

UNITED STATES INTERNATIONAL TRADE COMMISSION

In the Matter of:	)	Investigation No.
CERTAIN GRAPHICS SYSTEMS,	)	337-TA-1318
COMPONENTS THEREOF, and DIGITAL	)	
TELEVISIONS CONTAINING THE SAME	)	

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1 UNITED STATES INTERNATIONAL TRADE COMMISSION
2 Washington, D.C.
3 BEFORE THE HONORABLE CAMERON ELLIOT
4 Administrative Law Judge

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6 In the Matter of:) Investigation No.
7 CERTAIN GRAPHICS SYSTEMS,) 337-TA-1318
8 COMPONENTS THEREOF, and DIGITAL)
9 TELEVISIONS CONTAINING THE SAME)

10 _____
11
12 International Trade Commission
13 Courtroom A
14 500 E Street, S.W.
15 Washington, D.C.

16
17 Thursday, March 16, 2023
18 EVIDENTIARY HEARING -- Volume IV

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20 The Hearing commenced in person, pursuant to the
21 notice of the Judge, at 9:00 a.m.

22
23
24 Reported by: Marjorie Peters, RMR, CRR, FAPR

25

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

2 (9:00 a.m.)

3 JUDGE ELLIOT: All right. Good morning. We're
4 here in the matter of Certain Graphics Systems, Components
5 Thereof, and Digital Televisions Containing the Same,
6 United States International Trade Commission, Investigation
7 Number 337-TA-1318. My name is Cameron Elliot, Presiding
8 Administrative Law Judge.

9 May I have appearances from counsel, please.

10 MR. RIZK: Good morning, Your Honor. This is
11 Adam Rizk on behalf of the Complainants.

12 With me today is Tawfik Goma and Nana Liu, also
13 on behalf of the Complainants, a number of colleagues as
14 well are here.

15 MR. COYLE: Good morning, Your Honor. Jordan
16 Coyle from Orrick on behalf of Respondent, Realtek.

17 Joined today in the courtroom by my colleagues,
18 Jeffrey Johnson, Robert Benson, Ben Austin and Chris
19 Higgins, as well as a number of client representatives in
20 the back.

21 MR. PATARIU: Good morning, Your Honor. Kevin
22 Patariu from Perkins Coie on behalf of the TCL Respondents.

23 Also here with me today is co-counsel Louise Lu
24 also from Perkins Coie.

25 JUDGE ELLIOT: Good morning.

1 So what do we have this morning?

2 Go ahead, ma'am.

3 MS. LIU: Good morning, Your Honor. This is
4 Nana Liu for Complainants. I'm here to give an update on
5 the time.

6 The agreed-upon time between the parties is that
7 Complainants have used 10 hours and eight minute on the
8 record, and Respondents have used seven hours and 12
9 minutes on the record.

10 JUDGE ELLIOT: Very well. Thank you.

11 All right, anything else that we need to take up
12 this morning?

13 MR. RIZK: Not for Complainants. Thank you,
14 Your Honor.

15 MR. COYLE: No, Your Honor. Thank you.

16 JUDGE ELLIOT: Very good.

17 All right. So is Dr. Pedram in the courtroom?

18 THE WITNESS: Yes.

19 JUDGE ELLIOT: All right. Come on up, sir.

20 THE WITNESS: Good morning.

21 JUDGE ELLIOT: Good morning.

22 Sir, let me remind you, you are still under
23 oath.

24 THE WITNESS: Yes, sir.

25 Whereupon--

1 MASSOUD PEDRAM, PhD,
2 a witness, called for examination, having previously been
3 duly sworn, was examined and testified further as follows:

4 JUDGE ELLIOT: Go ahead.

5 MR. JOHNSON: Thank you, Your Honor.

6 CONTINUED DIRECT EXAMINATION

7 BY MR. JOHNSON:

8 Q. Dr. Pedram, when we stopped yesterday, we were
9 discussing the '381 Patent, if you recall. I was just
10 about to move to another reference, the Stuttard reference.

11 Are you prepared to do that today?

12 A. Yes, sir.

13 Q. Okay.

14 So, looking at slide 122, it shows a picture of
15 RX-416, is this the same Stuttard reference that we
16 discussed earlier with respect to the '053 Patent?

