UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.

Petitioner

v.

NETLIST INC.

Patent Owner

Case No. PGR 2025-00071

U.S. Patent No. 12,308,087

Videoconference Deposition of

ANDREW WOLFE, Ph.D.

Friday, May 22, 2026

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Pages: 1 - 116

Reported By: Dawn M. Hart, RPR/RMR/CRR

1 Pursuant to Notice, before Dawn M. Hart,
2 RPR/RMR/CRR and Notary Public.
3 A P P E A R A N C E S
4 ON BEHALF OF THE PETITIONER:
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19 ALSO PRESENT: Ferenc Pazmandi, Patent Agent
20 Edwin Aroma, AV Technician
21
22

C O N T E N T S

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E X H I B I T S

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1 P R O C E E D I N G S
2 ANDREW WOLFE, Ph.D.
3 being first duly sworn or affirmed to
4 testify to the truth, the whole truth, and nothing
5 but the truth, was examined and testified as
6 follows:
7 EXAMINATION BY COUNSEL FOR THE PATENT OWNER
8 BY MR. BEMBEN:
9 Q Dr. Wolfe, please state your full name
10 for the record.
11 A Andrew Wolfe.
12 Q And my name for the record is Richard
13 Bemben. I'm attorney at Sterne Kessler. I
14 represent Netlist, Incorporated. And with me
15 today is Dr. Zhang, also an attorney at Sterne
16 Kessler.
17 MR. BEMBEN: Counsel, would you like to
18 identify yourselves?
19 MR. CHANDLER: Sure. Ted Chandler from
20 Baker Botts on behalf of the Petitioner, Samsung
21 Electronics Co. Ltd. And with me is my colleague
22 Dr. Ferenc Pazmandi.

1 MR. BEMBEN: And, counsel, just before
2 we start, as you know we have a pending request
3 before the Panel to seek additional discovery into
4 the real parties in interest in this matter. We
5 think that we might be able to short circuit that
6 a bit if you are willing to state on the record
7 which Samsung entities Baker Botts was retained to
8 represent in this matter. Are you willing to do
9 that?
10 MR. CHANDLER: We are retained by
11 Samsung Electronics Co. Ltd.
12 MR. BEMBEN: Does that agreement include
13 Samsung Electronics America?
14 MR. CHANDLER: I'm not aware of any
15 agreement with Samsung Electronics America, but I
16 don't agree that it's appropriate to take Dr.
17 Wolfe's time with this matter.
18 MR. BEMBEN: Would you be willing to
19 produce the representation agreement that you have
20 with Samsung Electronics Corporation?
21 MR. CHANDLER: I am not the subject of
22 discovery. This is the deposition of Dr. Wolfe.

1 MR. BEMBEN: So for the record, counsel
2 is not willing to produce the representation
3 agreement.
4 MR. CHANDLER: I did not say that. I
5 said this is not a discovery matter of Baker
6 Botts. This is a deposition of Dr. Wolfe.
7 MR. BEMBEN: So you'd be willing to
8 produce the retention agreement?
9 MR. CHANDLER: I did not say that.
10 MR. BEMBEN: So you won't say one way or
11 the other?
12 MR. CHANDLER: Not right now.
13 BY MR. BEMBEN:
14 Q Dr. Wolfe, you understand that you're
15 under oath?
16 A I do.
17 Q Are you on any medication that would
18 impair your ability to provide truthful testimony
19 today?
20 A No.
21 Q Is there any reason that you cannot
22 provide truthful testimony today?

1 A No.
2 Q Okay. Let's go over some ground rules
3 for the deposition. I ask that you provide verbal
4 answers so the Reporter can transcribe our
5 conversation. Okay?
6 A I understand.
7 Q Okay. Let's try not to speak over each
8 other. You understand that I'm here today to ask
9 the questions and you're here to answer them,
10 correct?
11 A I understand.
12 Q If you don't understand a question that
13 I ask, please let me know and I'll try to clarify
14 it. Is that fair?
15 A Okay.
16 Q But if you answer a question that I have
17 asked, I'll assume that you've understood the
18 question. Is that fair?
19 A Okay.
20 Q We'll try to take breaks every hour. If
21 you need a break, just let me know and we can
22 finish up the line of questioning and take a

1 break.
2 Today is a remote deposition, correct?
3 A Correct.
4 Q Where are you?
5 A In my office in Santa Clara, California.
6 Q Is there anyone with you?
7 A No.
8 Q Do you have any materials with you?
9 A Yes.
10 Q What materials do you have?
11 A I have printed copies of five Exhibits
12 from this matter, Exhibit 1001, 1003, 1018, 1047
13 and 1048. And then I do have all the Exhibits on
14 my computer.
15 Q Those Exhibits that you just mentioned,
16 are those clean copies that you downloaded from
17 the PTAB website?
18 A Yeah, they have no annotations.
19 Q Okay. Do you have any notes with you?
20 A No. There may be some on my computer
21 somewhere but they're not easily accessible.
22 Q Do you understand that you're here today

1 to be deposed in a PGR of the '087 patent?
2 A I do.
3 Q And let me just clarify what I mean by
4 the '087 patent. So you mentioned Exhibit 1001 in
5 your answers. Do you recall that?
6 A Yes.
7 Q That Exhibit 1001 in this proceeding is
8 U.S. Patent No. 12,308,087, correct?
9 A Yes.
10 Q And is it okay if we refer to that as
11 the '087 patent today?
12 A Yes.
13 Q Are you aware that Netlist and Samsung
14 are involved in District Court litigation
15 involving the '087 patent?
16 A No. I am aware that the parties are
17 involved in various litigations, but I do not know
18 which patents are in the litigations.
19 Q Are you involved in the District Court
20 litigations that you're aware of?
21 A As far as I know, no.
22 Q What do you mean by "as far as you

1 know"?
2 A I've put opinions into the record. I
3 don't know whether or not anybody is using them in
4 those litigations, but I haven't had any
5 discussions with counsel for those litigations,
6 and I haven't provided any additional opinions or
7 advice regarding those litigations.
8 Q When you said you put opinions into the
9 record, which record are you referring to?
10 A Again, I don't know which patents are
11 involved, but a number of PTAB proceedings.
12 Q Okay. When you mentioned "into the
13 record," you meant the record of PTAB proceedings,
14 correct?
15 A Yes. Yes.
16 Q I see. Are you aware that Netlist and
17 Samsung are involved in litigation at the
18 International Trade Commission involving the '087
19 patent?
20 A Again, I'm aware that there are one or
21 more disputes at the ITC, but I do not know which
22 patents are involved, although -- I'd have to look

1 at my report. I may have seen small snippets of
2 information from that proceeding.
3 Q The small snippets that you may have
4 seen, would those be mentioned in your
5 declaration?
6 A Yes. Anything that I saw would be
7 mentioned in the declaration. They would probably
8 only be concerned with claim construction or
9 contentions.
10 Q Are you involved in any of the
11 International Trade Commission proceedings between
12 Netlist and Samsung?
13 A Not to my knowledge.
14 Q Have you reviewed any materials from any
15 International Trade Commission cases between
16 Netlist and Samsung?
17 A Again, I'd have to go back and look at
18 my declaration. I may have seen a contention or a
19 claim construction position, but that would be the
20 most.
21 Q Have you reviewed Samsung's
22 non-infringement contentions in any of the ITC

1 cases?
2 A No.
3 Q Are you familiar with Samsung's
4 non-infringement contentions in the ITC case?
5 A No.
6 Q Have you discussed Samsung's
7 non-infringement contentions with anyone?
8 A No.
9 Q Have you reviewed any of Samsung's
10 responses to Netlist's written discovery requests
11 in the ITC cases?
12 A No.
13 Q How did you come to be involved in this
14 PGR?
15 A Maybe four and a half years ago I
16 started working with Baker Botts on other Netlist
17 PTAB actions with other patents in the portfolio,
18 including, I believe, two of the parents of the
19 '087. And I have been periodically working with
20 them with respect to this portfolio since that
21 time.
22 Q And when did you come to be involved in

1 this specific PGR that we are here to talk about
2 today?
3 A Somewhere around the time the Notice of
4 Allowance was issued.
5 Q When you say "the Notice of Allowance,"
6 you mean the Notice of Allowance of the patent?
7 A Yes.
8 Q And let me just clarify. When you say
9 "Notice of Allowance," you meant the Notice of
10 Allowance of the '087 patent?
11 A Yes, or at least when Samsung became
12 aware of it.
13 Q And the Notice of Allowance, that's a
14 communication from the Patent Office during
15 prosecution indicating that claims have been
16 allowed; is that correct?
17 A Yes. And again, I don't know the entire
18 procedure, but at whatever point that became
19 public.
20 Q I see. Did you sign an engagement
21 letter to serve as an expert in this matter?
22 A I don't recall.

1 Q You don't recall if you have an
2 engagement agreement to represent Samsung?
3 A For this particular matter? I mean at
4 some point at the beginning I signed an engagement
5 letter, but I don't recall whether or not there
6 was an additional letter for this particular
7 matter.
8 Q So you do have an engagement letter that
9 covers your participation in this matter?
10 A I believe so, but again, I don't recall
11 which one.
12 Q Is the engagement letter with Baker
13 Botts?
14 A I'd have to look at the language.
15 Q You don't know who the engagement letter
16 is with, between you and who else?
17 A I received it from Baker Botts and I
18 returned it to Baker Botts, but I don't remember
19 how it was phrased in terms of who was engaging
20 me.
21 Q Are any Samsung entities listed in that
22 engagement letter?

