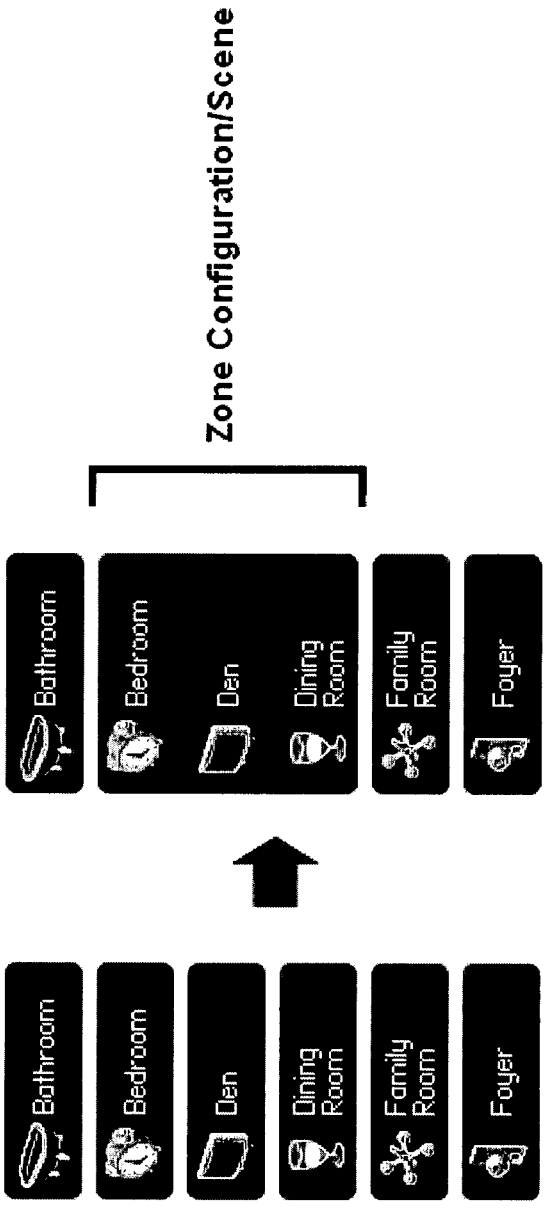
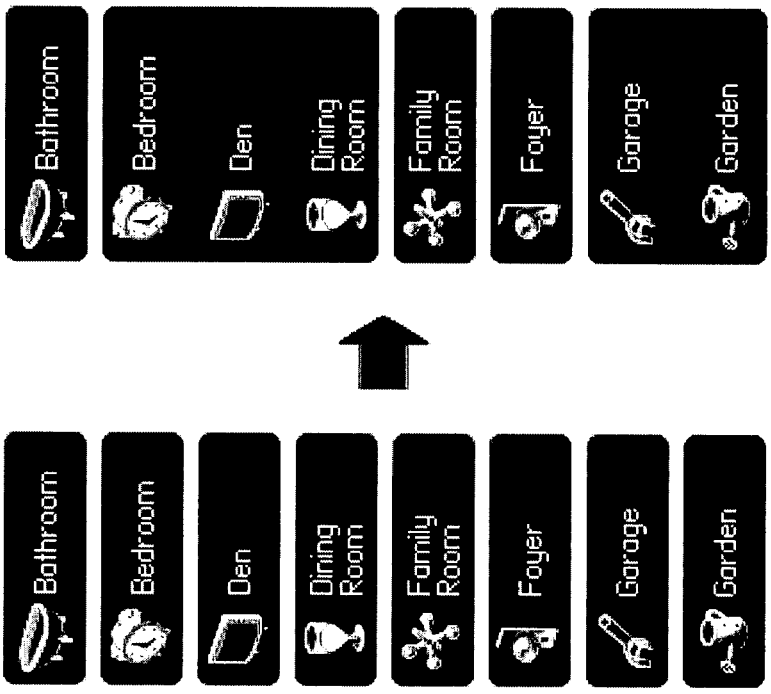

Zone Configuration/Scene
Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer
Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer

FIG. 3A

FIG. 3B


Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer
Garage
Garden
Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer
Garage
Garden

