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- VOLUME 1 -

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IN THE UNITED STATES DISTRICT COURT

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IN AND FOR THE DISTRICT OF DELAWARE

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SONOS, INC., : CIVIL ACTION

6

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Plaintiff, :

7

:

vs. :

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D&M HOLDINGS INC. d/b/a THE :

9

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D+M GROUP, D&M HOLDINGS :

U.S. INC., and DENON :

10

:

ELECTRONICS (USA), LLC, :

11

:

Defendants. : NO. 14-1330-WCB

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Wilmington, Delaware

14

Monday, December 11, 2017

9:16 o'clock, a.m.

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BEFORE: HONORABLE WILLIAM C. BRYSON, United States Circuit
Judge, and a jury

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- - -

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APPEARANCES :

20

POTTER, ANDERSON & CORROON LLP

21

BY: PHILIP A. ROVNER, ESQ. and

ALAN SILVERSTEIN, ESQ.

22

23

-and-

24

Valerie J. Gunning

25

Official Court Reporter

1 APPEARANCES (Continued):

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LEE SULLIVAN SHEA & SMITH LLP
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RORY SHEA, ESQ.,
GEORGE LEE, ESQ.,
MICHAEL P. BOYEA, ESQ.,
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Counsel for Defendants

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1 important, and I'm grateful to all of you for being here.
2 My name is William Bryson and I will be the
3 judge in this case. I'm assisted in the courtroom today by
4 my law clerk, Mr. Joshua Stein, my courtroom deputies, Ms.
5 Nicole Nolt and Ms. Mia Lamb, and during jury selection, by
6 Ms. Francesca Scarpato, by the court reporter, who takes
7 down everything that is said in court, and by a Court
8 Security Officer, who will be serving as the bailiff in this
9 case.
10 Now, when you entered the courtroom, you should
11 have been given a questionnaire and a pen. Please don't
12 read any of the questions at this point. We will be
13 discussing them with you later. Have the questionnaires
14 been distributed?
15 DEPUTY CLERK: No, your Honor.
16 THE COURT: And the questionnaires. Okay.
17 Well, we'll distribute the questionnaires now, but don't
18 read them and we'll get to the questionnaires later.
19 So I would like to give you a little bit of an
20 introduction first to what we're going to do by way of
21 jury selection. And please listen to these directions
22 carefully.
23 This is a civil case. A civil case has only
24 eight jurors typically. Criminal cases would have 12, but
25 civil cases have fewer, and, again, typically, eight, and

1 P R O C E E D I N G S

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(Proceedings commenced in the courtroom at 9:16
a.m.)

THE COURT: Thank you. Would you bring in the
jury, please.

(The prospective jurors entered the courtroom.)

THE COURT: Very well. Is that everyone? Very
well. Please be seated.

Members of the jury panel, you've already been
welcomed to the United States District Court for the
District of Delaware, but let me extend another welcome on
behalf of the Court staff and myself. Thank you for being
here.

I want to emphasize to you as you were probably
already told and you know that jury service is one of the
most important duties and privileges of citizenship. Our
system of justice depends on citizens who are willing to
meet their civic responsibilities to serve as jurors. It is
one of those times when you act as a representative of your
government and you participate in the operation of
democracy.

While I know that this may not be the most
convenient time for some of you to be here, your presence is

1 this will be a case in which we'll have eight jurors.
2 Now, there are a lot more than eight of you
3 here, of course, but that is for the purpose of attempting
4 to select a representative and impartial jury that the
5 parties are comfortable with as having the jurors who will
6 be deciding their case. So we'll engage in a process known
7 as jury selection.
8 Now, let me make sure, first of all, can you all
9 hear me all right? Sometimes my voice gets a little softer.
10 If anyone can't hear me?
11 A JUROR: Cannot hear.
12 THE COURT: Cannot hear. Can we turn the volume
13 up a little as I have a tendency sometimes to not speak as
14 loudly as I should, so I want to make sure everybody can
15 hear.
16 Good. All right. Let me try now. Is that
17 better? Better in the front? How about in the back? Can
18 you hear me all right? No. Still no? You are still having
19 trouble. Let's see if we can improve on that. Okay.
20 One more try. Is that better? I'm getting a
21 lot of feedback now. Okay. Is that all right? Okay. I
22 will try to keep my voice up.
23 If at any point somebody can't hear, just
24 raise your hand, and I will take steps to make sure you do.
25 Okay.

Cullen - redirect

1 technology relate to that category?
 2 A. It's roughly the same thing. There's a minor
 3 distinction for whatever it's worth. If you have five rooms
 4 and you group three together, that would be multiple rooms.
 5 We have a button you can hit that's called party mode and
 6 then it just immediately connects all the rooms in sync,
 7 whether you have 2, 5, or 32, and they all play perfectly in
 8 sync across 32. That's the difference across a lot of
 9 rooms. Multiple rooms and throughout, one a subset of the
 10 other.
 11 MR. SULLIVAN: No further questions, your Honor.
 12 THE COURT: Very well. This might be a good
 13 time for us to take our afternoon break.
 14 Ladies and gentlemen, while you are on your
 15 break -- we'll take a 15-minute break, come back at 3:20. I
 16 would like you to let Ms. Nolt know what your preferences
 17 are with respect to scheduling and whether you want to
 18 reduce the size of the day in order to deal with driving
 19 issues or whether the juror that has the long drive would
 20 prefer the option of staying over here in Wilmington at the
 21 Court's expense. So if you consider that, you can let her
 22 know what your preferences are.
 23 Thank you. We're adjourned.
 24 THE WITNESS: Thank you.
 25 MR. SULLIVAN: May the witness be excused, your