17 A. Yes, sir, it is.

18 Q. All right. Then let's just go ahead and go
19 straight to the claims, then. We don't need to rediscuss
20 its technology.

21 Starting with Claim 15 of the '381, does
22 Stuttard disclose a computing system?

23 A. Yes, it does. Stuttard talks about graphics
24 system, but does state on page 5, lines 1 to 4, that this
25 computer system could also be a stand-alone processing

1 system; therefore, it's a computing system.

2 Q. All right, and that's on slide 124, for the
3 record.

4 Looking next to the limitations in the claim,
5 does Stuttard disclose a memory and a first processing
6 unity?

7 A. Yes, it does.

8 The memory, as you look at Figure 1, is the
9 local memory 12, and the first processing unit is the
10 processing core 10.

11 Q. Were you able to determine in Stuttard whether
12 or not the memory and first processing unit were coupled by
13 a bus?

14 A. Yes. As you can see also in this figure, there
15 is a bus, in fact, there are pairs of buses, 4 and 6. Bus
16 4 is the primary bus and bus 6 is the secondary bus that
17 connects the processing core to the local memory, couple
18 them together.

19 Any one of these primary or secondary buses
20 could act as the claimed bus.

21 Q. All right. Moving to the next limitation shown
22 on slide 128.

23 Starting with 15(d) in the claim, the claim
24 begins to talk about the first processing unit; correct?

25 A. Yes, sir.

1 Q. So moving into the first limitation within that,
2 were you able to determine whether or not there was a
3 plurality of engines within the first processing unit?

4 A. Sure.

5 We have to zoom in to a processing core, the
6 block diagram, that's on Figure 3 of the Stuttard
7 reference, and I can identify the various components that
8 are required in this figure.

9 Q. All right.

10 Do we need to zoom in any more on Figure 3?

11 A. Yes.

12 Some of the components are within the thread
13 manager, so we have to look at the thread manager block
14 also.

15 Q. All right. Is that sufficient detail for you to
16 be able to explain it to the Court?

17 A. Yes, sir, it is.

18 Q. Okay.

19 So then could you identify where the plurality
20 of engines are located.

21 A. Sure.

22 I have identified the plurality of engines as
23 the collection of array controller 104, the channel
24 controller 108, the cache block 1024, status block 1030,
25 and thread processors 1026.

1 Q. All right. Moving through the limitation, I
2 believe the next thing is a scheduling module associated
3 with the second processing unit.

4 Does Stuttard disclose this limitation?

5 A. Yes, it does.

6 In this Figure 4, the fetch unit 1023 and the
7 scheduler 1025, the combination acts as the scheduling
8 module, and they are associated with an embedded processing
9 unit 8, which was shown in Figure 1.

10 You can also see the trace of it from -- in
11 Figure 3.

12 Q. All right.

13 Is there anything else in the patent itself that
14 supports your conclusion that the scheduling module
15 performs the function of the claim?

16 A. Yes, sir.

17 If you look at page 23, lines 13 to 28, it is
18 explained that the instructions for a thread are fetched
19 from the local external memory or from the EPU 8 by the
20 fetch unit 1023.

21 It is further explained that the scheduling is
22 performed by a thread scheduler in the thread manager 102,
23 which is one of the identified components, which ensures
24 that each processor block 106 is kept busy as much as
25 possible.

1 Q. All right.

2 Moving to the next limitation that's shown on
3 slide 134, does Stuttard disclose that the plurality of
4 engines are configured to load state data associated with
5 each of the plurality of tasks?

6 A. Yes, sir, it is.

7 If you look at the Figure 4, the status block
8 1030, this receives status information that is then
9 provided to the thread scheduler to choose one of the
10 threads, and then pass through the thread processors so
11 that the thread processors could put together the
12 instructions that are then passed down for further
13 processing.

14 Basically, the status block here, which is part
15 of the engines, loads the state data associated with each
16 of the plurality of tasks.

17 Q. I see.

18 Are you identifying the status information as
19 the state data?

20 A. Yes. The status information here refers to the
21 information about the threads, whether they are ready or
22 yielding, and that information, again, is received and
23 processed to decide which thread to activate.

24 Q. Okay.

25 Moving to the next limitation, 15(e), does

1 Stuttard disclose a shader core?

2 A. Yes.

3 The shader core is the collection of the
4 processing blocks 106.

5 As Your Honor, you remember, there are three
6 shown here, but in fact, there is disclosure that eight or
7 more processing blocks could be inside this processing
8 engine itself, and that the shader core will be the
9 collection of all of these.