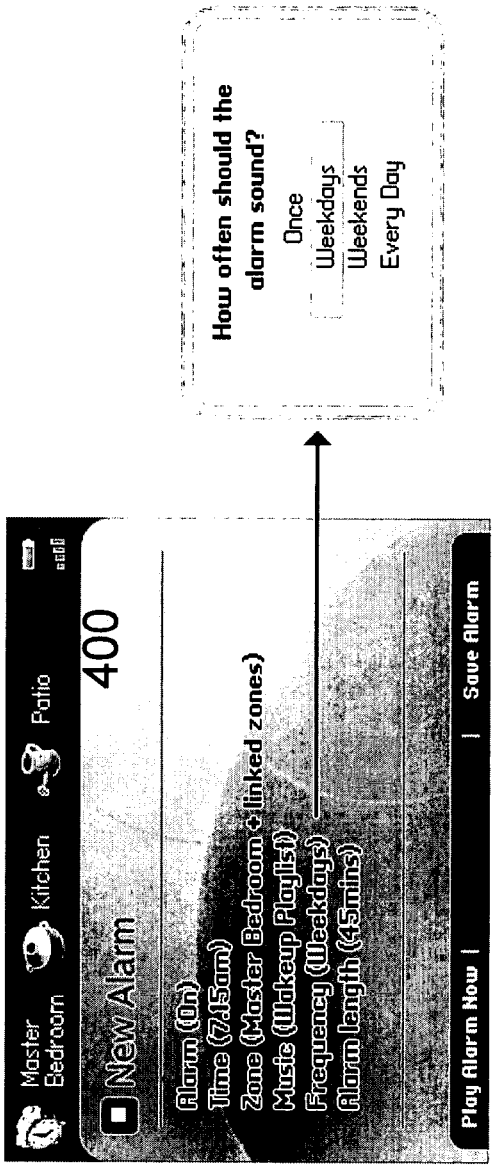


FIG. 4

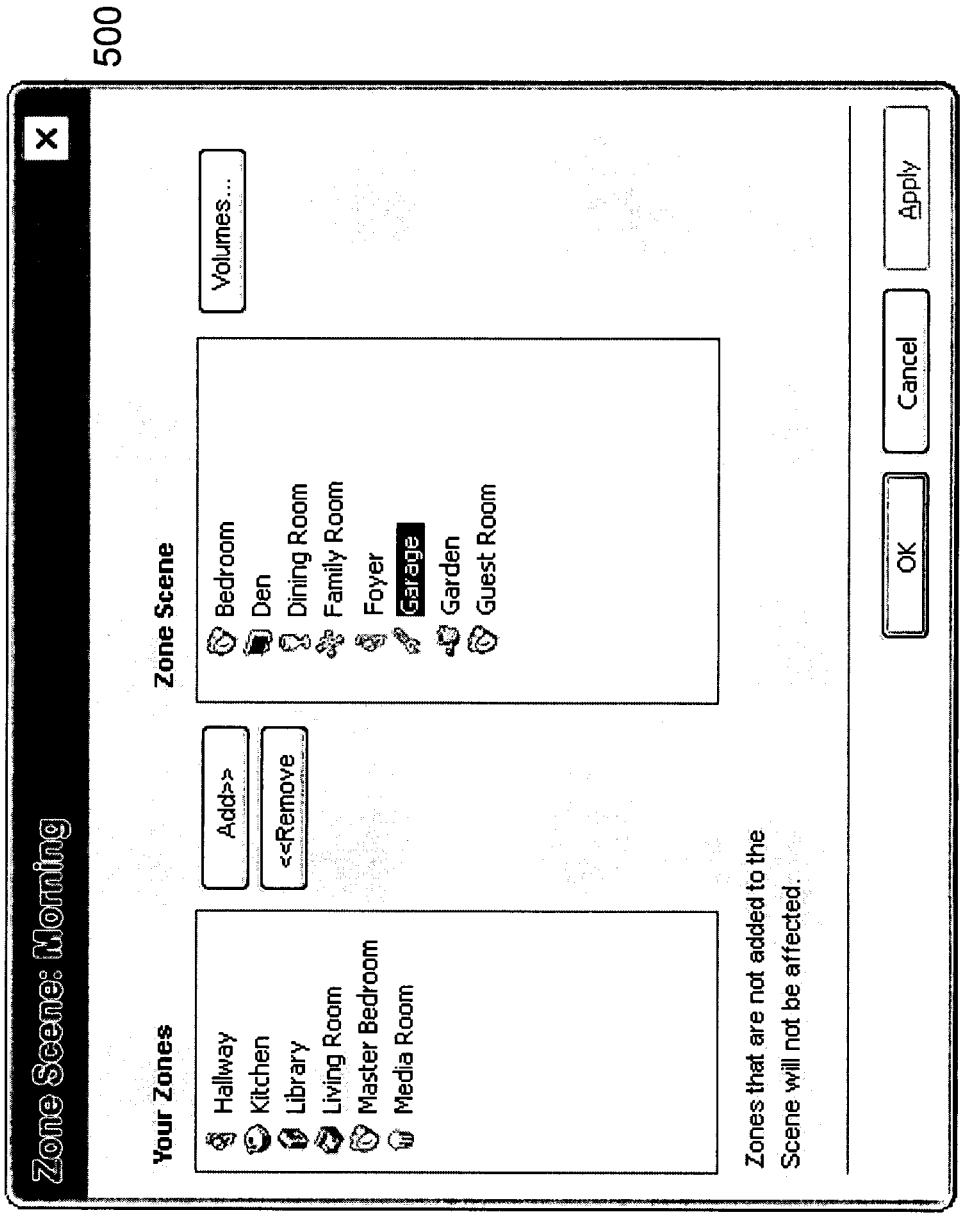


FIG. 5A

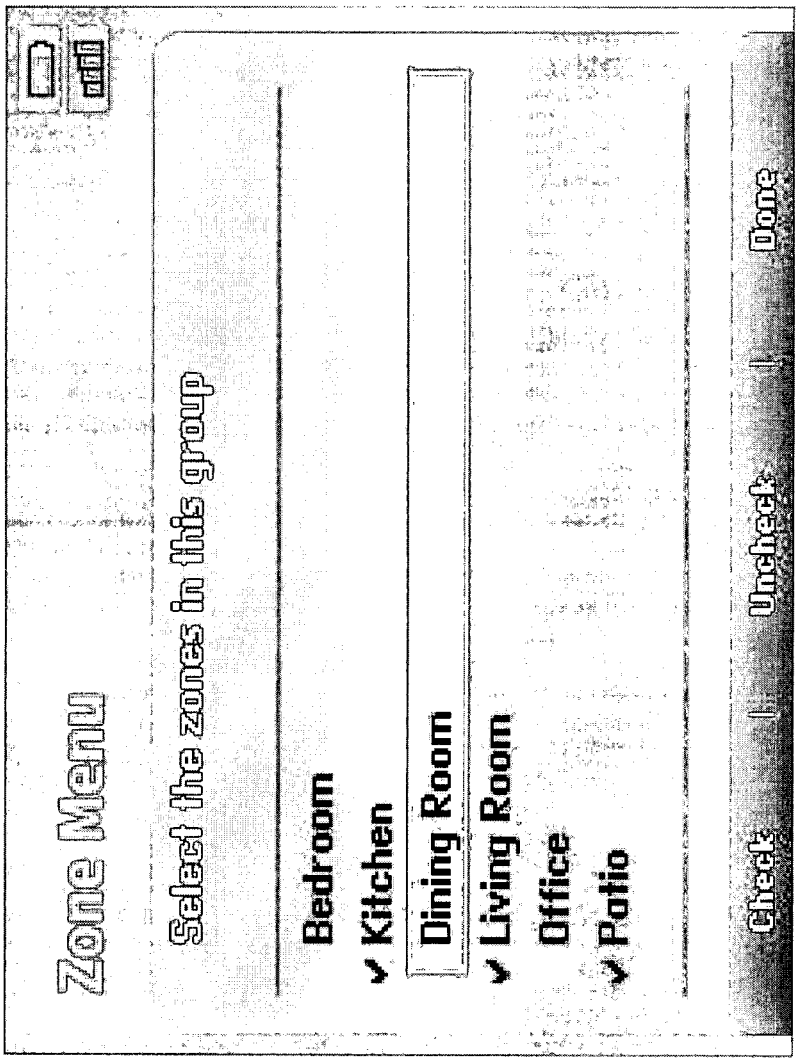

520
Zone Menu
Select the zones in this group
Bedroom
Kitchen
Dining Room
Living Room
Office
Patio
Check
Uncheck
Done

FIG. 5B

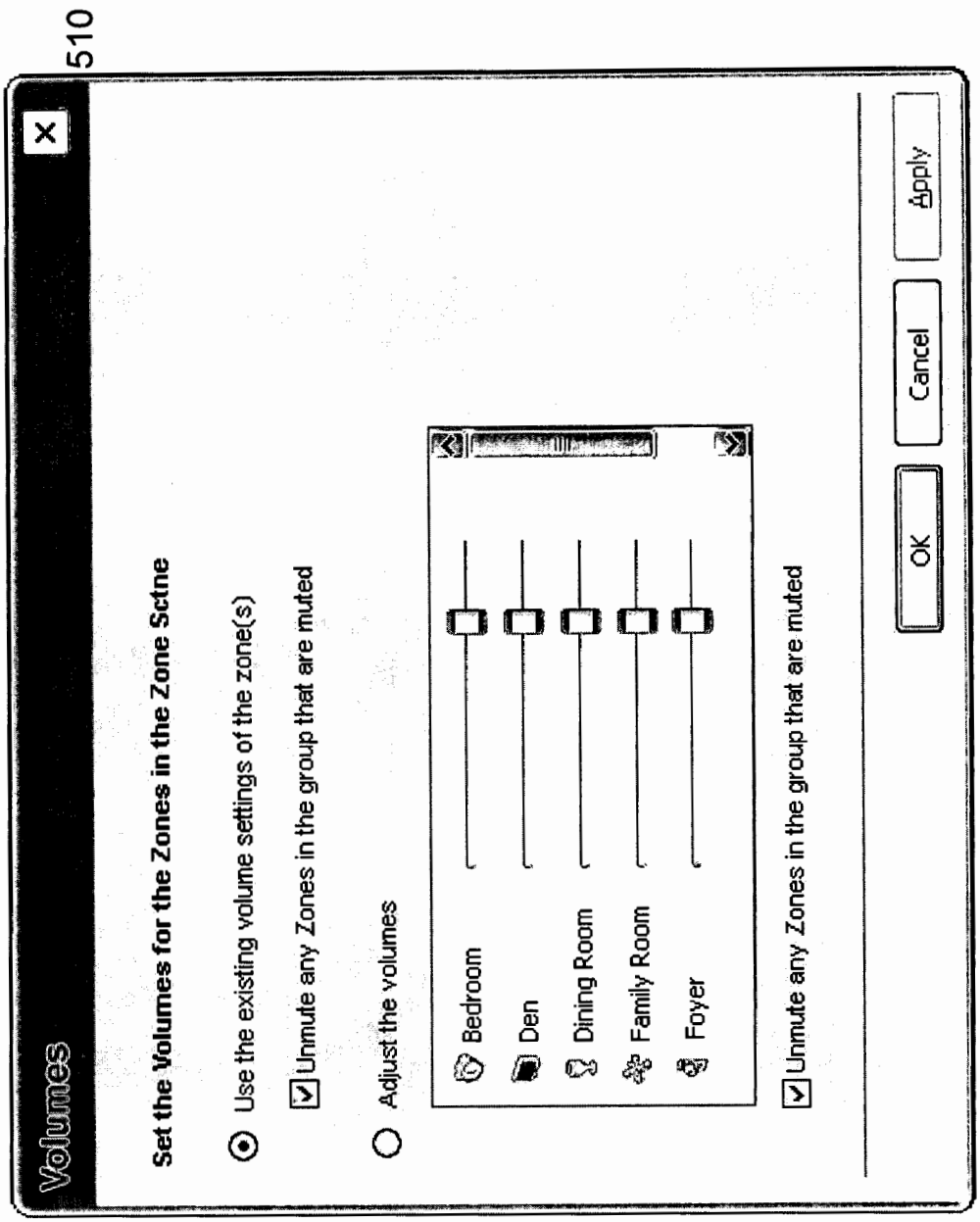


FIG. 5C

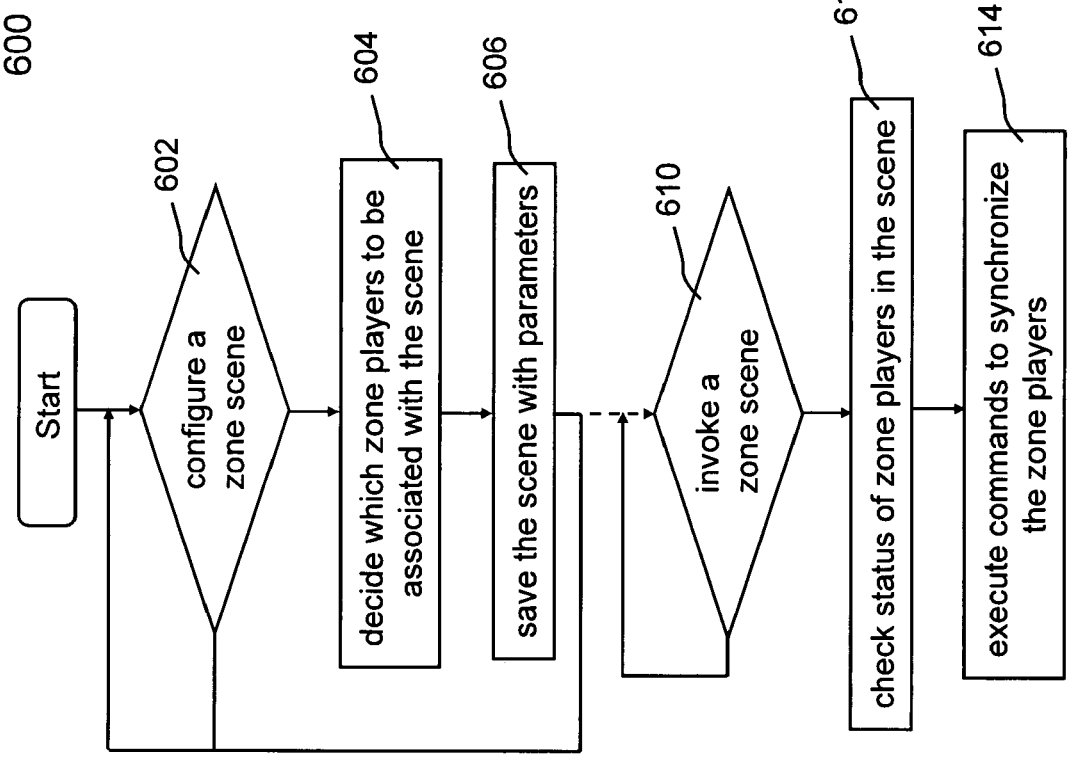


FIG. 6

ZONE SCENE MANAGEMENT

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of and claims priority to U.S. patent application Ser. No. 15/130,919, filed on Apr. 15, 2016, entitled "ZONE SCENE ACTIVATION," which is a continuation of U.S. patent application Ser. No. 14/465,457, filed on Aug. 21, 2014, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 13/896,829, filed on May 17, 2013, entitled "METHOD AND APPARATUS FOR UPDATING ZONE CONFIGURATIONS IN A MULTI-ZONE SYSTEM," which is a continuation of U.S. patent application Ser. No. 11/853,790, filed Sep. 11, 2007, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," which claims priority to U.S. Provisional Application No. 60/825,407 filed on Sep. 12, 2006, entitled "CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM," each of which is hereby incorporated by reference in its entirety for all purposes.

BACKGROUND OF THE INVENTION

Field of the Invention

The invention is generally related to the area of consumer electronics and human-computer interaction. In particular, the invention is related to method and apparatus for controlling or manipulating a plurality of multimedia players in a multi-zone system.