Cullen - redirect

1 Honor?
 2 THE COURT: The witness -- are you completely
 3 done with the witness? Yes. The witness may be excused.
 4 Does anybody expect to need him again?
 5 MR. BLUMENFELD: No, your Honor.
 6 THE COURT: All right. You're excused.
 7 THE WITNESS: Thank you, your Honor.
 8 THE COURT: Thank you for your testimony.
 9 THE WITNESS: Thank you very much.
 10 (Witness excused.)
 11 (Short recess taken.)
 12 - - -
 13 (Proceedings resumed after the short recess.)
 14 THE COURT: Very well. We can bring in the
 15 jury, please. Please be seated.
 16 The jury has decided they would like to go with
 17 the longer days and hope to finish on Friday and that's fine
 18 with me. It means we need to try to keep ourselves on
 19 schedule as best we can and move things along.
 20 Who will be your next witness, Mr. Sullivan?
 21 MR. SULLIVAN: Our next witness will be Nick
 22 Millington.
 23 (The jury entered the courtroom.)
 24 THE COURT: Thank you. Please be seated.
 25 Let me say for the jurors, if you feel a little

Millington - direct

1 cramped there, you have extra chairs. You should feel free
 2 to spread out if it's more comfortable for you. So if that
 3 is where you would like to sit, you are free to sit at any
 4 of the 14 chairs.
 5 I take it from Ms. Nolt that you've decided to
 6 go with the option of going with the current schedule and
 7 finish on Friday. Very good. That's what we'll do.
 8 Mr. Sullivan, your next witness?
 9 MR. SULLIVAN: Mr. Boyea.
 10 THE COURT: Mr. Boyea?
 11 MR. BOYEA: Thank you, your Honor.
 12 THE COURT: Call your witness, please.
 13 MR. BOYEA: Ladies and gentlemen of the jury, my
 14 name is Michael Boyea. I'm here on behalf of Sonos and will
 15 now call Sonos's chief product officer, Nick Millington, to
 16 the stand.
 17 THE COURT: Mr. Millington, please face the
 18 courtroom deputy to be sworn.
 19 ... NICHOLAS MILLINGTON, having been
 20 duly sworn as a witness, was examined and
 21 testified as follows ...
 22 THE COURT: Please introduce yourself to the
 23 jury and tell them where you're from.
 24 THE WITNESS: Hello. My name is Nick Millington
 25 and I'm from California.

Millington - direct

1 THE COURT: Very well. Mr. Boyea, proceed.
 2 MR. BOYEA: Your Honor, may I approach and bring
 3 Mr. Millington his exhibits?
 4 THE COURT: You may.
 5 (Mr. Boyea handed an exhibit binder to the
 6 witness.)
 7 THE WITNESS: Thank you.
 8 DIRECT EXAMINATION.
 9 BY MR. BOYEA:
 10 Q. Mr. Millington, you are Sonos's chief product officer;
 11 is that correct?
 12 A. Yes, that's correct.
 13 Q. What does the title, what does that role entail?
 14 A. My job is to lead the organization that designs and
 15 develops Sonos's products.
 16 Q. And how big is that organization?
 17 A. It's about 3 or 400 people at this time.
 18 Q. And we heard where you live. Do you have any family?
 19 A. I do, yes.
 20 Q. Can you tell us about your family just briefly?
 21 A. Yes, I can. I'm married and I have three kids.
 22 Q. I'd like to ask you a little bit about your
 23 educational background, please.
 24 A. Sure. So I studied electrical engineering and
 25 computer science at Duke University in North Carolina and I

Millington - direct

- 1 graduated with a Bachelor's degree in electrical
2 engineering, also qualifying for a second major in computer
3 science in 1998.
- 4 Q. And when did you first start working at Sonos?
5 A. I first started working at Sonos at the beginning of
6 April 2003.
- 7 Q. So between the time you graduated and the time you
8 started at Sonos, what did you do?
9 A. I spent nearly five years working at Microsoft in the
10 state of Washington.
- 11 Q. Well, what type of work did you do at Microsoft?
12 A. I was doing software development.
- 13 Q. Anything in particular?
14 A. I was doing software development on a product called
15 SharePoint.
- 16 Q. And could you just explain for us, what is SharePoint?
17 A. SharePoint is a piece of software that's used by large
18 companies like a bank or a real estate agency or a law firm
19 and what SharePoint is for is it's for collaborating and
20 sharing documents.
- 21 So if the members of that company want to share
22 something with one another, they might post it onto a
23 SharePoint website.
- 24 Q. So how would an every day consumer purchase
25 SharePoint?

Millington - direct

- 1 A. Well, it's not really -- sorry. It's not really a
2 consumer product like you might use in your home. It's a
3 piece of technology that might be set up by an information
4 technology department at a large organization. And so
5 no one would really go and just buy SharePoint for
6 themselves.
- 7 Q. So what were the circumstances that led you to leave
8 Microsoft and go to Sonos?
9 A. Well, so in the early 2003, I had been working at
10 Microsoft for close to 25 years, and frankly, I was just
11 interested in working on something that was a little more
12 fast paced, a little more innovative, and where I would
13 have the opportunity to build something from the ground
14 up as opposed to being a cog in a larger machine, if you
15 will.
- 16 Q. So how did working at Sonos compare to working at
17 Microsoft?
18 A. Well, it was, it was different in virtually every
19 respect I think at the time, Microsoft was a company of
20 something like 20 or 30,000 people while Sonos was a, you
21 know, a startup with an office that was like a one-room
22 schoolhouse and around eight employees. So very, very
23 different.
- 24 Q. Could you give us a little bit of flavor? What was
25 the startup experience like?