1 A I don't recall.
2 Q Do you have a copy of that engagement
3 letter?
4 A It would be on my computer somewhere.
5 MR. BEMBEN: Mr. Chandler, we would like
6 to request a copy of Dr. Wolfe's engagement
7 letter.
8 MR. CHANDLER: I believe you would have
9 to file a motion for additional discovery.
10 MR. BEMBEN: So you're saying that
11 you're unwilling to produce his engagement letter?
12 MR. CHANDLER: No, I'm not saying that.
13 MR. BEMBEN: So then you will produce
14 the engagement letter that we just discussed
15 today?
16 MR. CHANDLER: As I said, I believe the
17 process is you would be required to file a motion
18 for additional discovery.
19 MR. BEMBEN: So without a motion for
20 additional discovery you're unwilling to produce
21 Dr. Wolfe's engagement letter for this matter?
22 MR. CHANDLER: I don't believe that this

1 is the subject of Dr. Wolfe's deposition.
2 MR. BEMBEN: Well, he just talked about
3 a document that is relevant to this matter and we
4 don't have a copy of it, and so I'd asked you to
5 produce a copy of it.
6 MR. CHANDLER: I have responded to your
7 request.
8 MR. BEMBEN: And I'm just asking, so
9 without being compelled through additional
10 discovery process, you are unwilling to produce
11 Dr. Wolfe's engagement letter; is that correct?
12 MR. CHANDLER: That's not correct. I'd
13 have to think about it.
14 MR. BEMBEN: Okay. So we can talk about
15 this later, then?
16 MR. CHANDLER: Sure.
17 MR. BEMBEN: You're willing to consider
18 producing the document?
19 MR. CHANDLER: I'm willing to consider
20 any reasonable request.
21 MR. BEMBEN: Okay.
22

1 BY MR. BEMBEN:
2 Q Dr. Wolfe, getting back to you, how many
3 IPRs and PGRs have you served as an expert in?
4 A I haven't counted, but recently an
5 attorney told me it was about 130.
6 Q Does that sound about right to you?
7 A It could be. Sometimes I'll think of
8 something as being a single matter but there's
9 actually multiple proceedings involved, so I don't
10 always count the same way they do. But apparently
11 they have some type of an online tool that can
12 list them all.
13 Q I see. Okay. And how long have you
14 been serving as an expert in PTAB proceedings?
15 A I believe since very shortly after PTAB
16 proceedings began.
17 Q Okay. So that was in the 2013 time
18 frame; is that correct? Sound right?
19 A That's probably right, I don't exactly
20 recall.
21 Q So for about the last 12 or 13 years
22 you've been serving as an expert in PTAB

1 proceedings?
2 A That's likely.
3 Q Do you serve as an expert in any other
4 type of proceedings, patent proceedings?
5 A Sure. Over the years I have been an
6 expert in District Court proceedings. I've been
7 an expert in ITC proceedings. I have been an
8 expert in EPO proceedings. And I think once I did
9 the new court in Europe. It's called the UPC; is
10 that what it's called?
11 Q Yeah, that's right. Good memory.
12 And when was the last time that you were
13 an expert in a matter that was not a PTAB
14 proceeding; do you recall?
15 A So I'm going through some challenging
16 health issues right now. I had a District Court
17 case scheduled last week that they've had to find
18 a replacement expert for.
19 Q I'm sorry to hear that.
20 So my question was just when was the
21 last time that you were an expert in a matter that
22 wasn't a PTAB proceeding.

1 A I'm trying to remember when I started
2 shutting things down.
3 I think I probably filed my last expert
4 report four to six weeks ago.
5 Q I see. I'm sorry. I didn't understand
6 your answer. I understand.
7 Let's talk about your preparation for
8 this deposition. Did you prepare for this
9 deposition?
10 A Yes.
11 Q What did you do?
12 A Well, in addition to preparing the
13 report and all the previous work I had done with
14 the references and with the parent patents, I
15 reviewed the documents and I met online with
16 counsel twice.
17 Q When you say "the parent patents," are
18 you referring to what I believe you've listed as
19 the '060 and the '160 patents in your declaration?
20 A Yes.
21 Q So you mentioned that you met with
22 counsel twice. How long did you meet with counsel

1 on those two times?
2 A Five, six hours altogether.
3 Q When you say "counsel," who did you meet
4 with?
5 A Mr. Chandler and Dr. Pazmandi.
6 Q Did you meet with anyone else?
7 A No.
8 Q Did you meet with anyone from Samsung?
9 A Not on this matter, no.
10 Q Did you review any materials that are
11 outside the record of this matter?
12 A No.
13 Q Okay. Since we've been talking about
14 it, why don't I officially introduce into the
15 record Exhibit 1001. This is U.S. Patent
16 12,308,087.
17 (Exhibit 1001 was previously marked for
18 identification and is attached to the transcript.)
19 Q Dr. Wolfe, you have a copy of the '087
20 patent?
21 A I do.
22 Q Okay. Are you familiar with the '087

1 patent?
2 A Yes.
3 Q Have you read it?
4 A Yes.
5 Q You read the claims?
6 A Yes. It took a while, but yes.
7 Q Do you understand the claims?
8 A As best as I could. As I have explained
9 in my report, there are some issues with claims 24
10 through 26 that make them very difficult to
11 understand.
12 Q You also mentioned that you have a copy
13 of your declaration which has been previously
14 marked as Exhibit 1003, I believe, in this
15 proceeding; is that correct?
16 A Correct.
17 (Exhibit 1003 was previously marked for
18 identification and is attached to the transcript.)
19 A And now is probably a good time to note
20 that somewhere in production the first three pages
21 were marked as Exhibit 1001, but the remaining
22 pages are marked 1003.

1 Q I just noticed that.
2 Okay. And so you have -- you're
3 obviously familiar with this document?
4 A I am.
5 Q This is your declaration in this matter?
6 A It is.
7 Q Okay. And if we go to the, it's not the
8 last page, but page 222?
9 Is that your signature on page 222?
10 A Yes.
11 Q Have you noticed any errors in your
12 declaration that you would like to correct before
13 we get into reviewing it?
14 A So far I have not.
15 Q Did you write your declaration?
16 A I prepared it. That involved me
17 developing the opinions, reviewing all the
18 materials, and then in some cases I wrote text, in
19 other cases I discussed it with counsel and they
20 prepared a first draft of the text and I edited
21 it.
22 Q How long did you spend preparing the

1 declaration?
2 A I don't recall.
3 Q Was it less than 10 hours?
4 A I don't think so, but I don't recall.
5 Q You don't have any concept of how long
6 it took you to prepare the declaration?
7 A Not really. And again, it's been 10
8 months or so.
9 Q Okay. So with respect to obviousness,
10 you presented two grounds of obviousness, right?
11 Grounds 3 and 4, I believe. And Ground 3 is the
12 combination of Keith and Shaeffer, correct?
13 A Let me find that.
14 That is correct.
15 Q And just for the record, Keith is
16 Exhibit -- I'd like to introduce Exhibit 1047.
17 It's been previously marked. It is
18 U.S. 9,123,552. This is what I refer to as the
19 Keith reference.
20 (Exhibit 1047 was previously marked for
21 identification and is attached to the transcript.)
22 Q Dr. Wolfe, are you familiar with this?

A I am.
Q Okay. Did you review the Keith reference?
A Yes.
Q You read it and you understand it?
A I did.
Q Let me introduce the other references as well. So Exhibit -- I'd like to introduce Exhibit 1048. This has been previously marked. It is U.S. 9,665,507. This is what we've been referring to as Shaeffer, S-H-A-E-F-F-E-R.
A Yes.
(Exhibit 1048 was previously marked for identification and is attached to the transcript.)
Q Are you familiar with the document, Dr. Wolfe?
A Yes.
Q Have you read it?
A I have.
Q Do you understand it?
A I do.
Q And let me just introduce the final

1 piece of prior art in your grounds. I'd like to
2 introduce Exhibit 1018. This has been previously
3 marked. It is U.S. Patent Publication No.
4 2010/0195364. This is what we've been referring
5 to as Riho 2.
6 (Exhibit 1018 was previously marked for
7 identification and is attached to the transcript.)
8 Q Are you familiar with this document,
9 Dr. Wolfe?
10 A I am.
11 Q Have you read it?
12 A I have.
13 Q Okay. And you understand it?
14 A I do.
15 Q Okay. So the three pieces of art that
16 you rely on the grounds are in the record, as well
17 as your declaration and the patent.
18 You can set those aside and go back to
19 your declaration if you'd like. And my question
20 was just Ground 3 is based on Keith and Shaeffer;
21 is that correct?
22 A It is.

1 Q And Ground 4 is based on the combination
2 of Keith, Shaeffer and Riho 2, correct?
3 A Correct.
4 Q Did you select the references that you
5 used in Grounds 3 and 4?
6 A I made the final determination of what
7 references to use for each ground.
8 Q Who provided the references to you?
9 A I think counsel and I both assembled a
10 larger set of references and then we worked
11 together to select which ones to focus on from
12 within that set.
13 Q When you say "counsel," who are you
14 referring to?
15 A My communications were through
16 Mr. Chandler.
17 Q And who did you work with in preparing
18 your declaration?
19 A Mr. Chandler and Dr. Pazmandi.
20 Q Did you work with anyone else?
21 A No.
22 Q Let me go to paragraph 203 of your

1 declaration. It's on page 113.
2 A Okay.
3 Q So my question is why didn't you address
4 all of the claim elements in your declaration?
5 A Why didn't I?
6 Q Yes.
7 A In consultation with counsel, we felt
8 that some claim elements would be clear to the
9 PTAB without needing additional expert testimony.
10 Q And again, when you say "counsel," do
11 you mean Mr. Chandler and Dr. Pazmandi?
12 A Yes.
13 Q Is it your typical practice in preparing
14 a declaration for a PTAB proceeding not to address
15 all of the claim elements when you're working on
16 the petitioner side?
17 MR. CHANDLER: Objection. Form.
18 A I don't know that I've ever worked on a
19 claim this long before, but it varies. I would
20 say most of the time I'll address every claim
21 element, but sometimes I'm asked to opine on a
22 narrower set.

1 Q Did you choose the elements that you
2 would address in your declaration?
3 A I made the final decision, but it was in
4 consultation with counsel.
5 Q And again, how did you choose which
6 elements that you would address?
7 A The elements where I felt that expert
8 opinion would be helpful to the PTAB.
9 Q I asked you a similar question last week
10 when I deposed you, and I'm just trying to
11 understand the difference between Grounds 3 and 4.
12 So in your view, what does Riho 2, the reference
13 Riho 2 add that Keith and Shaeffer do not teach?
14 A It provides some --
15 MR. CHANDLER: Objection. Objection.
16 Form.
17 A It provides some additional detail in
18 how to design the circuits for driving signals.
19 In particular how to size drivers and how to
20 select the detailed structure of the driver with
21 respect to the load that would be on each of the
22 lines.

1 Q Okay. And when we're talking about
2 driver size, that's recited in claim 4 of the '087
3 patent; is that right?
4 A It is. But the driving of signals is
5 also in the independent claims, and therefore
6 there is some additional detail with respect to
7 exemplary ways to drive signals that might be
8 helpful.
9 Q Okay. But Riho 2 primarily is being
10 used to talk about driving signals and driver
11 size; is that correct?
12 MR. CHANDLER: Objection. Form.
13 A That's the primary additional teaching
14 in Riho above and beyond the other two references.
15 Q In Ground 4, this is the ground with
16 Riho 2, do you rely on Riho 2 to address any of
17 the claim elements of claim 1?
18 MR. CHANDLER: Objection. Form.
19 A In part. So for example, on page 120, I
20 show that Riho 2 corroborates the evidence that I
21 found in the other references.
22 Q So that's with respect to what Samsung

1 labeled limitation 1(c)(1), correct?
2 A In that case, yes.
3 Q Were there any other elements in claim 1
4 that you relied on Riho 2 for?
5 MR. CHANDLER: Objection. Form.
6 A I don't know if I can find them all
7 sitting right here, but they -- I also looked to
8 Riho for 1(e)(2) where it also corroborates the
9 other evidence.
10 Also for 1(j).
11 Those are the ones in claim 1 that I see
12 right now looking at it.
13 Q Can you go to paragraph 103 of your
14 declaration?
15 A Sure.
16 Q It's on page 48.
17 A Okay.
18 Q And so it's your opinion that the '087
19 patent refers to various possibilities that could
20 be combined in over a hundred million different
21 ways; is that right?
22 A That's an approximation, yes.