An enduring passion for quality audio reproduction or system is continuing to drive demands from users. One of the demands includes an audio system in a house in which, for example, one could grill to classic rock on a patio while another one may cook up his/her own music selections in a kitchen. This is all at the same time while a teenager catches a ballgame in a family room, and another one blasts pop in a bedroom. And the best part of such audio system is that each family member does not need his or her own stereo system—one system gives everyone access to all the music sources.

Currently, one of the systems that can meet part of such demand is a conventional multi-zone audio system that usually includes a number of audio players. Each of the audio players has its own amplifier(s) and a set of speakers and typically installed in one place (e.g., a room). In order to play an audio source at one location, the audio source must be provided locally or from a centralized location. When the audio source is provided locally, the multi-zone audio system functions as a collection of many stereo systems, making source sharing difficult. When the audio source is provided centrally, the centralized location may include a juke box, many compact discs, an AM or FM radio, tapes, or others. To send an audio source to an audio player demanding such source, a cross-bar type of device is used to prevent the audio source from going to other audio players that may be playing other audio sources.

In order to achieve playing different audio sources in different audio players, the traditional multi-zone audio system is generally either hard-wired or controlled by a pre-configured and pre-programmed controller. While the pre-programmed configuration may be satisfactory in one situation, it may not be suitable for another situation. For

example, a person would like to listen to broadcast news from his/her favorite radio station in a bedroom, a bathroom and a den while preparing to go to work in the morning. The same person may wish to listen in the den and the living room to music from a compact disc in the evening. In order to satisfy such requirements, two groups of audio players must be established. In the morning, the audio players in the bedroom, the bathroom and the den need to be grouped for the broadcast news. In the evening, the audio players in the den and the living room are grouped for the music. Over the weekend, the audio players in the den, the living room, and a kitchen are grouped for party music. Because the morning group, the evening group and the weekend group contain the den, it can be difficult for the traditional system to accommodate the requirement of dynamically managing the ad hoc creation and deletion of groups.

There is a need for dynamic control of the audio players as a group. With a minimum manipulation, the audio players may be readily grouped. In a traditional multi-zone audio system, the audio players have to be adjusted one at a time, resulting in an inconvenient and non-homogenous audio environment. Further, there is a need to individually or systematically adjust the audio volume of the audio players.

SUMMARY OF THE INVENTION

This section is for the purpose of summarizing some aspects of the present invention and to briefly introduce some preferred embodiments. Simplifications or omissions in this section as well as in the abstract or the title of this description may be made to avoid obscuring the purpose of this section, the abstract and the title. Such simplifications or omissions are not intended to limit the scope of the present invention.

In general, the present invention pertains to controlling a plurality of multimedia players, or simply players, in groups. According to one aspect of the present invention, a mechanism is provided to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone. When the scene is activated, the players in the scene react in a synchronized manner. For example, the players in the scene are all caused to play an audio source or music in a playlist, wherein the audio source may be located anywhere on a network.

According to another aspect of the present invention, the scene may be activated at any time or a specific time. A user may activate the scene at any time so that only some selected zones in an entertainment system facilitate a playback of an audio source. When the scene is activated at a specific time, the scene may be used as an alarm or buzzer.

According to still another aspect of the present invention, a controlling device (also referred to herein as controller) is provided to facilitate a user to select any of the players in the system to form respective groups each of which is set up per a scene. Although various scenes may be saved in any of the members in a group, commands are preferably sent from the controller to the rest of the members when one of the scenes is executed. Depending on implementation, the commands include parameters pertaining to identifiers of the players, volumes settings, audio source and etc.

According to yet another aspect of the present invention, a configurable module is implemented in the controlling device that provides interactive graphic user interface for forming, managing and controlling groups in the system, de-grouping a group or adjusting audio volume of individual players or a group of players.

The present invention may be implemented in many forms including software, hardware or a combination of both. According to one embodiment, the present invention is directed to a method for groupings in a multi-zone media system, the method comprises providing a mechanism to allow a user to determine which players in the system to be associated with a theme representing a group; and configuring the theme with parameters pertaining to the players, wherein the theme is activated at anytime or a specific time so that the players react in a synchronized manner. The players in a scene are synchronized to play a multimedia file when the scene is activated.

According to another embodiment, the present invention is directed to an entertainment system for grouping players, the system comprises: a plurality of players, each located in one zone; and a controller providing a mechanism to allow a user to select which of the players to be associated with a theme representing a group; and configure the theme with parameters pertaining to the selected players, wherein the theme is activated at anytime or a specific time so that the selected players react in a synchronized manner. As a result, the selected players are synchronized to play a multimedia that is in a digital format and retrieved from a source over a network.

One of the objects, features, and advantages of the present invention is to remotely control a plurality of multimedia players in a multi-zone system, playing and controlling the audio source synchronously if the players are grouped together, or playing and controlling the audio source individually if the players are disassociated with each other.

Other objects, features, and advantages of the present invention will become apparent upon examining the following detailed description of an embodiment thereof, taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. **1** shows an exemplary configuration in which the present invention may be practiced;

FIG. **2**A shows an exemplary functional block diagram of a player in accordance with the present invention;

FIG. **2**B shows an example of a controller that may be used to remotely control one of more players of FIG. **2**A;

FIG. **2**C shows an exemplary internal functional block diagram of a controller in accordance with one embodiment of the present invention;

FIG. **3**A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after "Morning";

FIG. **3**B shows that a user defines multiple groups to be gathered at the same time;

FIG. **4** shows an exemplary user interface that may be displayed on a controller or a computer of FIG. **1**;

FIG. **5**A shows a user interface to allow a user to form a scene;

FIG. **5**B shows another user interface **520** to allow a user to form a scene;

FIG. **5**C shows a user interface to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively;

FIG. **6** shows a flowchart or process of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone; and

FIG. **7** shows an example user interface for invoking a zone scene; and

FIG. **8** shows another example user interface for invoking a zone scene.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The detailed description of the invention is presented largely in terms of procedures in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will become obvious to those skilled in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuitry have not been described in detail to avoid unnecessarily obscuring aspects of the present invention.

Reference herein to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of the invention do not inherently indicate any particular order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views. FIG. **1** shows an exemplary configuration **100** in which the present invention may be practiced. The configuration may represent, but not be limited to, a part of a residential home, a business building or a complex with multiple zones. There are a number of multimedia players of which three examples **102**, **104** and **106** are shown as audio devices. Each of the audio devices may be installed or provided in one particular area or zone and hence referred to as a zone player herein.