Millington - direct

- 1 A. Well, I mean, you have to remember, this was 2003, and
2 today, of course, everyone is creating the next dot.com
3 startup in their garage. But in 2003, the industry was kind
4 of reeling from the name out of the dot.com crisis. And so
5 getting involved with a startup was not a trendy -- in fact,
6 it was a pretty risky undertaking. You know, I had a good
7 job at Microsoft, lots of career stability, and so instead
8 going and getting involved with something this small was a
9 bit of an adventure.
- 10 Q. So what was that adventure that Sonos wanted to take
11 you on?
12 A. Well, really, the -- as Tom referred to in 2002, there
13 was an idea that got started, but they were thinking about,
14 of this notion of wireless multi-room music, and I had heard
15 a little bit about that from the founders, and that's what I
16 knew that I would be working on when I joined Sonos.
- 17 Q. So when you first started working at Sonos, what work
18 had already been done?
19 A. Well, there had been -- there was this, there was this
20 idea, this kind of napkin sketch, if you will, but there was
21 very little in the way of like actually making something
22 that would work and that, you know, maybe a few
23 brainstorming documents existed, but really, nothing had yet
24 been engineered.
- 25 Q. So what was your initial role when you were brought

Millington - direct

- 1 onto the Sonos team?
2 A. It was to work in the software development.
3 Q. Anything in particular?
4 A. Well, yes. Actually, the specific area that I was
5 assigned to work on was getting audio around the home
6 wirelessly, and particularly doing that in sync.
- 7 MR. SULLIVAN: Dave, can we look at PTX-479,
8 please.
9 BY MR. SULLIVAN:
10 Q. And Mr. Millington, will you please -- you've got a
11 big binder there. Can you just turn to PTX-479?
12 A. Yes.
13 Q. Let me know when you are there.
14 A. I think I'm strong enough.
15 Q. All right.
16 A. Yes, please. Go ahead.
17 Q. So, Mr. Millington, do you recognize this document?
18 A. Yes, I do. This was a document that was written by
19 Andrew Schulert on April 3rd, 2003, and shared with the four
20 or five people that were on the software development team
21 along with me when we all started.
22 Q. Who is Mr. Schulert?
23 A. Andy Schulert was the first leader of the software
24 development team. He started, I think, in February 2003,
25 and so he was leading the software group.

Millington - direct

- 1 Q. What was your working relationship like with
2 Mr. Schulert?
3 A. Overall I had a great working relationship with Andy
4 Schulert. I had worked with him for a time at Microsoft and
5 also then again at Sonos, so I was excited to be working
6 with him again.
7 I would say that, you know, Andy tended to have
8 a big multi-year vision that he would think about and then I
9 was more the person that would go and actually, you know,
10 turn that into real, real products. In fact, I did my best
11 work with Andy when, you know, we were -- when Andy doubted
12 that a problem could be solved, but challenged me to do it
13 any way. And so that's why I loved working with him.
14 Q. Is Mr. Schulert still working at Sonos today?
15 A. He's actually not. After a long career, he recently
16 retired about a few months ago.
17 Q. Now, Mr. Millington, I would like to turn your
18 attention to page, PTX page 3 of the exhibit in front of
19 you.
20 A. Okay.
21 Q. And I believe I see your name here. Could you
22 describe to the jury, why is your name here?
23 A. So this is the same document that we were looking at
24 earlier describing the assignments that Andy had given to
25 the different members of the software development team. And

Millington - direct

- 1 this section lists the things that I was assigned to work on
2 on my first day at Sonos, back in April of 2003.
3 Q. And what specifically were you assigned to do on your
4 first day?
5 A. Well, as it says here, I was focused on the audio
6 transfer protocol and, in particular, the synchronization of
7 different rooms of music, which is what I was getting at.
8 MR. BOYEA: Your Honor, at this time zone offers
9 PTX-479.
10 MR. LATHAM: No objection, your Honor.
11 THE COURT: Admitted.
12 (PTX-479 was admitted into evidence.)
13 BY MR. BOYEA:
14 Q. Now, Mr. Millington, your first task with
15 synchronization, I'd like to ask you, what were the
16 challenges, technical challenges that you were faced with
17 that you were supposed to solve?
18 A. Well, so there were really, you know, two challenges
19 which were the most significant. The first thing to keep in
20 mind is that that we were trying to do all of this
21 wirelessly and so if you've ever used a wireless device like
22 a phone, you might notice that, you know, it's not totally
23 reliable. Sometimes the web page opens fast. Other times
24 it opens slowly. Sometimes calls are dropped, et cetera, et
25 cetera. And so the wireless network has issues with late

Millington - direct

- 1 ten see and delays and my first challenge was to overcome
2 some of those types of issues.
3 Now, the next thing to keep in mind is that, you
4 know, we were, the product that we envisioned was unlike any
5 other product that was out there in the sense that we were
6 trying to put intelligent devices in each room of the home
7 rather than having kind of a central wiring closet. And
8 each of those intelligent devices, you can think of it as
9 like a small computer, and like all computers, these things
10 have clocks inside them.
11 Now, if you have various digital clocks in your
12 home, like maybe the one on your microwave and the one on
13 your oven toaster, then you'll know that those clocks tend
14 to drift out of sync with one another, and so the clocks in
15 computers work the same way. Over time they get out of sync
16 with one another.
17 And so that was the second problem that we had
18 to solve, is achieving audio synchronization in summary even
19 in an environment where the network communication is
20 unreliable and in an environment in which the clocks are
21 wrong or run at the wrong frequency or things like that.
22 Q. That sounds pretty complicated. From the listener's
23 perspective, why does this matter?
24 A. Well, it really comes back to enjoying the music and
25 sound quality. You know, the human ear is incredibly