1 Q And so if we go to, for example, your
2 chart starting on page 48.
3 A Yes.
4 Q Go to A, the first row. You list that
5 the '087 patent describes six possibilities of
6 array dies. You see that?
7 (Court Reporter clarification.)
8 A Yeah, there are at least six because one
9 of them is open-ended.
10 Q Aren't these just alternatives that a
11 person of skill in the art would have been
12 familiar with?
13 MR. CHANDLER: Objection. Form.
14 A It depends what you mean by
15 "alternatives". They are different kinds of
16 memory but they all operate in very different
17 ways.
18 So there's not really any teaching in
19 the specification to show how each of those could
20 be used to implement a solution. And, you know,
21 as I testify elsewhere, I don't think there's any
22 teaching anywhere for a combination of structures,

1 features, teachings that actually show possession
2 of the claims.
3 Q Okay. Earlier you testified, I believe,
4 that you've been in over 130 PTAB proceedings,
5 right?
6 A Yes.
7 Q So you must have read a lot of patents;
8 is that right?
9 A I have read a lot of patents.
10 Q In your experience is it common for a
11 patentee to describe a variety of alternatives for
12 a given feature in their patent application?
13 A It can be, but one needs to dig much
14 deeper to figure out whether or not they were
15 described in a way that they can be claimed or in
16 a way that they are claimed.
17 Q And what are you basing that opinion on?
18 MR. CHANDLER: Objection. Form.
19 A My understanding of various
20 specifications from the perspective of a person of
21 ordinary skill in the art.
22 Q No, I just mean what are you basing the

1 opinion on that you need to dig much deeper to
2 figure out if it's described in a way that can be
3 claimed?
4 A So one needs to describe an invention to
5 be able to claim it, not just have a list of
6 components. So one would have to under -- if
7 there's a list of components, one would have to
8 understand it in context to see if it's part of a
9 description of an invention or if it's not.
10 Q Would a person of skill in the art have
11 been familiar with each of the identified types of
12 arrays in A of your table?
13 MR. CHANDLER: Objection. Form.
14 A You know, I used the phrase "type of
15 array dies" there, but they're really categories
16 of array dies. So I think a person of ordinary
17 skill in the art would have been aware of examples
18 in each category, but there would be many
19 different kinds of products within each category.
20 Q So would a person of skill in the art
21 have been familiar with DDR DRAM?
22 A At least some types, yes.

1 Q Would a person of skill in the art have
2 been familiar with SDRAM?
3 A At least some types, yes.
4 Q Would a person of skill in the art have
5 been familiar with flash?
6 A At least some types, yes.
7 Q Would a person of skill in the art have
8 been familiar with SRAM?
9 A At least some types, yes.
10 Q Would a person of skill in the art have
11 been familiar with GDDR SDRAM?
12 A At least some types, yes.
13 Q And would a person of skill in the art
14 have been familiar with graphics memory?
15 A Possibly.
16 Q Let's go to row B. Would a person of
17 skill in the art have been familiar with the types
18 of interconnects that are listed in the patent?
19 A In a general sense, yes.
20 Q What do you mean by "in a general
21 sense"?
22 A Well, there are lots of kinds of

1 conducting traces. I don't know that a person of
2 ordinary skill in the art would have known about
3 all of them, but they would have known about at
4 least some type.
5 Q So a person of skill in the art would
6 have been familiar with wire?
7 A Yes.
8 Q A person of skill in the art would have
9 been familiar with conducting rod?
10 A Of at least some types, yes.
11 Q A person of skill in the art would have
12 been familiar with conducting trace?
13 A Of at least some types, yes.
14 Q A person of skill in the art would have
15 been familiar with VIAs?
16 A In at least some contexts, yes.
17 Q And a person of skill in the art would
18 have been familiar with through-silicon VIAs, or
19 TSVs?
20 A TSVs, yes, in at least some types, yes.
21 Q Okay. If we move to row C where you say
22 subsets of dies, at least two possibilities.

1 So you have 1, two subsets which is
2 figure 2, or 2, six subsets, figure 3. Do you see
3 that?
4 A Yes.
5 Q Would a person of skill in the art have
6 been familiar with how to select an appropriate
7 number of subsets of dies to suit a desired
8 application?
9 MR. CHANDLER: Objection. Form.
10 A That would depend on the details of the
11 situation.
12 Q Okay. Would a person of skill in the
13 art have been familiar with two subsets of dies?
14 A Under certain circumstances, yes.
15 Q Which circumstances?
16 A There are lots of different
17 circumstances where that might be a good solution.
18 It depends on what the problem is and what the
19 analysis is and what the objectives are.
20 Q And would a person of ordinary skill in
21 the art been able to analyze the problem in order
22 to achieve the objective?

1 A For some problems, yes. For other
2 problems, no. Otherwise there wouldn't really be
3 any room for invention.
4 Q Like the invention of the '087 patent?
5 MR. CHANDLER: Objection. Form.
6 A Well, as I've said in my declaration, I
7 think that the alleged invention, the '087 patent,
8 is obvious in light of the prior art.
9 Q Would a person of skill in the art have
10 been familiar with six subsets of array dies?
11 A As a concept? Yes.
12 Q Let's go to page 49 and look at D
13 column, or row D. Here you list that the
14 specification lists six signals. Do you see that?
15 A Or six categories of signals, yes.
16 Q Okay. What's the difference -- okay, I
17 see.
18 Are these six signals common signals in
19 memory applications?
20 A Yes.
21 Q And then if we go to page 50, element
22 E -- or not element E, I'm sorry, row E where it

1 says bidirectional, unidirectional interconnects/
2 conduits. Do you see that?
3 A Yes.
4 Q Okay. So the signals that are listed in
5 row D, aren't those related to the conduits that
6 they travel on in row E?
7 MR. CHANDLER: Objection. Form.
8 A It depends what you mean by "related
9 to." I mean in this particular patent, the
10 purpose of the recited interconnects and conduits
11 is to carry signals of the types that are listed
12 in D, but in a variety of different ways.
13 Q Do you see on the column to the right on
14 page 50 where you have a number of times first
15 signals not disclosed?
16 A Yes.
17 Q You see you have second signals not
18 disclosed?
19 A Yes. And again, it's not that just
20 those two words are not disclosed, but those two
21 words in the context of where I've listed them in
22 the claim are not disclosed.

1 Q And when you say "not disclosed," you
2 mean not disclosed in the prior art, or in the
3 '087 patent?
4 A They're not described in the '087 patent
5 as part of an invention.
6 Q I see. And what is your understanding
7 of "first" and "second" as they're being used here
8 for a signal?
9 MR. CHANDLER: Objection. Form.
10 A It's context-dependent. Let me just go
11 back and look at it.
12 In some cases I believe they are two
13 subsequent transactions.
14 Q What do you mean by "two subsequent
15 transactions"?
16 A I would have to look at the claims in
17 detail, but something like, for example, a read
18 followed by a write.
19 Q When the patent uses "first signal" and
20 "second signal," do you, is it your opinion that
21 the type of signal is different because the patent
22 is using "first" and "second"?

1 MR. CHANDLER: Objection. Form.
2 A We'll have to look at a specific
3 instance where the patent is using that, but I
4 don't think they're necessarily different. The
5 context may show that they're different types, but
6 I don't think the words "first" and "second" mean
7 that they're different types, it means they're
8 different signals.
9 Q Go to paragraph 104, page 52.
10 A Okay.
11 Q Now, here again you contend that the
12 patent provides over a hundred million possible
13 combinations of features, correct?
14 A It depends what you mean by "provides."
15 I certainly don't think it describes a hundred
16 million configurations of features. I think it
17 just lists features in such a way that one could
18 speculate as to a hundred million combinations,
19 the vast majority of which are not actually taught
20 as complete combinations in the specification.
21 Q But when you say "features" in paragraph
22 104, you're referring to, for example, the types

1 of interconnects that are in column -- I'm sorry,
2 row B of your table; is that right?
3 MR. CHANDLER: Objection.
4 A For example.
5 Q Okay. And so it's your opinion that
6 wire, conducting rod, conducting trace, VIAs and
7 through-silicon VIAs are different features?
8 A The way that I use that term in
9 paragraph 104, yes.
10 Again, there are just a bunch of places
11 in the patent where it says you can do this or
12 this or this or this without describing how you
13 would choose between them, without talking about
14 how they would impact the rest of your design
15 decisions, without combining them with the rest of
16 the concepts in the specification in a way that
17 shows possession of an invention.
18 Q And so in row D of your chart on page
19 49, the six signals that you have listed there you
20 consider those to be different features in
21 paragraph 104 as well; is that right?
22 A No, in E I think it's a question of

1 which signals are unidirectional, which are
2 bidirectional, which are -- what direction they go
3 in, which are communicated on bidirectional
4 interconnects, which are communicated on
5 unidirectional interconnects, and then
6 specifically recited unidirectional interconnects.
7 So all those different combinations of the
8 features. Because in order to understand what's
9 being communicated in the spec, a person of
10 ordinary skill in the art would have to understand
11 which of those combinations are actually being
12 communicated as opposed to making the reader come
13 up with that themselves.
14 Q What about row D, are the six signals in
15 row D different features of the invention?
16 A I'm sorry, I thought that was the last
17 question.
18 Q That was the last question, but you
19 talked about row E.
20 A Okay. So just the six signals?
21 Q Yes.
22 A So in E, as I said, I'm analyzing the

1 way the signals are communicated as the variety of
2 features as opposed to just the, just the signals
3 themselves.
4 Q So in row D, like dog, there are six
5 signals that you listed?
6 A Yes.
7 Q Okay. Are those six signals different
8 features of the invention?
9 A Generally, although again there may be
10 variations within those as well.
11 Q Can you turn to the '087 patent?
12 A Sure.
13 Q Can you review column 9, line 67 through
14 column 10, line 8.
15 A (Complying.)
16 Okay.
17 Q Does the column 9, line 67 through
18 column 10, line 8 confirm that the features
19 described with respect to figure 2 of the patent
20 are also applicable to the memory package 300 of
21 figure 3?
22 A It says they may be.

1 Q And so what do you interpret that to
2 mean?
3 A It's not very informative but I think it
4 just gives some context to the reader in
5 understanding figure 3.
6 Q And so is it your opinion that the
7 features described with respect to figure 2 may be
8 applicable to the memory package 300 of figure 3
9 of the '087 patent?
10 A It does say that in the specification.
11 Q And what does that mean to you?
12 A As I said, it's not very informative.
13 It doesn't tell me which features or how they're
14 connected. But it does give me some context that
15 if I didn't understand portions of figure 3 it
16 would be helpful perhaps to look to figure 2 to
17 help understand it.
18 Q When the patent says the features
19 described with respect to figure 2, do you
20 interpret that to mean all of the features
21 described with respect to figure 2?
22 A Well, since it's permissive language I

1 think it may be all of them or it may not be all
2 of them.
3 Yeah, actually it's clearer than that.
4 It says some or all of them, embodiments.
5 Q So all of the features of figure 2 could
6 be used with respect to figure 3, correct?
7 A They could be. It doesn't quite say
8 how.
9 Q Can you go column 15, lines 7 through 20
10 and review them.
11 A (Complying.)
12 Okay.
13 Q Does the disclosure in column 15, lines
14 7 through 20 confirm that the driver structure of
15 figure 4 can be used in the memory packages of
16 figures 2 and 3 of the '087 patent?
17 A I think it says it could be but it
18 really doesn't say how.
19 Q Can you go to column 21 and review lines
20 7 through 13.
21 A (Complying.)
22 Okay.