As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital format and can be transported or streamed over a data network. To facilitate the understanding of the present invention, it is assumed that the configuration **100** represents a home. Thus, the zone player **102** and **104** may be located in two of the bedrooms respectively while the zone player **106** may be installed in a living room. All of the zone players **102**, **104** and **106** are coupled directly or indirectly to a data network **108**. In addition, a computing device **110** is shown to be coupled on the network **108**. In reality, any other devices such as a home gateway device, a storage device, or an MP3 player may be coupled to the network **108** as well.

The network **108** may be a wired network, a wireless network or a combination of both. In one example, all devices including the zone players **102**, **104** and **106** are coupled to the network **108** by wireless means based on an industry standard such as IEEE 802.11. In yet another example, all devices including the zone players **102**, **104** and

106 are part of a local area network that communicates with a wide area network (e.g., the Internet).

Many devices on the network **108** are configured to download and store audio sources. For example, the computing device **110** can download audio sources from the Internet and store the downloaded sources locally for sharing with other devices on the Internet or the network **108**. The computing device **110** or any of the zone players can also be configured to receive streaming audio. Shown as a stereo system, the device **112** is configured to receive an analog audio source (e.g., from broadcasting) or retrieve a digital audio source (e.g., from a compact disk). The analog audio sources can be converted to digital audio sources. In accordance with the present invention, the audio source may be shared among the devices on the network **108**.

Two or more zone players may be grouped together to form a new zone group. Any combinations of zone players and an existing zone group may be grouped together. In one instance, a new zone group is formed by adding one zone player to another zone player or an existing zone group.

Referring now to FIG. **2**A, there is shown an exemplary functional block diagram of a zone player **200** in accordance with the present invention. The zone player **200** includes a network interface **202**, a processor **204**, a memory **206**, an audio processing circuit **210**, a module **212**, and optionally, an audio amplifier **214** that may be internal or external. The network interface **202** facilitates a data flow between a data network (i.e., the data network **108** of FIG. **1**) and the zone player **200** and typically executes a special set of rules (i.e., a protocol) to send data back and forth. One of the common protocols used in the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol). In general, a network interface manages the assembling of an audio source or file into smaller packets that are transmitted over the data network or reassembles received packets into the original source or file. In addition, the network interface **202** handles the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player **200**.

The network interface **202** may include one or both of a wireless interface **216** and a wired interface **217**. The wireless interface **216**, also referred to as a RF interface, provides network interface functions by a wireless means for the zone player **200** to communicate with other devices in accordance with a communication protocol (such as the wireless standard IEEE 802.11a, 802.11b or 802.11g). The wired interface **217** provides network interface functions by a wired means (e.g., an Ethernet cable). In one embodiment, a zone player includes both of the interfaces **216** and **217**, and other zone players include only a RF or wired interface. Thus these other zone players communicate with other devices on a network or retrieve audio sources via the zone player. The processor **204** is configured to control the operation of other parts in the zone player **200**. The memory **206** may be loaded with one or more software modules that can be executed by the processor **204** to achieve desired tasks. According to one aspect of the present invention, a software module implementing one embodiment of the present invention is executed, the processor **204** operates in accordance with the software module in reference to a saved zone group configuration characterizing a zone group created by a user, the zone player **200** is caused to retrieve an audio source from another zone player or a device on the network.

According to one embodiment of the present invention, the memory **206** is used to save one or more saved zone configuration files that may be retrieved for modification at any time. Typically, a saved zone group configuration file is transmitted to a controller (e.g., the controlling device **140** or **142** of FIG. **1**, a computer, a portable device, or a TV) when a user operates the controlling device. The zone group configuration provides an interactive user interface so that various manipulations or control of the zone players may be performed.

The audio processing circuit **210** resembles most of the circuitry in an audio playback device and includes one or more digital-to-analog converters (DAC), an audio preprocessing part, an audio enhancement part or a digital signal processor and others. In operation, when an audio source is retrieved via the network interface **202**, the audio source is processed in the audio processing circuit **210** to produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier **214** for playback on speakers. In addition, the audio processing circuit **210** may include necessary circuitry to process analog signals as inputs to produce digital signals for sharing with other devices on a network.

Depending on an exact implementation, the module **212** may be implemented as a combination of hardware and software. In one embodiment, the module **212** is used to save a scene. The audio amplifier **214** is typically an analog circuit that powers the provided analog audio signals to drive one or more speakers.

Referring now to FIG. **2**B, there is shown an exemplary controller **240**, which may correspond to the controlling device **140** or **142** of FIG. **1**. The controller **240** may be used to facilitate the control of multi-media applications, automation and others in a complex. In particular, the controller **240** is configured to facilitate a selection of a plurality of audio sources available on the network, controlling operations of one or more zone players (e.g., the zone player **200**) through a RF interface corresponding to the RF interface **216** of FIG. **2**A. According to one embodiment, the wireless means is based on an industry standard (e.g., infrared, radio, wireless standard IEEE 802.11a, 802.11b or 802.11g). When a particular audio source is being played in the zone player **200**, a picture, if there is any, associated with the audio source may be transmitted from the zone player **200** to the controller **240** for display. In one embodiment, the controller **240** is used to synchronize more than one zone players by grouping the zone players in a group. In another embodiment, the controller **240** is used to control the volume of each of the zone players in a zone group individually or together.

The user interface for the controller **240** includes a screen **242** (e.g., a LCD screen) and a set of functional buttons as follows: a "zones" button **244**, a "back" button **246**, a "music" button **248**, a scroll wheel **250**, "ok" button **252**, a set of transport control buttons **254**, a mute button **262**, a volume up/down button **264**, a set of soft buttons **266** corresponding to the labels **268** displayed on the screen **242**.

The screen **242** displays various screen menus in response to a user's selection. In one embodiment, the "zones" button **244** activates a zone management screen or "Zone Menu", which is described in more details below. The "back" button **246** may lead to different actions depending on the current screen. In one embodiment, the "back" button triggers the current screen display to go back to a previous one. In another embodiment, the "back" button negates the user's erroneous selection. The "music" button **248** activates a music menu, which allows the selection of an audio source (e.g., a song) to be added to a zone player's music queue for playback.

The scroll wheel **250** is used for selecting an item within a list, whenever a list is presented on the screen **242**. When the items in the list are too many to be accommodated in one screen display, a scroll indicator such as a scroll bar or a scroll arrow is displayed beside the list. When the scroll indicator is displayed, a user may rotate the scroll wheel **250** to either choose a displayed item or display a hidden item in the list. The "ok" button **252** is used to confirm the user selection on the screen **242**.

There are three transport buttons **254**, which are used to control the effect of the currently playing song. For example, the functions of the transport buttons may include play/pause and forward/rewind a song, move forward to a next song track, or move backward to a previous track. According to one embodiment, pressing one of the volume control buttons such as the mute button **262** or the volume up/down button **264** activates a volume panel. In addition, there are three soft buttons **266** that can be activated in accordance with the labels **268** on the screen **242**. It can be understood that, in a multi-zone system, there may be multiple audio sources being played respectively in more than one zone players. The music transport functions described herein shall apply selectively to one of the sources when a corresponding one of the zone players or zone groups is selected.