Millington - direct

- 1 sensitive to echoes and delays in music that's not well
2 synchronized, and so think about somebody's house.
3 You live in an open plan apartment. You might
4 have a kitchen and a dining room right next to one another.
5 If you have two playback devices in those two rooms and they
6 are playing slightly out of sync with one another, one is
7 just a little bit behind the other one, it's going to drive
8 you crazy.
9 And so it was super important to get those
10 products to be really well synchronized with one another.
11 Q. At a high level, could you please describe to the jury
12 what synchronization solution did you come up with?
13 A. Okay. So the first part of synchronizing is
14 identifying the devices that you want to play in sync with
15 one another, which we call dynamic grouping, and so in the
16 case of grouping, what you're doing in particular is you're
17 designating, you know, I want my living room and my dining
18 room and my kitchen, but not my bedroom to play this music,
19 so you're grouping speakers together, and that's the first
20 part of this.
21 And then the second part of it, once you've
22 designated the speakers that are part of the group, is to
23 synchronize them so that they play the same thing at the
24 same time. And to achieve that, what you have to do is you
25 have to, in our invention, you designate one of the speakers

Millington - direct

- 1 internally as the leader or master of the group, and then
 2 that master device exchanges the timing information from the
 3 clock as well as playback time information as well as the
 4 audio itself, which is to be played, with each of the
 5 members of the group.
 6 And so that's how the synchronization is
 7 achieved, grouping, designating a master, exchanging timing
 8 information, and playback time information and the audio
 9 with the members.
 10 Q. So how would a master player communicate with a member
 11 player?
 12 A. Well, in the -- in the case of Sonos, we wanted that
 13 communication to be wireless, and so they would communicate
 14 with one another over a wireless network.
 15 Q. So you gave us a high level overview of your solution.
 16 Now I'd like to ask you: How did you ultimately come up
 17 with that solution?
 18 A. Okay. So, again, keep in mind that the goal of this,
 19 this product was to do, to do wireless multi-room audio, and
 20 in particular, for the connection between the master, you
 21 know, players, which could be dynamically assigned by the
 22 user and the group members, for that to be completely
 23 wireless. That is what we were aiming for with the wireless
 24 part of this technology.
 25 And so we really, we set about doing two things.

Millington - direct

- 1 One is that I started, I started testing different solutions
 2 to the problem. I, you know, created design documents. I
 3 created prototypes. I performed tests. I spent, you know,
 4 many, many hours, nights, weekends, working away on this
 5 invention.
 6 And then the second thing which I did, of
 7 course, is that I looked at what else was out there. You
 8 know, nobody wants to reinvent the wheel if they don't have
 9 to. And so I took a close look at, you know, some of the
 10 other technologies that were available in the space, but
 11 unfortunately, I didn't find anything that was quite
 12 suitable, and so in the end I had to invent something
 13 myself.
 14 Q. Have you ever reviewed UPnP?
 15 A. Yes, I have heard of UPnP.
 16 Q. Could you please describe for us, what is UPnP?
 17 A. Yes. It stands for universal plug and play. And so
 18 what UPnP is, is it's a standard that allows two or more
 19 devices on a network to find one another, and it allows
 20 basic commands to be exchanged. Like, for example, if those
 21 are audio devices, the commands might be things like play or
 22 next track or volume up, or something like that.
 23 Q. Did you consider using UPnP for synchronization in
 24 grouping?
 25 A. I did not, no.

Millington - direct

- 1 Q. And why not?
 2 A. Because it was an explicit non-goal of the UPnP
 3 standard to deal with synchronization and grouping.
 4 Q. I want to pull back up PTX-479 we just looked at and
 5 page 2, specifically.
 6 And, Mr. Millington, I see a couple of mentions
 7 here of UPnP.
 8 Dave, can we go to the one there, the second.
 9 Now, Mr. Millington, can you describe, what is
 10 this reference here about UPnP? What's the subject matter
 11 here.
 12 A. So this reference is talking about, so AV stands for
 13 audio visual, and that's talking about the parts of UPnP
 14 that handle playback and skipping between songs and things
 15 like that, but it's also clearly calling out that from day
 16 one, we understood as a team that UPnP did not support
 17 playing multiple, did not support multiple renderers playing
 18 the same content in sync. And that's why we knew that we
 19 would have to improve upon what UPnP offered with an
 20 invention of our own.
 21 Q. So I want to now turn to some documents that I
 22 believe you prepared early on, so we're going to start in
 23 your binder. You should have PTX-494, Mr. Millington, and
 24 495.
 25 MR. BOYEA: And, Dave, could we start with 494,

Millington - direct

- 1 please?
 2 THE WITNESS: Yes. I'm there now. Please go
 3 ahead.
 4 BY MR. BOYEA:
 5 Q. And, Mr. Millington, do you recognize this document?
 6 A. I do, yes.
 7 Q. And what is this document?
 8 A. Okay. So this is a document -- this is an e-mail that
 9 I sent on April 21st, 2003, so now I'm in about my second or
 10 third week at Sonos, and this e-mail is referring to an
 11 attachment that I sent to my colleagues on the software
 12 development team with some very early design sketches and
 13 brainstorming about how we might handle this grouping and
 14 audio synchronization problem that we were so convinced we
 15 needed to solve.
 16 MR. BOYEA: And, Dave, could you pull up
 17 PTX-495, please? And could we keep the header of the
 18 e-mail, maybe put both of them side by side or one on top of
 19 the other somewhat?
 20 BY MR. BOYEA:
 21 Q. Mr. Millington, could you please describe what PTX-495
 22 is?
 23 A. Yes. This is, this is the attachment to that e-mail,
 24 and the document itself is dated April 14, 2003, but I think
 25 that reflects when I started working on it, and the -- the