1 Q Does column 21, line 7 through 13 of the
2 '087 patent confirm that the control dies 822 in
3 figure 8 can be implemented as control dies 230 or
4 330 of figures 2 and 3?
5 A I don't see that. It says it can
6 include some or all of the embodiments described
7 with respect to those control dies.
8 Q So is it your understanding that control
9 dies 822 can include some or all of the
10 embodiments described with respect to control dies
11 230 of figure 2?
12 A It does say that. It doesn't say which
13 ones or how, but it does say that.
14 Q And is it your understanding that
15 control dies 822 can include some or all of the
16 embodiments described above with respect to
17 control dies 330 of figure 3?
18 A Yes. Again, it doesn't say which ones,
19 and it doesn't say how, but it does say that it
20 can include some or all.
21 Q Let's turn back to your declaration, and
22 let's go to paragraph 137, please.

1 A (Complying.)
2 Q And that begins on page 70.
3 A Okay.
4 Q So here in paragraph 137 you describe a
5 fork in the road configuration. Do you see that?
6 A Yes.
7 Q And you explain that -- and this is, I
8 believe, on page 72 of your declaration. You
9 explained that only one of the read drivers and
10 one corresponding chip can be selected to drive
11 read data at a time to the output terminal 402.
12 Do you see that?
13 A In the figure 4 embodiment, yes.
14 Q Okay, yeah. And this is described in
15 figure 4 of the '087 patent, correct?
16 A Yes.
17 Q And my question to you is, is the same
18 true in the write direction?
19 MR. CHANDLER: Objection. Form.
20 A I'm not sure I understand the question.
21 This is -- the question is can 404A and 404B both
22 drive signal at the same time?

1 I mean 408A and 408B wouldn't drive
2 signal in the write direction.
3 Q Okay, and let me rephrase. So in the
4 write direction --
5 MR. CHANDLER: Objection as vague. I
6 assume when you're saying write, it's W-R-I-T-E?
7 Is that -- it's vague. I object as vague so far,
8 but I apologize. Hopefully you'll clarify it. As
9 opposed to left versus right.
10 MR. BEMBEN: Okay. Thank you for that.
11 Q Going back to be your declaration, Dr.
12 Wolfe, when we're talking about, page 72 we talk
13 about read driver. And so what are the, what are
14 the read drivers in figure 4?
15 A The data drivers are 408A and 408B.
16 Q And so in paragraph 137, but on page 72
17 you state, only one read driver and one
18 corresponding chip can be selected to drive read
19 data at a time to the output terminal 402. Do you
20 see that?
21 A Yes.
22 Q And so I want to ask you about the write

1 direction. When I say write, I mean W-R-I-T-E,
2 okay?
3 A Yes.
4 Q Okay. And so in figure 4 what are the
5 write drivers?
6 A 404A and 404B.
7 Q Okay. And so my question is, can only
8 one write driver and one corresponding chip be
9 selected to drive the write data from the input
10 terminal 402?
11 MR. CHANDLER: Objection. Form.
12 A Can they be? I don't recall. It's not
13 really the subject of this opinion.
14 In respect -- well, it does say here,
15 yeah, that 404A and 404B can drive the signal to
16 the array die corresponding to the chip select
17 signal and not to array dies that do not
18 correspond to a chip select signal, citing
19 Exhibit 1001, starting at 1537.
20 Q Sorry, where are you looking?
21 A I'm looking at the bottom of page 71 of
22 my report.

1 Q Okay. So the write drivers are 404A and
2 404B; is that correct?
3 A Yes.
4 Q So in the write direction in figure 4,
5 write data would arrive at 402; is that correct?
6 A Under some circumstances.
7 Q In a write operation, write data would
8 arrive at 402; is that correct?
9 A At certain times under some
10 circumstances.
11 Q Okay. And it would be driven by 404A or
12 404B; is that correct?
13 A In response to a chip select signal, one
14 of those would drive, yes.
15 Q And my question to you is, does 404A and
16 404B -- strike that.
17 My question is, 404A and 404B, can they
18 operate at the same time?
19 MR. CHANDLER: Objection. Form.
20 A We're not taught that they can. We're
21 only taught about the implementations where they,
22 only one of them operates. But there are other

1 potential implementations.
2 Q Your understanding of figure 4 -- okay,
3 so if we look at page 72, kind of halfway through
4 you say, furthermore in figure 4, which has the
5 fork in the road configuration, a POSITA would
6 understand that a chip select signal is needed
7 during read operations, open paren, i.e., going
8 down, closed paren, because the read drivers, open
9 paren, 408A and 408B, closed paren, share the same
10 output terminal, open paren, 402, closed paren,
11 meaning only one read driver and one corresponding
12 chip can be selected to drive read data at a time
13 to the output terminal 402. Do you see that?
14 A I do.
15 Q So in the read direction, correct me if
16 I'm wrong, but I believe you're saying that only
17 one of the read drivers, 408A or 408B, can be
18 selected at any time; is that correct?
19 A Based on what's illustrated.
20 Q Okay. And in the write direction, can
21 only one of the write drivers, 408A and 408B, be
22 selected at a given time?

1 MR. CHANDLER: Objection. Form.
2 A That's the only mode of operation that's
3 taught. There could be untaught or unillustrated
4 structure that would enable some other mode of
5 operation.
6 Q But I'm asking based on the '087 patent
7 and figure 4 of the '087 patent, is it your
8 understanding that only one of the write drivers,
9 408A or 408B, would be driven at any given time?
10 MR. CHANDLER: Objection. Form.
11 A That's the only implementation that is
12 explicitly taught.
13 Q And is that your understanding of how
14 figure 4 works for the write direction?
15 A That's what's taught in column 15.
16 Q Do you have any other understanding than
17 what's taught in column 15 of how figure 4 works
18 in the write direction?
19 A I'm not sure what you mean by "works",
20 but that's the way it's taught to work.
21 Q Well, you just said "works," so what did
22 you mean by "work"?

1 A Hypothetically somebody could add
2 additional untaught structure or untaught
3 operational features to figure 4 and get it to
4 work in a different way, but that's not taught in
5 the specification.
6 Q So in the context of the '087 patent,
7 the write drivers, 404A and 404B, of figure 4,
8 they only operate one at a time; is that correct?
9 MR. CHANDLER: Objection. Form.
10 A That's the only mode of operation that's
11 taught.
12 Q And is that what a person of ordinary
13 skill in the art would have understood from the
14 '087 patent?
15 A That's what a person of ordinary skill
16 in the art would have understood to be taught in
17 the '087 patent.
18 Q Based on what's taught in the '087
19 patent, would a person of ordinary skill in the
20 art have understood that the write drivers, 404A
21 and 404B, of figure 4 could be operated at the
22 same time?

1 A There is no teaching in the '087 patent
2 that 404A and 404B can be operated so that they're
3 turned on at the same time.
4 Q We've been going for about an hour.
5 Would you like to take a break?
6 A We can take a break.
7 Q Would you like five or 10 minutes?
8 A Five is fine for me.
9 MR. BEMBEN: Off the record, and we'll
10 come back at 12:08, or 9:08.
11 (A recess was taken at 12:03 p.m.)
12 (Back on the record at 12:12 p.m.)
13 BY MR. BEMBEN:
14 Q Dr. Wolfe, can you go paragraph 122 of
15 your declaration?
16 A Sure.
17 Q Are you there?
18 A Yep.
19 Q Do you see where you say that the claims
20 24 through 28 have nonsensical requirements?
21 A I do.
22 Q What did you mean by "nonsensical

1 requirements"?
2 A That if they are read as written a
3 person of ordinary skill in the art couldn't
4 understand what structure is being claimed.
5 Q Would a person of ordinary skill in the
6 art have understood looking at claim 24 that there
7 were some mistakes, some typos?
8 MR. CHANDLER: Objection. Form.
9 A It's not clear. I think they would have
10 understood that what was there doesn't make any
11 sense, but I'm not sure that they would have
12 understood that -- when I think of a typo, I think
13 normally I would think that there was something
14 where I could understand it anyway. This would
15 not fall in that category. It simply describes
16 signals being connected in a way that don't make
17 any sense.
18 Q Did you review the prosecution history
19 of claim 24?
20 A I did.
21 Q Do you think that the prosecution
22 history would inform a person of skill in the art

1 what was meant by claim 24?
2 A I don't recall.
3 Q Can you go paragraph 38 of your
4 declaration.
5 MR. CHANDLER: What page, if you have
6 it?
7 THE WITNESS: 19.
8 MR. CHANDLER: Got it.
9 MR. BEMBEN: 19.
10 Q What date does your declaration consider
11 when determining the level of skill of a person of
12 skill in the art?
13 A Initially 2010, but I also say that it
14 would not be different if it were 2011. So there
15 are two dates on the face of the patent. Let me
16 grab them. November 3rd, 2010, and November 3rd,
17 2011. So those are the two dates that I
18 considered and I didn't see a meaningful
19 distinction between them.
20 Q I'm going to flip over to the '087
21 patent real quick.
22 The '087 patent was filed on March 14,

1 2022. Do you see that?
2 A Correct, as a continuation of prior
3 patents.
4 Q In your declaration do you discuss the
5 level of skill in the art as of the '087 patent's
6 filing date on March 14th, 2022?
7 A No. My understanding is that I should
8 consider it the time of the priority date.
9 Q Would a person of skill in the art in
10 March 2022 have had more, or less skill than a
11 person of skill in the art in the 2010 time frame?
12 A With respect to this art, I don't think
13 it would have been more or less. They might have
14 had knowledge of intervening improvements in
15 technology, and they might have had knowledge of
16 intervening changes in terminology, but I don't
17 think that would have impacted the way they would
18 have understood something that had been written in
19 2010 and 2011.
20 Q In the industry between 2010 and 2022
21 were there significant changes and improvements in
22 this technology?

1 A In the technology that's described in
2 the '087 patent?
3 Q In the field of the invention.
4 A In the field of memory dies, yes, there
5 were improvements beyond what was described in the
6 '087 patent.
7 Q Were there significant improvements
8 between 2010 and 2022 in the field of this
9 invention?
10 A In the field of the invention, yes.
11 Q And would a person of skill in the art
12 have been familiar with those significant
13 improvements?
14 MR. CHANDLER: Objection to form.
15 A What person of ordinary skill in the
16 art?
17 Q Fair question. Would a person of skill
18 in the art in 2022 have been familiar with those
19 significant improvements?
20 A I'm still not sure I'm parsing that. I
21 mean a person of ordinary skill in the art with
22 respect to this patent I don't think would have

1 been any different in 2022. But generally a
2 person of skill in the art in memory technology in
3 2022 would have been familiar with those
4 improvements.
5 Q So you made a distinction there between
6 a person of skill in the art of this patent and a
7 person of skill in the art of memory technology.
8 What is the difference to you?
9 A So again, you're pushing beyond my legal
10 knowledge here, but my understanding is that when
11 we talk about a person of ordinary skill in the
12 art with respect to a patent, we're talking about
13 that person's perspective at the time the patent
14 was written.
15 Q I see. Can we go to the '087 patent,
16 turn back to the '087 patent.
17 A Sure.
18 Q And let's look at the claims, starting
19 with claim 1.
20 A (Complying.)
21 Okay.
22 Q And if you go to column 23, line 52

1 through 54.
2 A (Reviewing.)
3 We might be lining the columns up
4 differently.
5 Q Hold on a second here.
6 A 52 is where the "wherein" clause starts?
7 Q Yeah. Let me just read it to you.
8 The one I'm looking at, can you review?
9 It says, wherein, claim 1 says, wherein the DRAM
10 package is configured to receive CA signals via
11 the CA terminals. Do you see that?
12 A Yes.
13 Q What would a person of skill in the art
14 have understood "transmits the CA signals to the
15 DRAM package"?
16 MR. CHANDLER: Objection. Form.
17 A I'm sorry, I don't see that in the
18 language. Can you point me to it again?
19 Q I'm looking at the "wherein the DRAM
20 package is configured to receive CA signals via
21 the CA terminals."
22 A Yes.