10 Q. All right.

11 Moving to the next limitation shown on slide
12 138, were you able to determine if the shader core is
13 configured to receive the plurality of tasks from at least
14 one of the plurality of engines?

15 A. Yes, sir.

16 There is disclosure on page 11, line 27, to page
17 12, line 7, in which it is stated that the thread
18 processors, which is one of the identified engines, control
19 the issuance of core instructions from the thread manager
20 so that we can maintain the simultaneous active program
21 threads within the processing blocks of the Stuttard
22 reference.

23 So, in fact, these processing blocks receive the
24 corresponding instructions, which are the corresponding
25 tasks, from the engines.

1 Q. Okay.

2 Moving to the next limitation shown on slide
3 140, were you able to determine whether or not the shader
4 core is configured to execute a first task from the
5 plurality of tasks while executing a second task from the
6 plurality of tasks based on respective state data
7 associated with each of the first and second tasks?

8 A. Yes, sir.

9 Again, there is explicit disclosure in Stuttard.
10 It would be page 10, lines 7 to 17, where Stuttard talks
11 about both multithreading and multitasking. He explains
12 that multithreading refers to the use of several threads to
13 perform a single task, whereas multitasking refers to the
14 use of several threads to perform multiple tasks
15 simultaneously.

16 We know in the Stuttard system there are eight
17 threads that can be active, and therefore, we can do
18 multithreading as well as multitasking as described here.

19 There is also further disclosure on the next
20 page that I can use this to provide a better idea of what
21 the difference is between single thread versus multithread
22 versus multitask.

23 If you have a single thread and eight processing
24 blocks, one of them could be active, for example, whereas
25 the other seven sitting idle doing not much.

1 If you have multithreads, more of these
2 processing blocks could be active, increases the
3 utilization and the performance of the system.

4 If you have multitasks, each task creating its
5 own set of threads, then you could have maximum
6 performance, maximum resource utilization, and all the
7 benefits that come about from high speed processing and a
8 good utilization of the resources.

9 Q. So for clarity on the record, we're on slide
10 142, and could you just clarify what would the green boxes
11 indicate?

12 A. So a green box is an active processing block. A
13 yellow box is an idle processing block.

14 The idea here is to show that because the
15 Stuttard in its embodiments usually talks about eight
16 processing blocks, shows that with a single thread versus
17 multithread versus multitask, you could increasingly have
18 more of your processing blocks, the Stuttard processing
19 blocks, being active and doing useful work.

20 Q. All right. What does the blue boxes represent?

21 A. The blue box is all of the threads corresponding
22 to a second task.

23 The green is the threads associated with the
24 first task.

25 Q. All right. Moving back to the claim limitation

1 that we're talking about, is there any additional
2 disclosure that supports your opinion?

3 A. Sure.

4 On page 11, lines 16 to 25, Stuttard explains
5 that among the eight threads, thread 0 can be assigned to a
6 general system control task; whereas thread 1 may be
7 assigned to execute two-dimensional activity tasks; and
8 threads 2 to 7 assigned to executing 3D activities,
9 including calculating vertices, primitives, and
10 rasterization.

11 This clearly shows that in fact there could be
12 three tasks running corresponding to different functions,
13 and these tasks could use any number of the threads, as
14 desired and available.

15 Q. What is the basis for you concluding that they
16 would each be based on respective state data?

17 A. So again, we know that nothing gets passed to
18 the processing blocks until the status block, which is one
19 of the engines would provide the status information to the
20 scheduler and the thread processors to activate and pass
21 down the instructions for execution.

22 So it must be that the state data has already
23 been loaded and provided to these threads before they can
24 get executed.

25 Q. All right.

1 Moving to slide 144, what does this show?

2 A. This is just disclosure on page 12, lines 1 to
3 7, that the number of threads could in fact exceed the
4 number of thread processors, so that each thread processor
5 can handle control for more than one thread. This again
6 goes to the idea of multithreading and multitasking and
7 supports that.

8 Q. All right.

9 So based on your review of Stuttard, were you
10 able to determine, or form an opinion with respect to
11 whether or not it disclosed or rendered obvious the
12 limitations of Claim 15?