Millington - direct

1 date when I finished this version of the document is when I
 2 wrote the e-mail.
 3 Q. Okay. Now, Mr. Millington, could you please provide
 4 us a high level discussion, description of what you have
 5 written up here?
 6 A. Yes. So this was a document that I wrote, again, in
 7 my second or third week of Sonos, talking about some of the
 8 technical issues that I had just started to understand
 9 related to the synchronized wireless audio transport that we
 10 were developing, or I was developing. Excuse me.
 11 Q. Now, Mr. Millington, what happened to the concepts
 12 that you originally described in this write up?
 13 A. Well, the best way to think about this is sort of a
 14 brainstorming sketch. So some of the ideas made sense.
 15 They worked as we tested them in our labs and proceeded with
 16 putting them into, you know, inventions that ultimately
 17 ended up in the product.
 18 Others were just throwaway things. You know,
 19 ideas that we tried and dismissed because they ended up not
 20 working in the way we would have hoped, as would be very
 21 typical in inventive process, you know, a couple of weeks
 22 into it.
 23 MR. BOYEA: Dave, can we scroll down a little
 24 bit in the document?
 25 BY MR. BOYEA:

Millington - direct

1 Q. Dave, underneath the chart here there's a reference to
 2 UPnP. Can you please describe for us what's being discussed
 3 with reference to UPnP there?
 4 A. Sure. So if you just highlight the first paragraph
 5 there, then you'll see where I'm going to talk about it.
 6 This is basically getting the same topic that I
 7 mentioned before, which is the UPnP is a technology for
 8 discovering devices on a network and that is what we
 9 intended to use it for.
 10 Q. And what about for grouping in sync?
 11 A. No. It was unrelated to grouping in sync because UPnP
 12 cannot do grouping in sync.
 13 MR. BOYEA: So, Dave, can we turn to page 6 of
 14 this exhibit, please?
 15 BY MR. BOYEA:
 16 Q. And, Mr. Millington, there's a reference near the top
 17 of the document to RTP.
 18 A. Yes.
 19 Q. Can you please describe for the ladies and gentlemen
 20 of the jury, what is RTP?
 21 A. So I will start just by reading the paragraph and then
 22 I will put a little color on that. So it says here, RTP,
 23 which stands for real time protocol, is a protocol that
 24 provides for interleaving data and timing information using
 25 NTP timestamps.

Millington - direct

1 So the way to think about RTP is it's used in,
 2 you know, Internet telephony applications, when you are
 3 making a phone call over the Internet. And it's a way of
 4 making sure that the audio and video associating with those
 5 things arrives in order at the receiving end.
 6 Q. Now, you're referencing RTP here in your write up
 7 about synchronization. Was RTP in your file synchronization
 8 invention?
 9 A. It wasn't, because it turned out it was basically
 10 doing the opposite of what we wanted it to do. RTP was
 11 assigning timestamps to things that had happened in the
 12 past. Namely, somebody talking into a phone receiver, for
 13 example, while synchronization is about several players
 14 planning activity in the future, and so RTP wasn't suitable
 15 for what it was that we wanted to do.
 16 MR. BOYEA: Your Honor, at this time Sonos
 17 offers PTX-494 and 495.
 18 MR. LATHAM: No objection.
 19 THE COURT: Admitted.
 20 (PTX-494 and 495 were admitted into evidence.)
 21 BY MR. BOYEA:
 22 Q. Now, Mr. Millington, after you prepared this early
 23 design sketch, do you recall preparing any further design
 24 sketches regarding your synchronization invention?
 25 A. Yes. There was much more work to be done to make

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1 something that actually worked, and so I continued to
 2 prototype and create further design sketches.
 3 MR. BOYEA: Dave, could we pull up PTX-496,
 4 please.
 5 BY MR. BOYEA:
 6 Q. And, Mr. Millington, I believe, could you just
 7 describe generally, what is this e-mail?
 8 A. This is another e-mail that I wrote to my boss, Andy
 9 Schuler, the leader of the software development team.
 10 Here we're at May 13, 2003, so a little over a
 11 month now I've been working on this problem, prototyping,
 12 testing, coding. And this document describes, you know, the
 13 latest state of my understanding of the synchronization
 14 problem, or, I'm sorry, the attachment to this e-mail
 15 describes the latest state of my understanding of this
 16 synchronization problem about five or six weeks into my work
 17 at Sonos.
 18 MR. BOYEA: And, Dave, can we pull that
 19 attachment up, PTX-497.
 20 BY MR. BOYEA:
 21 Q. So, Mr. Millington, can you just describe for us at a
 22 high level what we have here?
 23 A. Okay. This is a second write up that I did on
 24 May 13th, 2003, describing my progress on the design of the
 25 way that we would synchronize the Sonos players.

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- 1 Q. And do you see any reference to RTP here?
 2 A. Scroll the document all the way to the bottom. No, I
 3 don't think this document contains any reference to RTP.
 4 Q. And why would that be the case?
 5 A. Because it was unsuitable for our application because
 6 it did the opposite of what we needed it to do.
 7 Q. So we've been talking a little bit about groups and
 8 talking about communicating between, or synchronizing, I
 9 should say, multiple playback devices.
 10 Now I want to ask you, how would two playback
 11 devices know they need to run the synchronization algorithm
 12 that you created?
 13 A. Well, within this overall vision of decentralized
 14 wireless multi-room music, recall that you have to designate
 15 in some way the speakers that you want to have grouped
 16 together, and so the grouping process, and, in particular,
 17 dynamic grouping, which is what let's one at any time add or
 18 remove members from groups as you walk around the home and
 19 they are enjoying your music, dynamic grouping was the part
 20 of the invention that solved the problem of allowing the
 21 system to know what players needed to play in sync with one
 22 another.
 23 Q. Okay. Thank you.
 24 Before we turn to another document or another
 25 exhibit, your Honor, now I forgot to introduce or request to