1 Q My question just said what sends the CA
2 signals to the DRAM package?
3 A It's not specified in this part of the
4 claim.
5 Q What would a person of ordinary skill in
6 the art have understood it "transmits the CA
7 signals to the DRAM package"?
8 A Something outside of the claim
9 structure.
10 Q Okay. And could that be a memory
11 controller?
12 A Could be.
13 Q Could it be a processor?
14 A Could be generally through a memory
15 controller, but yes.
16 Q Let's go to column 24. The very last
17 limitation starting at line 62, the "wherein the
18 die interconnects include first unidirectional
19 interconnects configured to conduct signals from
20 one or more DRAM dies of the stacked DRAM dies to
21 the control die and not configured to conduct any
22 signal from the control die to any of the stacked

1 DRAM dies." Do you see that?
2 A I do.
3 Q And there is another limitation on the
4 next page. The very next limitation is for the
5 second unidirectional interconnects. Do you see
6 that?
7 A Yes.
8 Q Did you provide a claim construction of
9 the claim term "unidirectional interconnect" in
10 your declaration?
11 A I will check. I don't recall doing so.
12 I don't believe -- I applied ordinary
13 meaning.
14 Q What would a person of skill in the art
15 have understood the claim "unidirectional
16 interconnect" to mean?
17 A In the context of this claim, it would
18 be an interconnect that is only capable of
19 communicating signals in one direction and not the
20 other.
21 Q You did not include that opinion in your
22 declaration, did you?

1 MR. CHANDLER: Objection. Form.
2 A I think I applied it that way, its plain
3 meaning.
4 Q You didn't provide that opinion in your
5 declaration, did you?
6 A I don't recall. Again, I think that's
7 the way I applied it.
8 Q Well, did you state that a
9 unidirectional interconnect is an interconnect
10 that is only capable of communicating signals in
11 one direction and not the other?
12 A I don't recall.
13 Q An interconnect can be a wire, correct?
14 A It can be a wire.
15 Q Can you explain to me how an
16 interconnect could be incapable of conducting
17 signals in more than one direction?
18 A Well, the very idea that the terms
19 "bidirectional interconnect" and "unidirectional
20 interconnect" are used in the specification means
21 that it's including the way they are configured,
22 the way they are connected, the circuits.

1 Otherwise that would be nonsense.
2 So my understanding, and I think the
3 understanding of a person of ordinary skill in the
4 art, would be that a bidirectional interconnect
5 includes wires that are configured with circuits
6 so that they can communicate in two directions.
7 And unidirectional interconnects are configured
8 with circuits so that they can only conduct in one
9 direction. And the embodiments in the
10 specification at most support that understanding.
11 Q Did you include the opinion that you
12 just gave anywhere in your declaration?
13 MR. CHANDLER: Objection. Form.
14 A Again, I don't recall. I certainly
15 applied it that way, but I don't recall whether I
16 said that in so many words.
17 Q Well, take a look at your declaration
18 and let me know if you can find that opinion
19 anywhere.
20 A (Reviewing.)
21 So I think it's clear from the context,
22 the way I use the term. I don't think I say that

1 in so many words, I think I just applied the plain
2 meaning.
3 Q Is an interconnect that transits signals
4 in only one direction within the scope of the
5 claim term "unidirectional interconnect"?
6 MR. CHANDLER: Objection. Form.
7 A So it would have to be configured so it
8 can only send signals in one direction, right?
9 Because you could have a bidirectional
10 interconnect where you only send signals in one
11 direction but that doesn't make it a
12 unidirectional interconnect, it's still a
13 bidirectional interconnect.
14 Q Is an interconnect that transmits only
15 unidirectional signals within the scope of the
16 claim term "unidirectional interconnect"?
17 A No, because, again, it's not defined by
18 its behavior. It's defined by its configurations
19 in the claims.
20 Q Does claim 1 indicate how long the first
21 unidirectional interconnect is configured to
22 conduct signals from the DRAM die to the control

1 die?
2 MR. CHANDLER: Objection. Form.
3 A No, it seems to be a structural
4 description, not a temporal one.
5 Q So it's your opinion that the
6 unidirectional interconnect limitations are
7 structural limitations, not temporal ones?
8 A It appears that way to me because,
9 again, it's clearly trying to distinguish that
10 from something that is bidirectional.
11 Bidirectional would only conduct in one direction
12 at a time.
13 Q Did you include that opinion in your
14 direction?
15 A No. Again --
16 MR. CHANDLER: Objection. Form.
17 A -- I think that's ordinary meaning.
18 Q Does claim 1 indicate how long the
19 second unidirectional interconnects are configured
20 to conduct signals from the control dies to the
21 DRAM dies?
22 A No, I think it's explained in structural

1 language, not temporal language.
2 Q So the '087 patent doesn't put any
3 temporal limitations on the unidirectional
4 limitations, correct?
5 MR. CHANDLER: Objection. Form.
6 A I don't see any. It seems to be a
7 structural description. The claim does describe
8 things that happen during certain periods of time,
9 but this is not one of them.
10 Q Is an interconnect that's configured to
11 conduct signals in only one direction during
12 certain operating modes of the DRAM package but
13 not in other operating modes within the scope of
14 the claim term "unidirectional interconnect"?
15 MR. CHANDLER: Objection. Form.
16 A I don't see any discussion of operating
17 modes. I mean that would require me to understand
18 that something that is sometimes configured is
19 configured. I don't see that as being the most
20 natural reading of these claims.
21 Q What is your understanding of
22 "configured to"?

1 A That it's been -- in these claims? That
2 it's been structurally arranged such that it
3 conducts signals in the way that's described.
4 Q And it cannot be configured in another
5 way; is that your understanding?
6 MR. CHANDLER: Objection. Form.
7 A I'm not sure what that means. I mean it
8 says in the claim how it's configured. I think it
9 needs to be configured as in the claim. I mean it
10 literally says it's not configured to conduct a
11 signal in the opposite direction.
12 Q What would a POSA have understood the
13 claim term "conduct" to mean?
14 A Again, plain and ordinary meaning.
15 Carry current from one place to another.
16 Q Can you see in claim 1 it refers to
17 "configured to conduct"? Do you see that?
18 A I think it's in more than one place.
19 Q Let's look at the first unidirectional
20 limitation, so column 24, starting on line 62.
21 A Yes.
22 Q The first unidirectional interconnects

1 are configured to conduct signals. Do you see
2 that?
3 A Yes.
4 Q What type of signals would be conducted
5 on the first unidirectional interconnects?
6 A Well, again, given the structure of the
7 claim, these interconnects are further included in
8 the claim. So I think they're different than the
9 ones that were previously recited. The previous
10 recited ones include the data connections. So I
11 think these would be additional control and
12 address connections, so they would be control and
13 address signals.
14 Q And the second unidirectional
15 interconnects in column 24 -- 25, can you go
16 there?
17 A Yes.
18 Q The second unidirectional interconnects
19 are configured to conduct signals also, correct?
20 A They are in a specific way.
21 Q And what types of signals are the second
22 unidirectional interconnects configured to

1 conduct?
2 A It's not completely clear because I
3 don't think it's supported in the spec, but
4 they're not the data interconnects that have been
5 previously recited and they're not the control
6 address signals to -- I'm sorry, they're not the
7 control address signals from the DRAM die. So
8 they would have to be additional control address
9 signals to the DRAM die.
10 I think the only thing that's really
11 supported for that second set of interconnects in
12 the spec are chip selects.
13 Q Can you go to claim 20 and turn to
14 column 31?
15 And I'm going to go to the last
16 limitation in 20 which is column 31 starting on
17 line 50.
18 A Okay.
19 Q Do you see that "wherein" clause uses
20 the term "emulation logic"?
21 A Yes.
22 Q What would a person of skill in the art

1 understand the claim term "emulation logic" to
2 mean?
3 A In the context of this claim in the
4 specification it would have been a logic that
5 makes the external host believe that there is a
6 larger DRAM die when it's physically comprised of
7 two or more smaller DRAM dies.
8 Q Is what you just described in your
9 answer sometimes referred to as rank
10 multiplication?
11 A Sometimes it is.
12 Q Is rank multiplication described in the
13 '087 patent?
14 MR. CHANDLER: Objection. Form.
15 A Yes.
16 Q And when rank multiplication is
17 described in the '087 patent, would a person of
18 ordinary skill in the art have understood it to
19 mean logic that makes the external host believe
20 that there is a larger DRAM die when it's
21 physically comprised of two or more smaller DRAM
22 dies?

A It would have been one way to do that, yes.

Q Go back to claim 1 and go to column 25 starting on line 58.

A I'm confused, that's not claim 1, right?

Q Sorry. I'm sorry, line -- take a look at line 20.

MR. CHANDLER: I'm sorry, which column are we at?

MR. BEMBEN: 25, line 20.

A Okay.

Q All right. That "wherein" clause starting on line 20 says, wherein control die is configured to in response to the first set of CA signals receive first signals associated with the memory read operation from a DRAM die of the stacked DRAM dies via the first unidirectional interconnects. Do you see that?

A Yes.

Q You see the term "memory read operation"?

A Yes.