FIG. **2**C illustrates an internal functional block diagram of an exemplary controller **270**, which may correspond to the controller **240** of FIG. **2**B. The screen **272** on the controller **270** may be a LCD screen. The screen **272** communicates with and is commanded by a screen driver **274** that is controlled by a microcontroller (e.g., a processor) **276**. The memory **282** may be loaded with one or more application modules **284** that can be executed by the microcontroller **276** with or without a user input via the user interface **278** to achieve desired tasks. In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source. In another embodiment, an application module is configured to control together the audio volumes of the zone players in a zone group. In operation, when the microcontroller **276** executes one of the application modules **284**, the screen driver **274** generates control signals to drive the screen **272** to display an application specific user interface accordingly, more of which will be described below.

The controller **270** includes a network interface **280** referred to as a RF interface **280** that facilitates wireless communication with a zone player via a corresponding RF interface thereof. In one embodiment, the commands such as volume control and audio playback synchronization are sent via the RF interfaces. In another embodiment, a saved zone group configuration is transmitted between a zone player and a controller via the RF interfaces. The controller **270** may control one or more zone players, such as **102**, **104** and **106** of FIG. **1**. Nevertheless, there may be more than one controllers, each preferably in a zone (e.g., a room) and configured to control any one and all of the zone players.

In one embodiment, a user creates a zone group including at least two zone players from the controller **240** that sends signals or data to one of the zone players. As all the zone players are coupled on a network, the received signals in one zone player can cause other zone players in the group to be synchronized so that all the zone players in the group playback an identical audio source or a list of identical audio sources in a timely synchronized manner. Similarly, when a user increases the audio volume of the group from the controller, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume and in scale.

According to one implementation, an application module is loaded in memory **282** for zone group management. When a predetermined key (e.g. the "zones" button **244**) is activated on the controller **240**, the application module is executed in the microcontroller **276**. The input interface **278** coupled to and controlled by the microcontroller **276** receives inputs from a user. A "Zone Menu" is then displayed on the screen **272**. The user may start grouping zone players into a zone group by activating a "Link Zones" or "Add Zone" soft button, or de-grouping a zone group by activating an "Unlink Zones" or "Drop Zone" button. The detail of the zone group manipulation will be further discussed below.

As described above, the input interface **278** includes a number of function buttons as well as a screen graphical user interface. It should be pointed out that the controller **240** in FIG. **2**B is not the only controlling device that may practice the present invention. Other devices that provide the equivalent control functions (e.g., a computing device, a hand-held device) may also be configured to practice the present invention. In the above description, unless otherwise specifically described, it is clear that keys or buttons are generally referred to as either the physical buttons or soft buttons, enabling a user to enter a command or data.

One mechanism for 'joining' zone players together for music playback is to link a number of zone players together to form a group. To link a number of zone players together, a user may manually link each zone player or room one after the other. For example, there is a multi-zone system that includes the following zones.

Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer

If the user wishes to link 5 of the 6 zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite time consuming. According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to herein as a theme or a zone scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes for the grouping are automatically effectuated.

For instance, a "Morning" zone scene/configuration command would link the Bedroom, Den and Dining Room together in one action. Without this single command, the user would need to manually and individually link each zone. FIG. **3**A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after "Morning".

Expanding this idea further, a Zone Scene can be set to create multiple sets of linked zones. For example, a scene creates 3 separate groups of zones, the downstairs zones would be linked together, the upstairs zones would be linked together in their own group, and the outside zones (in this case the patio) would move into a group of its own.

In one embodiment as shown in FIG. **3**B, a user defines multiple groups to be gathered at the same time. For example: an "Evening Scene" is desired to link the following zones:

Group 1
Bedroom
Den
Dining Room
Group 2
Garage
Garden

where Bathroom, Family Room and Foyer should be separated from any group if they were part of a group before the Zone Scene was invoked.

One important of the features, benefits and objects in the present invention is that that zones do not need to be separated before a zone scene is invoked. In one embodiment, a command is provided and links all zones in one step, if invoked. The command is in a form of a zone scene. After linking the appropriate zones, a zone scene command could apply the following attributes:

Set volumes levels in each zones (each zone can have a different volume)
Mute/Unmute zones.
Select and play specific music in the zones.
Set the play mode of the music (Shuffle, Repeat, Shuffle-repeat)
Set the music playback equalization of each zone (e.g., bass treble).

A further extension of this embodiment is to trigger a zone scene command as an alarm clock function. For instance the zone scene is set to apply at 8:00 am. It could link appropriate zones automatically, set specific music to play and then stop the music after a defined duration. Although a single zone may be assigned to an alarm, a scene set as an alarm clock provides a synchronized alarm, allowing any zones linked in the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed UPnP, no Internet connection for an Internet Radio station), a backup buzzer will sound. This buzzer will be a sound file that is stored in a zone player.

FIG. **4** shows an exemplary user interface **400** that may be displayed on a controller **142** or a computer **110** of FIG. **1**. The interface **400** shows a list of items that may be set up by a user to cause a scene to function at a specific time. In the embodiment shown in FIG. **4**, the list of items includes "Alarm", "Time", "Zone", "Music", "Frequency" and "Alarm length". "Alarm" can be set on or off. When "Alarm" is set on, "Time" is a specific time to set off the alarm. "Zone" shows which zone players are being set to play a specified audio at the specific time. "Music" shows what to be played when the specific time arrives. "Frequency" allows the user to define a frequency of the alarm. "Alarm length" defines how long the audio is to be played. It should be noted that the user interface **400** is provided herein to show some of the functions associated with setting up an alarm. Depending on an exact implementation, other functions, such as time zone, daylight savings, time synchronization, and time/date format for display may also be provided without departing from the present invention.

According to one embodiment, each zone player in a scene may be set up for different alarms. For example, a "Morning" scene includes three zone players, each in a bedroom, a den, and a dining room. After selecting the scene, the user may set up an alarm for the scene as whole. As a result, each of the zone players will be activated at a specific time.

FIG. **5**A shows a user interface **500** to allow a user to form a scene. The panel on the left shows the available zones in a household. The panel on the right shows the zones that have been selected and be grouped as part of this scene. Depending on an exact implementation of a user interface, Add/Remove buttons may be provided to move zones between the panels, or zones may be dragged along between panels.

FIG. **5**B shows another user interface **520** to allow a user to form a scene. The user interface **520** that may be displayed on a controller or a computing device, lists available zones in a system. The list of zones in the user interface **520** includes ALL the zones in the system, including the zones that are already grouped. A checkbox is provide next to each of the zones so that a user may check in the zones to be associated with the scene.