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- 1 offer PTX-496 and 497 into evidence.
 2 MR. LATHAM: No objection.
 3 THE COURT: Admitted.
 4 (PTX-496 and PTX-497 were admitted into
 5 evidence.)
 6 BY MR. BOYEA:
 7 Q. Mr. Millington, I would like to direct your attention
 8 to PTX-498 now.
 9 A. Okay.
 10 Q. And this appears to be an e-mail chain from July 21st,
 11 2003. Is that what I'm seeing?
 12 A. Yes, that's correct. This is another e-mail written
 13 by me to my boss, Andy Schulert, about -- so this was about
 14 a little more than three months into my time at Sonos.
 15 Q. Can you describe for the jury, what's the general
 16 subject matter of this e-mail chain?
 17 A. Well, as the subject says, groups, and in particular,
 18 this is me starting to work on how we would add the missing
 19 grouping functionality that we needed to UPnP.
 20 Q. Was there a particular name for that additional add on
 21 that you were going to be putting to UPnP?
 22 A. The one that we had to add?
 23 Q. Yes.
 24 A. Yes. It was called group management.
 25 Q. And what was the group management add-on?

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- 1 A. This was a, an addition that we made to the base UPnP
 2 platform for our own use, and it had, in particular, three
 3 pieces of functionality. One of them was adding a member to
 4 a group, so, for example, if the living room and kitchen are
 5 already playing and you want to add the dining room, you
 6 would need a way to add a member to that group.
 7 The second one was removing a member from a
 8 group, so, for example, if you were going upstairs and no
 9 longer needed music in your living room, you might remove
 10 that member from the group.
 11 And the third one was what we called changing
 12 the coordinator or changing the, the master, the leader of
 13 the group, because, remember that it's possible the user
 14 could remove the player that we had internally designated as
 15 the master from the group, and so at that point, we had to
 16 do some special work to handle that situation. And so
 17 that's the nature and purpose of the group management
 18 service that we had to add to UPnP.
 19 MR. BOYEA: And, Dave, can we turn to the second
 20 page of this e-mail chain?
 21 THE WITNESS: Yes.
 22 BY MR. BOYEA:
 23 Q. And can we focus in on the very top line there?
 24 Mr. Millington, do you see, there's a reference to a custom
 25 UPnP subpoenas?

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- 1 A. Yes.
 2 Q. Can you describe, what is a custom UPnP service?
 3 A. So a custom UPnP service means an addition to UPnP
 4 that was invented at Sonos in this case that we added to the
 5 standard for our own use to implement the features of our
 6 product.
 7 Q. And this specific one that you are discussing here,
 8 that's with reference to grouping; is that correct?
 9 A. Just scroll up a little bit so I can make sure.
 10 Sorry. The other way. Yes, yes. This is about the
 11 grouping service. The group management service. Excuse
 12 me.
 13 MR. BOYEA: Your Honor, at this time Sonos
 14 offers PTX-498 into evidence.
 15 MR. LATHAM: No objection.
 16 THE COURT: Admitted.
 17 (PTX-498 was admitted into evidence.)
 18 MR. BOYEA: Dave, can we pull up PTX-499,
 19 please.
 20 BY MR. BOYEA:
 21 Q. And, Mr. Millington, can you please describe for us
 22 what we're looking at right now?
 23 A. Yes. This is another e-mail written by me, so now
 24 we're in August 2003. So this is about a little more than
 25 four months into my tenure at Sonos.

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1 And Rincon-Dev was a mailing left we set up at
2 this point for all of our software developers, and whenever
3 we added new functionality to the product, we would send
4 e-mails that described the new functionality we were adding.
5 What this showed is in August 2003, I was still working on
6 the group management concept that we were talking about
7 during the previous exhibit.

8 Q. And, Mr. Millington, I see a reference to Rincon
9 proprietary UPnP services. Is that similar in any way to
10 the custom UPnP service phrase that we saw in the last
11 exhibit?

12 A. Yes. It's exactly, it's exactly the same. So Rincon,
13 as Tom mentioned, was the early name of Sonos before we had
14 gotten the Sonos trademark, and a Rincon proprietary UPnP
15 service, just like a custom service, reflects something
16 that we added to UPnP for our own use as part of our
17 invention.

18 Q. Were there any other phrases that Sonos might have
19 used to describe an invention that they added on top of
20 UPnP?

21 A. You mean like an extension or an enhancement or a
22 customization or modification? We would have probably used
23 all of those terms at various times.

24 Q. But all of those terms mean something that is not in
25 UPnP; is that correct?

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1 A. Well, so at this point we've talked about grouping and
2 we've talked about synchronization, so you now have music
3 playing in different rooms of your house. The same thing or
4 different things. And one of the other things that is
5 essential for you to be able to do is to control the volume
6 of that music in the different rooms. In particular,
7 controlling the volume individually, for the rooms
8 individually, or controlling the volume collectively for the
9 entire group. And that is another thing, which it was very
10 important for us to have the capability of doing in our
11 system.

12 Q. So that volume functionality that you just discussed,
13 how was that developed at Sonos?

14 A. Well, so when you're talking about something like
15 volume control, you are now heavy into the area of user
16 interaction. You know, this is like, how does this work?
17 What do we show on the screen? What are the buttons and
18 slide errs and things like that?

19 And so we had hired a really talented designer,
20 whose name is Rob Lambourne, and Rob was responsible for
21 coming up with the user interface design for how we were
22 going to do group volume in our invention while I was
23 responsible for the, you know, the technical implementation
24 of the feature.

25 Q. What was your working relationship like with Rob?

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1 A. Yes, such as grouping and synchronization.