1 Q What would a person of skill in the art
2 have understood the claim term "memory read
3 operation" to mean?
4 A Its plain meaning, an operation that
5 reads data from the memory on the device.
6 Q And if we continue in that "wherein"
7 clause starting at line 24, do you see where it
8 says, and in response to the second set of CA
9 signals?
10 A Yes.
11 Q Okay. It says, and in response to a
12 second set of CA signals, drive second signals
13 associated with the memory write operation to one
14 or more DRAM dies of the stacked DRAM dies via the
15 second unidirectional interconnects. Do you see
16 that?
17 A Yes.
18 Q And you see the claim term "memory write
19 operation"?
20 A Yes.
21 Q What would a person of skill in the art
22 have understood the claim term "memory write

1 operation" to mean?
2 A In this context it would have been a
3 write, or sometimes we call it a store, operation
4 where data is being placed into a portion of the
5 memory.
6 Q And would a person of skill in the art
7 have understood that the memory write operation is
8 performed during normal operations of the DRAM
9 package?
10 MR. CHANDLER: Objection. Form.
11 A It could be. I mean you could have --
12 yeah. I mean it depends what you mean by "normal
13 operation," but memory read operations and memory
14 write operations are part of the set of ordinary
15 operations that DRAMs are involved in.
16 Q Can we go to column 24 now, line 60.
17 And spanning line 60 through 61 of column 24 of
18 the '087 patent do you see the claim term "chip
19 select signal"?
20 A Yes.
21 Q What would a person of skill in the art
22 have understood the claim term "chip select

1 signal" to mean?
2 A It's really got to be looked at in
3 context here. Traditionally a chip select signal
4 is a signal sent to a memory die to select that
5 particular die to participate in an operation of
6 any type. But in this context of rank
7 multiplication, sometimes chip select signal is
8 referring to something that selects a specific
9 die. And sometimes it's selecting, it's
10 communicating the host's virtualized understanding
11 of the larger die that are being emulated. So you
12 have to look at it each time in context to
13 understand.
14 Q In the context of claim 1, what would a
15 person of skill in the art have understood "chip
16 select signal" to mean?
17 A I have look through, I mean how many
18 times it's used because there's like over a
19 thousand words here.
20 All right. So I only see it being used
21 once in claim 1 where we looked at it in lines 60
22 and 61 of column 24. And there, because it's

1 broad and it says "any chip select signal," I
2 think that that would refer to any signal that is
3 capable of enabling one or more of the DRAM die.
4 Q Can you turn to paragraph 238 of your
5 declaration, and I believe it's on 135, page 135.
6 A Okay.
7 Q So you see there you say Stack ID or
8 SID?
9 A Yes.
10 Q Is SID a chip select signal?
11 A In my opinion I generally think that it
12 is. But my understanding is that Netlist has
13 asserted that it's not.
14 So I was simply explaining here that if
15 in fact Netlist is correct that ID signals are not
16 chip select signals, then Keith has an analogous
17 signal disclosed.
18 Q The analogous signal in Keith that you
19 just referenced, is that this ID information
20 signal?
21 A Yes.
22 Q Okay. And so it's your opinion that

1 Keith's ID information signal is analogous to the
2 SID?
3 A Yes.
4 Q Can you turn to paragraph 242 of your
5 declaration, which is just the next page, I think,
6 137, and review that.
7 A (Complying.)
8 Okay.
9 Q I want you to walk me through what
10 you're suggesting here. So paragraph 242 you're
11 talking about write operations, correct?
12 A Correct.
13 Q Okay. And so write data would come from
14 a memory controller, correct?
15 MR. CHANDLER: Objection. Form.
16 A Again, it doesn't have to, but it could.
17 It could have been initiated from a memory
18 controller.
19 Q Okay. But the write data is received by
20 the DRAM package, correct?
21 A Under some circumstances.
22 Q Well, in the context of paragraph 242

1 you're talking about write operations. Where does
2 the write data come from?
3 A It comes from outside of the DRAM die,
4 from a memory controller or some other host. It
5 then passes through the registers and the
6 switching circuits and eventually would go to one
7 or more DRAM dies.
8 Q Okay. And in paragraph 242 the language
9 that you have in italics, that's claim language;
10 is that right?
11 A Yes.
12 Q And that language in the italics comes
13 from element 1(k)(1), which is on 133 of your
14 declaration; is that correct?
15 A Correct.
16 Q And so just to clarify, element 1(k)(1)
17 states, wherein the control die further includes
18 control logic configurable to control respective
19 states of the first and second conduits in
20 response to one or more CA signals received via
21 one or more of the CA terminals, correct?
22 A Yes.

1 Q And then you broke it up. But then
2 there's element 1(k)(2) which recites wherein the
3 one or more CA signals do not include any chip
4 select signal, correct?
5 A Correct.
6 Q Okay. And so walk me through in 242.
7 The write data here that we're talking about would
8 be received at a first data terminal, correct?
9 A Correct.
10 Q And are you saying in paragraph 242 that
11 the first data terminal would transmit the write
12 data to both the first and second conduits at the
13 same time?
14 A That would be obvious to do just based
15 on the fact that it's a write operation.
16 Q But don't the claim limitations 1(k)(1)
17 and 1(k)(2) require the CA signals, not including
18 the chip select signal, to select between the
19 first and second conduit?
20 A No.
21 MR. CHANDLER: Objection. Form.
22 A Only to control their respective state.

1 Q I'm sorry, can you repeat your answer?
2 A No, only to control their respective
3 state, not to select between.
4 Q So the CA signals do not have to select
5 one or the other of the conduits; is that correct?
6 MR. CHANDLER: Objection. Form.
7 A I don't see that in the limitation.
8 Q Can we just go to the patent
9 specification -- patent again, and go to
10 column 24, line 56, and the "wherein" clause
11 reads, wherein the control die further includes
12 control logic configurable to control respective
13 states of the first and second conduits in
14 response to one or more CA signals received via
15 one or more of the CA terminals wherein the one or
16 more CA signals do not include any chip select
17 signal. Do you see that?
18 A Yes.
19 Q And is it your opinion that this
20 limitation does not require that the CA signals,
21 not including the chip select signal, select
22 between the first and second conduit?

1 MR. CHANDLER: Object to form.
2 A I don't literally see that. That may be
3 one way to implement this limitation, but as long
4 as it controls the respective states of the
5 conduits I think the limitation is met.
6 Q So I'm at a good place to take a break,
7 and we've been going for about, maybe about 50
8 minutes. We could continue to go or we could take
9 a break if you like, a five-, 10-minute break now.
10 A I'm happy to continue. If anyone else
11 would like a break, that's fine.
12 MR. CHANDLER: No opinion.
13 Q Let's continue.
14 Can you turn to the Keith reference.
15 A Okay. Give me a minute.
16 Yes.
17 Q So I believe you mentioned in your
18 declaration that Keith is interested in increasing
19 bandwidth; is that correct?
20 A I think that's correct.
21 Q Why was that important to Keith, to
22 increase bandwidth?

1 A I'm not sure he tells us specifically,
2 but I think the suggestion, what would be
3 recognized by a person of ordinary skill is that
4 he wants to be able to have a certain amount of
5 memory speed without having to increase the number
6 of memory devices.
7 Q How does Keith --
8 A Number of memory packages is probably a
9 better way to say it.
10 Q How does Keith achieve increased
11 bandwidth?
12 A He does it primarily by stacking die so
13 that they can provide read data or read operations
14 during overlapping times.
15 Q What do you mean by "overlapping times"?
16 Do you mean like concurrent access?
17 A Yeah. I mean, that's probably a close
18 enough description. In practice it would probably
19 be slightly staggered so that they overlap but
20 they're not literally concurrent.
21 Q I see what you're saying.
22 Okay. Go to paragraph 227 of your

1 declaration, which probably don't have the page
2 numbers, 128.
3 A Okay.
4 Q And this is 227, paragraph 227, it spans
5 128, 29, and 30 of your declaration. I'm going to
6 ask you a question about what's on 130, but if you
7 want to review the paragraph because it's really
8 long, please feel free.
9 A Okay.
10 Q So on page 130, do you see in the last
11 sentence where you refer to "odd and even
12 partitions"?
13 A Yes.
14 Q What did you mean by "odd and even
15 partitions" with respect to Keith?
16 A So, again, this is an old concept --
17 Keith repeats it; he didn't invent it -- where
18 when you have two banks of memory sharing the same
19 interconnect, you stagger their operations. So
20 since you're staggering their operations, they're
21 taking turns using the interconnect for data.
22 So you kind of number them 0, 1, 2, 3,

1 4, 5, the turns and one side -- one set of die
2 uses the odd-numbered turns and the other set of
3 die uses the even-numbered turns, right?
4 So very similar to. You know, if we're
5 sharing an office and somebody had it on the odd-
6 numbered days and somebody else had it on the
7 even-numbered days, that kind of concept. So we
8 often refer to it as odd or even or sometimes as,
9 you know kind of a chessboard, checkerboard kind
10 of a thing, red/black or white/black.
11 Q And is that concept shown in figure 5 of
12 Keith?
13 A Figure 5 is consistent with it, but
14 doesn't have enough detail to show it.
15 Q Is there a figure that you can point me
16 to that shows the odd and even partitions that you
17 mention in paragraph 227?
18 A Again, a number of the drawings are
19 consistent with that concept, including figure 5
20 and figure 7, but it's really described in the
21 text. It didn't need to be illustrated because as
22 I mentioned, it's not something new to Keith.

1 It's a much older concept that probably dates back
2 to the 60s.
3 Q Can you point me to where in the text of
4 Keith it describes odd and even partitions?
5 A Sure. The one that I'd cited in the
6 spec was column 1, 65 through column 2, 10, and
7 then it goes on all the way through column 2, line
8 34, in that description. Let me see if there's a
9 better one.
10 Descriptions of figures 5, 6, and 7 in
11 column 1 all talk about partition interleaving.
12 That's a well-known concept that's being discussed
13 there. As I mentioned, it's in column 2,
14 especially around lines 29 through 34. It's in
15 column 2, lines 50 through 60. There are a bunch
16 of other references and descriptions of columns --
17 of drawings 5, 6, and 7. Do you want me to go
18 through them all?
19 Q No, no. And I'm just really trying to
20 understand, I didn't see where Keith mentioned
21 actually odd and even partitions so I was just
22 wondering what you meant there.

1 A Yes. He calls it interleaving. And as
2 I mentioned, it's described typically as either
3 odd/even or red/black. There are a bunch of
4 different terms. They all mean the same thing.
5 Q I see. When you said "odd/even," you
6 were referring to Keith's interleaving partitions?
7 A Yeah. He actually -- if you look, for
8 example, in column 7, in a number of places
9 between lines 4 and 35 he does refer to them as
10 odd and even.
11 Q I see in column 7, line 4, starting at
12 line 4 where it refers to even dice or odd dice,
13 but he doesn't refer to even and odd partitions.
14 Is there a difference?
15 A Not really. In 10 he talks about
16 interleaving between -- column 10, starting line
17 40 he talks about interleaving between the odd
18 dice and the even dice again.
19 He's a little bit loose with the
20 language here, but again, interleaving is such a
21 mature concept by this time, that he doesn't
22 really need to teach it, just to hint towards it.

1 Q Keith does, however, make a distinction
2 between a partition and a dice, though, correct?
3 A In some embodiments, but I think that he
4 also makes it clear that a partition could be one
5 die.
6 Q Okay. But if you could just go to
7 figure 2 in Keith.
8 So I believe figure 2 of Keith shows a
9 control die which is labeled 210 and four DRAM
10 dies; is that correct?
11 A Yes.
12 Q Okay. The memory dies would be 220 and
13 221, 222, and 223, correct?
14 A I'll take a peak.
15 Yes.
16 Q And in Keith he is also showing each
17 memory die would have four partitions?
18 A Yes. What they're saying is they go
19 across. And that would be one implementation if
20 you had four banks per die, but you could also
21 have a one-bank-per-die implementation.
22 Q Okay. And each of the memory dies are

1 shown with four partitions here in figure 2 of
2 Keith, correct?
3 A In the figure 2 example, yes.
4 Q And in the vertical direction, four
5 memory partitions, Keith describes them as a
6 vault; is that correct?
7 A Correct.
8 Q And the memory partitions in a vault,
9 they would share communication paths which are
10 kind of shown to the right of the memory
11 partitions; is that correct?
12 A Correct.
13 Q Keith does not disclose that the memory
14 partitions in different vaults share communication
15 paths, correct?
16 MR. CHANDLER: Objection. Form.
17 A I don't think it says one way or the
18 other. Yeah, the language is permissive.
19 Q Look at figure 5 of Keith. And do you
20 see the circuits, both circuits labeled I/0
21 circuit?
22 A Yes.