FIG. **5**C shows a user interface **510** to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively. As shown in the user interface **510**, the 'Volumes . . . ' button (shown as sliders, other forms are possible) allows the user to affect the volumes of the associated zone players when a zone scene is invoked. In one embodiment, the zone players can be set to retain whatever volume that they currently have when the scene is invoked. Additionally the user can decide if the volumes should be unmuted or muted when the scene is invoked.

FIG. **6** shows a flowchart or process **600** of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone. The process **600** is presented in accordance with one embodiment of the present invention and may be implemented in a module to be located in the memory **282** of FIG. **2**C.

The process **600** is initiated only when a user decides to proceed with a zone scene at **602**. The process **600** then moves to **604** where it allows a user to decide which zone players to be associated with the scene. For example, there are ten players in a household, and the scene is named after "Morning". The user may be given an interface to select four of the ten players to be associated with the scene. At **606**, the scene is saved. The scene may be saved in any one of the members in the scene. In the example of FIG. **1**, the scene is saved in one of the zone players and displayed on the controller **142**. In operation, a set of data pertaining to the scene includes a plurality of parameters. In one embodiment, the parameters include, but may not be limited to, identifiers (e.g., IP address) of the associated players and a playlist. The parameters may also include volume/tone settings for the associated players in the scene. The user may go back to **602** to configure another scene if desired.

Given a saved scene, a user may activate the scene at any time or set up a timer to activate the scene at **610**. The process **600** can continue when a saved scene is activated at **610**. At **612**, upon the activation of a saved scene, the process **600** checks the status of the players associated with the scene. The status of the players means that each of the players shall be in condition to react in a synchronized manner. In one embodiment, the interconnections of the players are checked to make sure that the players communicate among themselves and/or with a controller if there is such a controller in the scene.

It is assumed that all players associated with the scene are in good condition. At **614**, commands are executed with the parameters (e.g., pertaining to a playlist and volumes). In one embodiment, data including the parameters is trans-

ported from a member (e.g., a controller) to other members in the scene so that the players are caused to synchronize an operation configured in the scene. The operation may cause all players to play back a song in identical or different volumes or to play back a pre-stored file.

One of the features, benefits and advantages in the present invention is to allow sets of related devices (controllers and operating components) to exist as a group without interfering with other components that are potentially visible on the same wired or wireless network. Each of the sets is configured to a theme or a scene.

FIG. **7** shows an example user interface for invoking a zone scene. The user interface of FIG. **7** shows a Zone Menu that includes selectable indications of zone scenes.

FIG. **8** shows another example user interface for invoking a zone scene. FIG. **8** shows a Zone Menu that includes a softkey indicating a Scenes menu. Pressing the Scenes softkey will show the Scenes menu where all the available zone scenes are shown as selectable indications.

The present invention has been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts may be resorted without departing from the spirit and scope of the invention as claimed. While the embodiments discussed herein may appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the invention has applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present invention is defined by the appended claims rather than the forgoing description of embodiments.

I claim:

1. A first zone player comprising:

a network interface that is configured to communicatively couple the first zone player to at least one data network;

one or more processors;

a non-transitory computer-readable medium; and

program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

(i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and

(ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the second zone player is different than the third zone player;

after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone scenes has been selected for invocation;

after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and

based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

2. The first zone player of claim **1**, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the first zone scene, and

wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to play back output media in synchrony with output of media by at least the second zone player.

3. The first zone player of claim **2**, wherein the instruction is a first instruction, and wherein the first zone player further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in accordance with the first predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the second predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) beginning to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

4. The first zone player of claim **2**, wherein the first zone scene

further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the first zone player further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

based on the instruction, coordinating with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media with at least the second zone player.

5. The first zone player of claim **1**, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the second zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

6. The first zone player of claim **5**, wherein the instruction is a first instruction, and wherein the first zone player further comprises program instructions stored on the non-transitory computer-readable medium that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in accordance with the second predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the first predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the second predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player and (b) beginning to operate in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

7. The first zone player of claim **1**, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

8. A non-transitory computer-readable medium, wherein the non-transitory computer-readable medium is provisioned with program instructions that, when executed by one or more processors, cause a first zone player to perform functions comprising:

while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

(i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and

(ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the second zone player is different than the third zone player;

after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone scenes has been selected for invocation;

after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and

based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

9. The non-transitory computer-readable medium of claim **8**, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the first zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

10. The non-transitory computer-readable medium of claim **9**, wherein the instruction is a first instruction, and wherein the non-transitory computer-readable medium is also provisioned with program instructions that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in accordance with the first predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the second predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) beginning to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

11. The non-transitory computer-readable medium of claim **9**, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, and wherein the non-transitory computer-readable medium is also provisioned with pro-

gram instructions that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

based on the instruction, coordinating with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

12. The non-transitory computer-readable medium of claim **8**, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the second zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

13. The non-transitory computer-readable medium of claim **12**, wherein the instruction is a first instruction, and wherein the non-transitory computer-readable medium is also provisioned with program instructions that, when executed by the one or more processors, cause the first zone player to perform functions comprising:

while operating in accordance with the second predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the first predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the second predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player and (b) beginning to operate in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

14. The non-transitory computer-readable medium of claim **8**, wherein the first predefined grouping of zone players does not include the third zone player, and wherein the second predefined grouping of zone players does not include the second zone player.

15. A method executed by a first zone player, the method comprising:

while operating in a standalone mode in which the first zone player is configured to play back media individually in a networked media playback system comprising the first zone player and at least two other zone players:

(i) receiving, from a network device over a data network, a first indication that the first zone player has been added to a first zone scene comprising a first predefined grouping of zone players including at least the first zone player and a second zone player that are to be configured for synchronous playback of media when the first zone scene is invoked; and

(ii) receiving, from the network device over the data network, a second indication that the first zone player has been added to a second zone scene comprising a second predefined grouping of zone players including at least the first zone player and a third zone player that are to be configured for synchronous playback of media when the second zone scene is invoked, wherein the second zone player is different than the third zone player;

after receiving the first and second indications, continuing to operate in the standalone mode until a given one of the first and second zone scenes has been selected for invocation;

after the given one of the first and second zone scenes has been selected for invocation, receiving, from the network device over the data network, an instruction to operate in accordance with a given one of the first and second zone scenes respectively comprising a given one of the first and second predefined groupings of zone players; and

based on the instruction, transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players such that the first zone player is configured to coordinate with at least one other zone player in the given one of the first and second predefined groupings of zone players over a data network in order to output media in synchrony with output of media by the at least one other zone player in the given one of the first and second predefined groupings of zone players.