2 Q. So we've talked a lot about the group management UPnP
3 service that you invented. Could you describe just
4 succinctly, you know, just again, what was it used for?

5 A. So we've seen today various controllers and apps and
6 things like that for interacting with Sonos, and in all of
7 those controllers and apps, there's a way for the user to
8 designate rooms where music will play.

9 So, for example, the living room and dining room
10 are going to play some music together. The same music in
11 sync. And so whenever the user is doing one of those types
12 of operations inside one of the Sonos apps, the group
13 management service will spring to life and perform the
14 operation for them.

15 Q. Thank you.

16 MR. BOYEA: Before I ask you a little bit more
17 about the controller functionality, your Honor, I would like
18 to offer into evidence PTX-499.

19 MR. LATHAM: No objection.

20 THE COURT: Admitted.

21 (PTX-499 was admitted into evidence.)

22 BY MR. BOYEA:

23 Q. So you said a little bit about what a user could do
24 with a controller in the Sonos system. Are there any other
25 things that the user might want to do?

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1 A. Well, the best way to think the way about how someone
2 like Rob and someone like me would work together, it's like
3 on a construction project, there would be an architect and
4 there would be a contractor.

5 The architect might say, you know, this is what
6 this building will look like. Here's how many stories it
7 has and things like that and the contractor is responsible
8 for framing the building, for making sure it doesn't, you
9 know, sink into the mud and things like that.

10 And so Rob would work on the graphical and
11 interaction design for these products while I would work on
12 the technical implementation, the bits and bytes, the
13 software code.

14 And he and I would talk regularly and bounce
15 ideas off one another. Also, these were really distinct
16 rolls with distinct skill sets. So, you know, we were not
17 always working, you know, hand in glove either.

18 Q. Now, we've been talking about some of the technology
19 that you developed early in 2003 and 2004. Do you recall,
20 did Sonos file any patent applications related to that
21 technology?

22 A. I do recall and we most certainly did.

23 Q. And specifically related to the technology of group
24 go, synchronization and group volume control; is that right?

25 A. Yes. That was the exact area of some of our early

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- 1 patent filings.
- 2 Q. And so I'd like to take a look just real quickly at
- 3 PTX-3.
- 4 A. Okay.
- 5 Q. And, Mr. Millington, is this one of your patents?
- 6 A. Yes, it is. It's a United States patent on which I am
- 7 the inventor.
- 8 Q. Could you just explain to the jury, what's the general
- 9 subject matter of this patent?
- 10 A. This patent is the one that we referred to as our
- 11 grouping and sync patent. So this patent covers the process
- 12 of grouping players together, designating a master device,
- 13 and then causing the audio to play in sync.
- 14 MR. BOYEA: Dave, could we now turn to PTX-1.
- 15 BY MR. BOYEA:
- 16 Q. And, Mr. Millington, is this another one of your
- 17 patents?
- 18 A. On this patent, Rob Lambourne and I are listed as the
- 19 joint inventors.
- 20 Q. And could you please explain to the jury the general
- 21 subject matter of this patent?
- 22 A. Yes. This patent is about the concept of grouping
- 23 players together and then controlling the volume of those
- 24 players either individually or collectively as a group.
- 25 Q. And then PTX-2, please, Dave.

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- 1 And then, Mr. Millington, is this another one of
- 2 your patents.
- 3 A. Once again, this is a patent where Rob and I are
- 4 listed as inventors, yes.
- 5 Q. And then just once more, what's the general subject
- 6 matter of this patent?
- 7 A. The general subject matter of this patent is roughly
- 8 the same as the previous one. It's about grouping players
- 9 together for the purpose of synchronized playback and then
- 10 controlling the volume of the playback on those players,
- 11 either individually or collectively as a group.
- 12 Q. Now, we've looked at some of the patents related to
- 13 the technology you were developing in 2003 and 2004.
- 14 Now, what was the state of the Sonos system in
- 15 mid-2004?
- 16 A. So in mid-2004, let's see. We had been working away
- 17 for about a year and we were getting ready to show Sonos to
- 18 the public for the first time.
- 19 Q. And where were you planning to show Sonos to the
- 20 public at?
- 21 A. We were planning to show Sonos to the public at a
- 22 conference called All Things Digital that was hosted by
- 23 Walter Mossberg of the Wall Street Journal.
- 24 Q. And did Sonos actually go to that conference?
- 25 A. We did, where we showed off the ZP100, our first

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- 1 wireless network amplifier, and the controller 100, our
- 2 first wireless controller in, was it, I think June of 2004.
- 3 Q. And when you say showed off, what do you mean by
- 4 showed off?
- 5 A. I mean we demonstrated it to the public. The
- 6 journalists who would write about it, members of the public
- 7 who might be attending the conference who could literally
- 8 interact with and use a working product.
- 9 Q. So that June 2004 demonstration, how is that received?
- 10 A. I think it was received really well, because we were
- 11 demonstrating a number of things that had never been seen
- 12 before in a product like this. In particular, the, you
- 13 know, the ability to group players, to have them play in
- 14 sync with one another, and then to control the volume using
- 15 a wireless controller like the one that you have seen in
- 16 some of our exhibits.
- 17 Q. So after the unveil at All Things Digital, what
- 18 happened next?
- 19 A. So this was June of 2004, and we then proceeded to get
- 20 ready for the launch of a commercial product that we would
- 21 put on sale for anyone to buy.
- 22 Q. And when did those go on sale?
- 23 A. The ZP100 and the CR100, that's the amplifier and
- 24 the controller, they went on sale to the public in
- 25 January 2005.