1 Q So, for example, 530 at figure 5 of
2 Keith is an I/O circuit?
3 A Yes.
4 Q I/O means input/output, correct.
5 A Generally.
6 Q Is that what you understand I/O to mean
7 in figure 5 of Keith?
8 A Yes.
9 Q And so data from the memory dies in
10 Keith would be transmitted via the I/O pads; is
11 that right?
12 A I don't see anything about I/O pads.
13 Q I'm sorry, let me rephrase that.
14 Data from the memory dies would be
15 transmitted via the I/O circuits, correct?
16 A They can be. Again, it's permissive
17 language in the text.
18 Q I guess, let me ask you this. What
19 types of signals would you expect to be
20 transmitted in the I/O circuits that are shown in
21 figure 5 in Keith?
22 A I think generally those would be data

1 signals.
2 Q What about strobe signals?
3 A There is no discussion of strobe signals
4 in Keith. And strobe signals are not inherent in
5 the DRAM memory.
6 Q If a strobe signal were to be
7 transmitted in the embodiment shown in figure 5 of
8 Keith, would they be transmitted on the I/O
9 circuits?
10 A I don't know. There's no disclosure
11 about that, so ...
12 Q So Keith doesn't contemplate using
13 strobe signals; is that correct?
14 A Not specifically, no.
15 Q But would a person of ordinary skill in
16 the art have understood that the memory devices
17 used in Keith use strobe signals?
18 A Certainly some of the types that are
19 there would.
20 Q So for the types that are there, would
21 they be transmitted using the I/O circuit shown in
22 figure 5?

1 MR. CHANDLER: Objection. Form.
2 A That's really not disclosed in Keith.
3 Q So you don't know one way or the other?
4 MR. CHANDLER: Object to form.
5 A No, there's no discussion of strobes in
6 Keith.
7 Q But you would expect data to be
8 transmitted using the I/O circuits shown in figure
9 5 of Keith; is that correct?
10 A Yes.
11 Q Aren't data and strobe signals typically
12 sent on parallel paths?
13 A Similar paths in some systems.
14 Q So wouldn't you expect the strobe
15 signals, if there were some in Keith, to be sent
16 by the I/O circuit shown in figure 5?
17 A Not necessarily. There could be other
18 circuits that simply are not illustrated there
19 because strobe signals aren't the subject of
20 Keith.
21 Q But you wouldn't expect strobe signals
22 to be sent in the data signals in the embodiments

1 of Keith that use strobe signals; is that correct?
2 A Perhaps in some.
3 MR. CHANDLER: Just for clarification,
4 was the question "would not" or "would"?
5 Q So let me just reread the question.
6 But you wouldn't expect strobe signals
7 to be sent -- hold on a second.
8 MR. BEMBEN: Yeah, thank you,
9 Mr. Chandler.
10 Q So my question was, you would expect
11 strobe signals to be sent with the data signals in
12 embodiments of Keith that use strobe signals,
13 correct?
14 A Perhaps in some embodiments. Again,
15 strobe signals aren't the subject of Keith, and I
16 didn't have to analyze strobe signals to
17 understand any of the claims.
18 Q I think this might be a good place to
19 take a break. Would you like five, or 10 minutes
20 this time?
21 A I'm good with five.
22

1 Q Okay, back at 23 after.
2 MR. CHANDLER: Sounds good.
3 (A recess was taken at 1:20 p.m.)
4 (Back on the record at 1:28 p.m.)
5 BY MR. BEMBEN:
6 Q Dr. Wolfe, can we go back to that
7 sentence we were looking at in paragraph 227 of
8 your declaration. It's on page 130.
9 A Yeah, okay.
10 Q In the last sentence of paragraph 227 of
11 your declaration you suggest that the odd and even
12 partitions of Keith can share input/output data
13 pins, correct?
14 A Yes, that would be the ordinary way to
15 connect up an odd/even interleave system.
16 Q If Keith's odd and even partitions
17 shared input/output data pins, only one of the
18 partitions could use the input/output pins at a
19 time, right?
20 MR. CHANDLER: Objection to form.
21 A Not necessarily. With respect to data
22 outputs for reads that would be true.

1 Q Let's go to the Shaeffer reference,
2 Exhibit 1048.
3 A (Complying.)
4 Q Shaeffer is a reference from Rambus,
5 correct?
6 A Correct.
7 Q And I'm just going to direct you to
8 column 30, starting at line 11. Shaeffer gives --
9 A I don't see a column 30 in Shaeffer.
10 Q I'm sorry, did I say 30?
11 So I'll direct you to column 3, line
12 11 --
13 A Okay.
14 Q -- where Shaeffer provides a definition
15 of "ranks". But Shaeffer uses the term "ranks"
16 throughout this discussion, correct?
17 A Yes.
18 Q When Shaeffer uses the term "rank", is
19 he referring to different DIMMs on a motherboard,
20 or different groups of DRAMs on a single DIMM?
21 MR. CHANDLER: Objection. Form.
22 Q Dr. Wolfe, did you understand my

1 question?
2 A Maybe.
3 Q Okay.
4 A So the ambiguity here is it looks like
5 he refers to ranks 44 times. I don't know which
6 one you're talking about.
7 Q Just in general. So he gives a
8 definition in column 3 starting in line 11 of
9 ranks, and then he talks about ranks in computer
10 systems in column 1 starting at line 58, and my
11 question, I'm just trying to understand what he
12 means by "ranks".
13 A So at times he talks about them very
14 generally, so he could be referring to either.
15 Q When you say "either," you mean --
16 (Simultaneous speaking.)
17 A Yeah, go ahead.
18 Q I was going to say, he could be
19 referring to multiple DIMMs on a motherboard,
20 correct?
21 A I think certainly in his background
22 section he could be.

1 Q When you say the "background section,"
2 where are you referring to?
3 A Oh, he calls them detailed descriptions,
4 but he goes into some background teachings at the
5 beginning of that section.
6 Q At times Shaeffer refers to "ranks" as
7 different DIMMs on a motherboard; is that right?
8 A I think so. So, for example, in
9 column 1, lines 58 and 59, I think he's using the
10 term broadly enough that it can include that.
11 Q And in Shaeffer, how would a rank be
12 selected?
13 A The memory controller makes a selection.
14 Q So does the memory controller send a
15 signal?
16 A It can. Typically it's the EDC or TRS
17 codes that are disclosed; the timing reference
18 signal in particular.
19 Q The timing reference signal is sent by
20 the memory controller to the memory?
21 A To each rank, yes.
22 Q Can you go to column 3, lines 9 through

1 10.
2 You just talked about the timing
3 reference signal. So my question is, Shaeffer
4 uses timing reference signal, TRS, calibration
5 parameter and parameter -- I'm sorry, strike that.
6 Shaeffer uses the terms "timing
7 reference signal", or "TRS, "calibration preamble"
8 and "preamble" interchangeably, correct?
9 MR. CHANDLER: Objection to form.
10 A At times. Again, it's permissive
11 language, yes.
12 Q Can you go to column 4, starting on
13 line 26 of Shaeffer.
14 A Okay.
15 Q Do you see where it says, in some
16 embodiments the timing reference signal may be
17 added to the head of the first available read data
18 burst being transmitted from a newly selected
19 newly accessed rank to the memory controller. Do
20 you see that?
21 A Yes.
22 Q Okay. And so here Shaeffer is saying

1 that the TRS signal, or the timing reference
2 signal, is sent with the data; is that correct?
3 A In some cases, yes.
4 Q Can you go to figure 3 of Shaeffer?
5 A Yes.
6 Q And figure 3 shows a timing diagram; is
7 that right?
8 A It does show a timing diagram.
9 Q And the preamble 302 that's shown in
10 figure 3, that's the same thing as the TRS,
11 correct?
12 MR. CHANDLER: Objection. Form.
13 A Yeah, that is one example of a TRS.
14 Q Okay. And in figure 3 the preamble is
15 being sent on the DQ data line, correct?
16 MR. CHANDLER: Objection. Form.
17 A In this situation, yes.
18 Q The preamble is not being sent on the
19 communication line that carries the EDC signal,
20 correct?
21 MR. CHANDLER: Objection. Form.
22 A Not in this particular situation, no.

1 Q Okay. And in figure 3 the preamble is
2 not being sent on the communication line that
3 carries the CA signals, correct?
4 A Not in this particular situation.
5 Q And CA in figure 3, that's command
6 address; is that correct?
7 A Yes.
8 Q And above that CK in figure 3, that's
9 the clock; is that right?
10 A Yes. I think it actually is showing
11 both phases of a two-phase clock, but yes.
12 Q Let's go to figure 4A of Shaeffer.
13 A Give me a second.
14 Okay.
15 Q Figure 4A shows another timing diagram;
16 is that right?
17 A Yes.
18 Q And figure 4A of Shaeffer, the preamble
19 402 is the TRS, correct?
20 A In this particular situation it is.
21 Q And in figure 4A of Shaeffer the
22 preamble is being sent on the DQ line with the

1 data, correct?
2 A In this particular situation, yes.
3 Q In figure 4A of Shaeffer, the preamble
4 402 is not being sent on the same line as the EDC
5 signal, correct?
6 A Correct.
7 Q In figure 4A of Shaeffer, preamble 402
8 is not being sent on the lines that send the
9 command address signals, correct?
10 A Correct.
11 Q Okay. Now, Shaeffer also discloses that
12 the TRS signal can be sent on the same line as at
13 that EDC signal, correct?
14 A It does.
15 Q If we go to figure 4B, it's a timing
16 diagram showing that, correct?
17 A Correct.
18 Q So in figure 4B it shows the TRS, it
19 shows four TRS signals being transmitted on the
20 same line as the EDC signal, correct?
21 A Correct.
22 Q In figure 4B the TRS signal is not being

1 sent on the same line as the command address
2 signals, correct?
3 A Not the ones that are labeled "command
4 address" in this figure, no.
5 Q And when you say "not the ones labeled
6 'command address' in this figure," you're
7 referring to what's shown as CA in figure 4B?
8 A Correct.
9 Q Does Shaeffer ever disclose sending the
10 TRS over the same line as the CA signals?
11 MR. CHANDLER: Objection. Form.
12 Q I'm sorry, did you understand my
13 question? Maybe I should --
14 A I think so.
15 I don't believe Shaeffer discloses
16 transmitting the TRS over the lines that Shaeffer
17 labels as CA.
18 Q Can you go to column 3, line 45 of
19 Shaeffer.
20 A Okay.
21 Q You see that the EDC signal is labeled
22 130?