16. The method of claim **15**, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in accordance with the first zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

17. The method of claim **16**, wherein the instruction is a first instruction, the method further comprising:

while operating in accordance with the first predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the second predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the first predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player and (b) beginning to operate in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

18. The method of claim **16**, wherein the first zone scene further comprises an indication of predetermined media to be played when the first zone scene is invoked, the method further comprising:

based on the instruction, coordinating with at least the second zone player to output the predetermined media in synchrony with output of the predetermined media by at least the second zone player.

19. The method of claim **15**, wherein the instruction to operate in accordance with the given one of the first and second zone scenes comprises an instruction to operate in

accordance with the second zone scene, and wherein transitioning from operating in the standalone mode to operating in accordance with the given one of the first and second predefined groupings of zone players comprises transitioning from operating in the standalone mode to operating in accordance with the second predefined grouping of zone players such that the first zone player is configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player.

20. The method of claim **19**, wherein the instruction is a first instruction, the method further comprising:

while operating in accordance with the second predefined grouping of zone players, receiving, from the network device over the data network, a second instruction to operate in accordance with the first predefined grouping of zone players; and

based on the second instruction, (a) ceasing to operate in accordance with the second predefined grouping of zone players such that the first zone player is no longer configured to coordinate with at least the third zone player to output media in synchrony with output of media by at least the third zone player and (b) beginning to operate in accordance with the first predefined grouping of zone players such that the first zone player is configured to coordinate with at least the second zone player to output media in synchrony with output of media by at least the second zone player.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 10,848,885 B2
APPLICATION NO. : 16/383561
DATED : November 24, 2020
INVENTOR(S) : Robert A. Lambourne

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page

Delete "11 Drawing Sheets" and insert --13 Drawing Sheets--

In the Drawings

Following FIG. 6, insert FIG. 7 and FIG. 8 as shown on the attached drawing sheets

Signed and Sealed this
Eleventh Day of May, 2021

Drew Hirshfeld
Performing the Functions and Duties of the
Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office

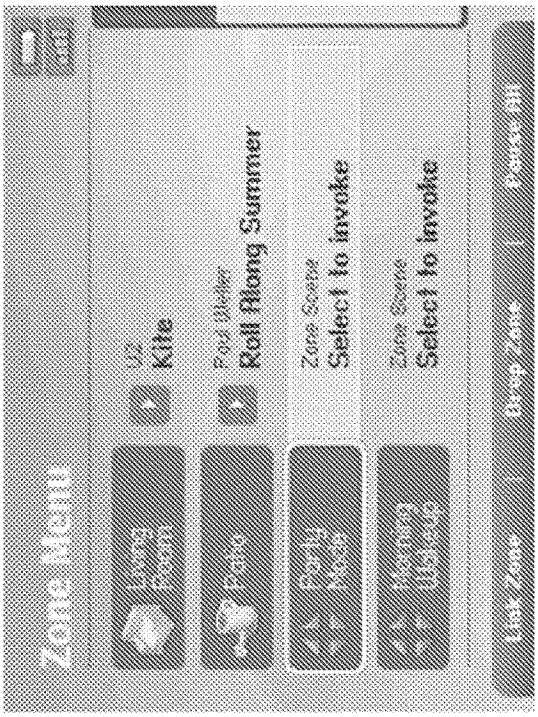

Zone Menu
Bond Room
Patio
Party Mode
Meeting Update
V2
Kite
Pool Water
Roll Along Summer
Zone Scene
Select to invoke
Zone Scene
Select to invoke
Drop Zone
Drop Zone
Link Zone

FIG. 7

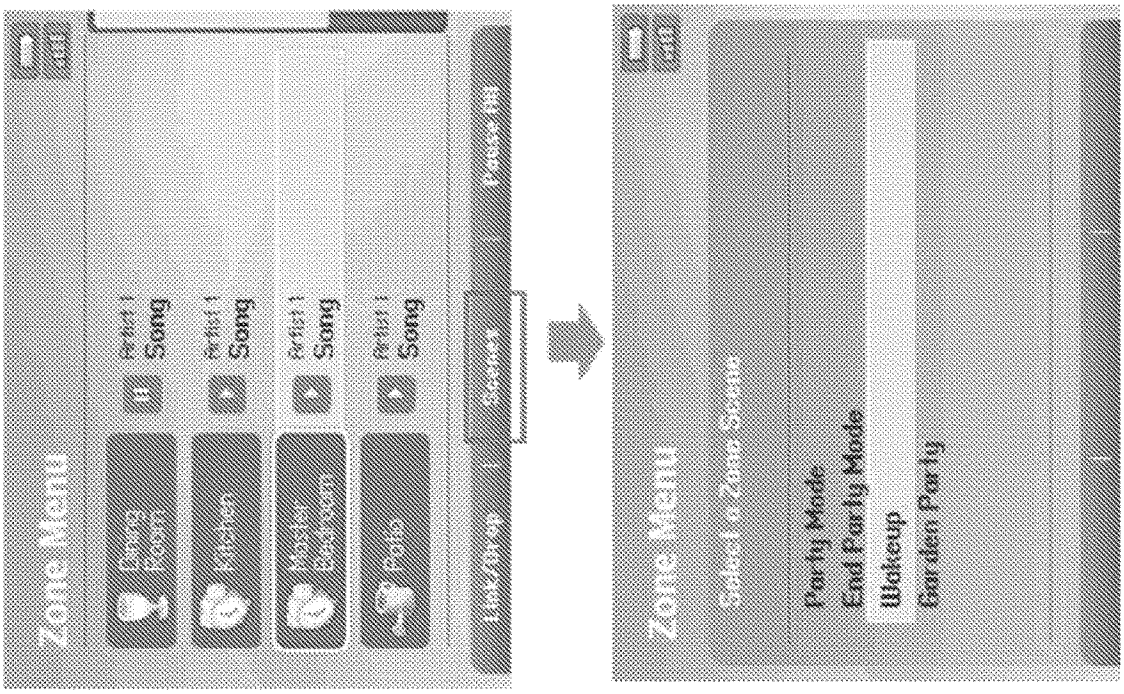

Zone Menu
Living Room
Kitchen
Master Bedroom
Patio
Artist | Song
Artist | Song
Artist | Song
Artist | Song
Select
Pause All
Unpause
Zone Menu
Party Mode
End Party Mode
Wakeup
Garden Party

FIG. 8

CERTIFICATE OF COMPLIANCE

The brief complies with the type-volume limitation of Fed. Cir. R. 32(b)(1) because this brief contains 14,000 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(f) and Fed. Cir. R. 32(b)(2).

This brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5) and the type style requirements of Fed. R. App. P. 32(a)(6) because this brief has been prepared in a proportionally spaced typeface using Microsoft Word for Microsoft 365 in Century Schoolbook 14-point font.

ORRICK, HERRINGTON & SUTCLIFFE LLP

/s/E. Joshua Rosenkranz
E. Joshua Rosenkranz
Counsel for Appellant