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- 1 Q. And did those products incorporate the dynamic
- 2 grouping and syncing technology that you invented?
- 3 A. Yes, they most certainly did.
- 4 Q. And why was that?
- 5 A. Because key to the experience of wireless multi-room
- 6 music is the ability to group speakers as you want and then
- 7 for the music to play in sync in the rooms that you are in.
- 8 Q. What about your products today? Do they include that
- 9 same technology?
- 10 A. Yes, they most certainly do.
- 11 Q. How about the dynamic grouping and group volume
- 12 control invention that you and Rob came up with? Was that
- 13 in the first products that you guys released in January of
- 14 2005?
- 15 A. Yes, it was.
- 16 Q. And why was that?
- 17 A. Because, once again, the ability to control the volume
- 18 of the players in a group either individually or
- 19 collectively is key to the experience of the wireless
- 20 multi-room unit.
- 21 Q. And since it's key, that's -- I assume it's still in
- 22 your product; is that right?
- 23 A. It is today. In fact, to be precise, the lineal
- 24 descendant of our controller is now the apps that we make
- 25 for the Android and the iPhone, but it's the same, same

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1 exact experience that pretty much that is in the products
 2 that we launched in 2005 and that are covered by those
 3 patents.
 4 Q. How have your customers responded to the products that
 5 you've invented?
 6 A. Well, in general, I think that the customer, customer
 7 reception has been, has been fantastic. You know, as an
 8 engineer and inventor, the thing that I live for is buying
 9 our products and being excited about using them and ideally
 10 buying more of them.
 11 And time and again, we see people, who they
 12 might start their Sonos system with one player, but then
 13 they'll add another one to take advantage of the
 14 synchronized multi-room music and extend music throughout
 15 their whole house. So for me as an engineer, it's
 16 incredibly gratifying.
 17 MR. BOYEA: Dave, can we pull up PTX-660,
 18 please?
 19 BY MR. BOYEA:
 20 Q. Mr. Millington, we have here a 2006 e-mail. Could you
 21 describe what you are seeing on the screen?
 22 A. Yes. This is an e-mail from Craig Murphy to myself
 23 describing his experience with the ZP80. You can think of
 24 ZP80, that was an old name for the connect product that we
 25 now sell. It's basically a Sonos player without an

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1 amplifier in it.
 2 Q. And who is Craig Murphy?
 3 A. Craig Murphy works or worked, I should say at this
 4 time, in the multi-media group of the Windows group at
 5 Microsoft, where he was responsible for audio and video
 6 types of things.
 7 Q. And how did he describe the experience with your ZP80?
 8 A. Well, let me just actually, let me just actually let
 9 his words speak for themselves. When he, when he got hold
 10 of these products, he said, wow. And then he continued.
 11 I've got all four up on my mixer and all four are in perfect
 12 sync. Sounds great. I also thought that it was really cool
 13 that when I linked them all together, they all
 14 simultaneously swapped over with a glitch. I think he means
 15 without a glitch there, because he continues, the previous
 16 firmware stopped playback.
 17 So in the net, I think he was really excited
 18 about the performance of these products and, in particular,
 19 the domain of synchronized audio.
 20 Q. And how did that make you feel to receive e-mails like
 21 that?
 22 A. Well, having, having worked at Microsoft, I know that
 23 these guys are tough raters, and also I know that
 24 particularly in a group like Windows and media, they would
 25 see many, many products in this space.

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1 And so for a person like that to nonetheless be
 2 so impressed that he would begin an e-mail to me, wow, you
 3 know, I think it speaks for itself in terms of the reaction
 4 of technologists when they saw the inventions that we had
 5 put on sale in 2005.
 6 MR. BOYEA: Your Honor, Sonos office PTX-490
 7 into evidence.
 8 MR. LATHAM: No objection.
 9 THE COURT: Was that --
 10 MR. BOYEA: I'm sorry, your Honor. 660.
 11 THE COURT: 660?
 12 MR. BOYEA: Yes. 660.
 13 THE COURT: Admitted.
 14 (PTX-660 was admitted into evidence.)
 15 MR. BOYEA: Dave, can we pull up PTX-490 now?
 16 BY MR. BOYEA:
 17 Q. Mr. Millington, this is an e-mail that has already
 18 been introduced to the jury, but could you -- could we look
 19 at the very bottom e-mail again?
 20 A. Yes.
 21 Q. And can you describe, what's the subject matter of
 22 this e-mail exchange that you had with Mr. MacFarlane?
 23 A. So this is John MacFarlane, the CEO of Sonos at the
 24 time, sharing with me notes from a conversation that Tom
 25 Cullen had had with Bang & Olefson that we saw before.

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1 Q. And, again, what was the nature of Bang & Olefson's
 2 request?
 3 A. Well, as you can see, the punchline is that they were
 4 asking if they could actually license the synchronization
 5 technology that I had developed at Sonos, because when they
 6 looked at our products, they saw they had a done a really
 7 good job at solving this product while in contrast, they
 8 themselves were stuck trying to get to a good solution.
 9 Q. Can we scroll up to the top e-mail in this chain? As
 10 I said, it looks like Mr. MacFarlane forwarded you this
 11 e-mail.
 12 How did receiving an e-mail like this, again,
 13 how did it make you feel?
 14 A. Do you mind scrolling so I can see what my response
 15 was? Sorry. The other way. Yes.
 16 So I think the reaction overall was positive.
 17 And it says here, you know, I think that for me, the mail
 18 from -- Tom's mail describing that conversation reenforced
 19 in my mind that we created some intellectual property, some
 20 inventions that were of value. And for me as an engineer,
 21 the best feeling of all is to have other bright people see
 22 the value in the work that I do.
 23 MR. BOYEA: Thank you, Mr. Millington.
 24 THE COURT: Cross-examination.
 25 On that 490, that has already been admitted, I