1 A An EDC signal, yes.
2 Q I believe sometimes in your declaration
3 you refer to 130 as a line. Do you recall that?
4 A I don't recall that.
5 Somewhere specific?
6 Q Yeah, let me see if I can find it.
7 Can you go to 138 of your declaration,
8 paragraph 247?
9 A I do see that.
10 Q You see it says Shaeffer's lines 130?
11 A I do.
12 Q Has Shaeffer ever referred to element
13 130 as a line?
14 A I guess not literally. I think I pulled
15 that figure 1B where it appears to be illustrated
16 as a line. So something that connects two
17 circuits together.
18 Q Figure 1B?
19 A 1A as well.
20 Q Sorry?
21 A 1A and 1B.
22 Q Just to be clear, on figure 1A of

1 Shaeffer 130 is an EDC signal, correct?
2 A It is, but it's also illustrated as a
3 physical part of an interface that appears to be
4 connecting one circuit to another circuit. I
5 think it would definitely be obvious for that to
6 be a line.
7 Q Can you go paragraph 54 of your
8 declaration?
9 A Sure.
10 Okay.
11 Q In paragraph 54 you say, I understand
12 for a negative claim limitation silence is
13 generally not disclosure. Do you see that?
14 A I do.
15 Q You made that statement in the context
16 of Section 112 analysis, written description
17 analysis, correct?
18 A Yes.
19 Q Is it your understanding that silence in
20 a prior art reference generally does not disclose
21 a negative limitation as well?
22 A It doesn't explicitly disclose it, but

1 again, the standard is different for obviousness
2 than it is for written description. A person of
3 ordinary skill in the art can fill in obviousness
4 -- obvious unstated limitations in the prior art,
5 where my understanding is that they can't in terms
6 of written description.
7 Q Did you explain that in the Legal
8 Standards section for obviousness in your
9 declaration?
10 A I don't think I said it in exactly those
11 words but I think that in substance I did, because
12 I explained what my understanding was of the
13 standard for obviousness and that a person of
14 ordinary skill in the art could rely on various,
15 on their own knowledge in various ways in certain
16 circumstances.
17 Q Can you go to paragraph 36.
18 A Okay.
19 Q And so this is where you talk about
20 objective factors or objective indicia of
21 non-obviousness, correct?
22 A Yes.

1 Q You're aware that taking a license under
2 the patent by others is one of the factors or
3 objective indicia of non-obviousness?
4 A I did.
5 Q In paragraph 36 you stated at the end,
6 last sentence, I'm not presently aware of any
7 evidence of objective factors suggesting the claim
8 methods were not obvious and reserve my right to
9 address any such evidence if it is identified in
10 the future. Do you see that?
11 A Yes.
12 Q So when you wrote your declaration, you
13 were not aware of any objective indicia of
14 non-obviousness; is that correct?
15 A I was aware of objective indicia, just
16 not any that would impact my conclusions of
17 obviousness.
18 Q You were aware of objective indicia of
19 non-obviousness with respect to the '087 patent
20 when you wrote your declaration?
21 A At least allegedly so, yes.
22 Q What do you mean "allegedly so"?

1 A I understand that there's a dispute as
2 to whether or not the license was properly
3 terminated.
4 Q What license are you referring to?
5 A The portfolio license that Samsung had
6 with Netlist.
7 Q Okay. And so when you wrote your
8 declaration, you were aware that Netlist had
9 licensed its portfolio to Samsung; is that
10 correct?
11 A Yes.
12 Q And are you aware that that license was
13 in 2015?
14 A Yes.
15 Q Were you aware that Samsung's license
16 included earlier patents in the same patent family
17 as the '087 patent?
18 A That would be my understanding. It is
19 also my understanding those have been invalidated.
20 Q When you say that you were aware of the
21 licenses but they did not affect your obviousness
22 analysis -- is that what you said?

A They didn't affect my conclusion.
Q Your conclusion. Why didn't you mention that in your declaration?
A Because they didn't affect my conclusion.
Q Have you heard of SK Hynix?
A As a company, yes.
Q Who is SK Hynix?
A They're a semiconductor manufacturer from Korea.
Q Do they manufacture memory products?
A They have in the past. I don't keep up-to-date on what they are doing right at the moment.
Q When you signed your declaration, were you aware that SK Hynix had licensed Netlist's portfolio, including the '087 patent?
MR. CHANDLER: Objection. Form.
A I don't recall being aware of that.
Q Have you ever heard of Micron?
A Yes.
Q Who is Micron?

1 A They were a manufacturer out of Boise,
2 Idaho.
3 Q Do you understand that the three largest
4 memory manufacturers are Samsung, SK Hynix and
5 Micron?
6 A I do not know that for a fact, but it
7 would not surprise me.
8 Q Do you think that it's significant that
9 two of the three largest memory manufacturers in
10 the world licensed Netlist's portfolio?
11 A That would depend on the terms and the
12 reasons as to whether it was significant. It's
13 certainly something that could be considered, but
14 I think it takes a lot more information to
15 determine if it's significant.
16 Q And did you consider any of that
17 information when you formed the opinions that you
18 provided in your declaration?
19 A No, I did not consider any licenses that
20 weren't in the record at the time that I filed my
21 application, or my declaration.
22 MR. BEMBEN: Okay. I think that we may

1 be wrapping up here, so let's go off the record
2 for 15 minutes and talk then.
3 MR. CHANDLER: Okay.
4 (A recess was taken 1:52 p.m.)
5 (Back on the record at 2:05 p.m.)
6 MR. BEMBEN: Dr. Wolfe, I have no
7 further questions for you at this time.
8 I pass the witness.
9 MR. CHANDLER: All right. Let's go off
10 the record for about five minutes.
11 (A recess was taken at 2:06 p.m.)
12 (Back on the record at 2:12 p.m.)
13 EXAMINATION BY COUNSEL FOR THE PETITIONER
14 BY MR. CHANDLER:
15 Q Dr. Wolfe, I'd like to follow up some
16 questions that you were asked about secondary
17 considerations of non-obviousness. Do you recall
18 that line of questioning?
19 A I do.
20 Q Could you please pull up Exhibit 1129,
21 and let me know when you have it in front of you.
22

1 (Exhibit 1129 was previously marked for
2 identification and was attached to the
3 transcript.)
4 A (Complying.)
5 Okay.
6 Q And then please read to yourself
7 paragraphs 12 through 15 and paragraph 19 of
8 Exhibit 1129 and let me know when you're done.
9 A (Complying.)
10 Okay, I've read those portions.
11 Q I want you to assume that paragraphs 12
12 through 15 and paragraph 19 of Exhibit 1129 are
13 true and that Samsung had a license to Netlist's
14 patent portfolio from 2015 to 2020. And I want
15 you to assume that there was a nexus between that
16 license and the '087 patent.
17 And my question is, could you please
18 explain the extent to which that impacts your
19 conclusion that the claims of the '087 patent are
20 obvious?
21 A It would certainly be something I'd have
22 to consider, but I would give it very little

1 weight.
2 Q Why?
3 A Based on, one, the fact that there is no
4 evidence that the '087 patent was important to
5 Samsung in making the decision to take that
6 license. And two, because as far as I know, the
7 '087 claims had not been written yet as of 2020,
8 is that right -- the right date?
9 (Reviewing.)
10 Yes. Samsung could not have been aware
11 of the '087 claims at the time they made any
12 decisions with respect to that license.
13 Q And to what extent does the fact that it
14 was a portfolio license impact the weight that you
15 would assign to that secondary consideration of
16 non-obviousness?
17 A Again, it's certainly something I'd have
18 to consider, but I would have to consider whether
19 or not this particular patent had any, any impact
20 on the decision to take that license or to pay a
21 certain amount for that license, and I haven't
22 seen any evidence that it did.

1 Q Could you please pull up paper 12, and
2 let me know when you have it in front of you.
3 A Okay.
4 Q And please read to yourself the middle
5 paragraph on page 55 that starts, in 2021,
6 SK Hynix licensed Netlist's patent portfolio, and
7 let me know when you've read that paragraph to
8 yourself.
9 A (Complying.)
10 I have.
11 Q Assuming that the paragraph in the
12 middle of page 55 of paper 12 is true and that in
13 2021 SK Hynix licensed Netlist's patent portfolio,
14 including the '087 patent, please explain the
15 extent to which that impacts your conclusion that
16 the claims of the '087 patent are obvious.
17 A Well, one, there's still limited
18 information here as to the terms of that license.
19 But even assuming that those terms were favorable
20 to Netlist, there is no evidence as to whether or
21 not SK Hynix attributed any, or a substantial
22 amount of the value of that license to the '087

1 patent.
2 Q And to what extent does the fact that it
3 was a portfolio license that SK Hynix allegedly
4 took in 2021 to Netlist's patents impact the
5 weight that you would you assign to that secondary
6 consideration of non-obviousness?
7 A It means that there could be a multitude
8 of reasons why SK Hynix was motivated to take that
9 license, and that as of right now, there's no
10 evidence that the '087 patent had any substantial
11 impact on SK Hynix's decision. So therefore there
12 is not enough evidence to, to give any significant
13 weight to this particular license in evaluating
14 the obviousness of the '087 patent.
15 Q Do alleged patent portfolio licenses
16 taken by Samsung and SK Hynix to the Netlist
17 family of patents change your ultimate conclusion
18 about whether or not the claims of the '087 patent
19 are obvious?
20 A No. I considered one. I'm considering
21 the other one now based on the evidence that
22 you've shown me. And because of the very limited

1 amount of evidence, they do not have any impact on
2 my conclusions.
3 Q And what is your conclusion about the
4 obviousness of the claims of the '087 patent?
5 A That if in fact there is written
6 description support, then they are invalid under
7 103 based on Grounds 3 and 4 as stated in my
8 declaration.
9 Q And in your opinion, are the claims also
10 obvious even if they lack written description?
11 A I guess so because even if they lack
12 written description we can still understand the
13 claims and they would still be obvious in light of
14 the prior art.
15 MR. CHANDLER: I pass the witness.
16 MR. BEMBEN: Let me take five minutes.
17 Come back at 25 after.
18 (A recess was taken at 2:19 p.m.)
19 (Back on the record at 2:23 p.m.)
20 MR. BEMBEN: I have no further
21 questions.
22 MR. CHANDLER: All right. So for the

1 Court Reporter, we would like the opportunity to
2 review and make corrections if necessary to the
3 transcript. So we would like, from our end, the
4 final transcript in one week, on Friday May 29th.
5 (Off the record at 2:24 p.m.)
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1 CERTIFICATE OF SHORTHAND REPORTER
2 I, Dawn M. Hart, the Shorthand Reporter,
3 before whom the foregoing proceedings were
4 conducted, do hereby certify that the foregoing
5 transcript is a true and correct record of such
6 proceedings; that said proceedings were taken down
7 by me stenographically and thereafter reduced to
8 typewriting under my direction. That I am neither
9 counsel for, related to, nor employed by any of
10 the parties to this case and have no interest,
11 financial or otherwise, in its outcome.
12 IN WITNESS WHEREOF, I have hereunto set my
13 hand and affixed my notarial seal this 29th day
14 of May, 2026.
15 My commission expires:
16 January 2, 2029
17
18 _____
19 NOTARY IN AND FOR THE
20 STATE OF MARYLAND
21
22

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