13 A. Yes. In my view, it does disclose all of the
14 elements of Claim 15, and therefore Claim 15 is invalid.

15 Q. All right.

16 Did you review the Stuttard reference with
17 respect to the dependent claims?

18 A. Yes, sir, I did.

19 Q. All right. Did you form an opinion with respect
20 to the dependent claims?

21 A. Yes. Yes, I did.

22 Q. So let's go through those, starting with Claim
23 16.

24 Can you remind the Court what you identified as
25 the shader core?

1 A. It's the collection -- the shader core is the
2 collection of the processing blocks in Stuttard's system.

3 Q. Here you depicted it with eight processing
4 blocks. Why is that?

5 A. Again, many of the embodiments drawing, speak of
6 eight processing blocks, although there could be more.

7 Q. Can you remind the Court whether or not Stuttard
8 is limited to eight processing blocks?

9 A. No, it's not. It can have more than eight, as
10 disclosed.

11 Q. All right.

12 So looking back at the claim limitation, were
13 you able to determine whether or not the shader core
14 comprises a first plurality of processing elements, and a
15 second plurality of processing elements?

16 A. Yes. At any point in time, there could be
17 multiple tasks, let's say two tasks running in the Stuttard
18 system. One task could use a first plurality of blocks.
19 In this case I show four of them being selected to perform
20 the first task, and the remaining four are used to perform
21 the second task; therefore, they constitute a second
22 plurality of processing elements.

23 Note that this is an example only. The
24 partitioning could be 2 and 6 or 6 and 2 for one task
25 versus the other. It's a dynamic situation, and can

1 change.

2 Q. All right.

3 Moving to slide 150, to show the additional
4 limitations, were you able to determine whether or not
5 Stuttard discloses that those pluralities of processing
6 elements are configured to execute a first task based on a
7 first set of state data associated with the first task, and
8 a second task based on a second state data associated with
9 the second task, respectively?

10 A. Yes. The processing blocks are where all of the
11 processing of the graphics tasks, and general control
12 tasks, are done.

13 So we have seen this particular citation, page
14 11, lines 16 to 25. That clearly shows that these tasks
15 are there, assigned to different threads, and these threads
16 get executed within the processing blocks.

17 As I've already explained, the processing blocks
18 would only receive threads if the status block has already
19 been loaded and considered by the thread manager -- I'm
20 sorry, thread scheduler and thread processors.

21 Q. All right.

22 Based on your review, did you make a
23 determination as to whether or not the limitations of Claim
24 16 were disclosed or obvious by Stuttard?

25 A. Yes, I believe they are disclosed.

1 Q. All right.

2 A. Or rendered obvious.

3 Q. Moving to the next dependent claim, Claim 17,
4 does Stuttard disclose that the plurality of engines
5 comprise the first queue configured to receive the first
6 task and the second queue configured to receive the second
7 task?

8 A. Yes, it does.

9 Again, the Stuttard reference explains that the
10 cache unit, 1024, can be replaced by a series of
11 first-in/first-out buffers, one per thread. If you have
12 different tasks running the system, each one of them could
13 be using queues, these FIFO buffers, to store the
14 corresponding information.

15 Q. Sure. Could you explain a little more the
16 relationship between a queue and a FIFO buffer?

17 A. Yes. FIFO is first-in/first-out buffer, and
18 that's another term for a queue, as known by a person
19 skilled in the art.

20 Q. All right.

21 The quote that you had here at page 23, lines 3
22 through 11, is shown on slide 152 for the record.

23 All right. Based on your review, what did you
24 determine about the limitations of Claim 17 with respect to
25 the Stuttard disclosure?

1 A. That it discloses or renders obvious this
2 particular Claim 17.

3 Q. All right.

4 Moving to the next dependent claim, 19, does
5 Stuttard disclose the first task comprises a graphics
6 processing task, and a second task comprises the general
7 compute task?

8 A. Yes, sir, it does.

9 In the citation that we have seen a few times
10 already, Stuttard talks about using thread 0 to do general
11 system control, and thread 1 to do two-dimensional
12 activities, and threads 2 to 7 to do 3D activities.

13 3D activities would correspond to graphics
14 processing tasks, and at least the general system control
15 done on thread 0 would be considered general compute tasks.

16 Q. Could you just remind the Court, I know we
17 discussed it yesterday, but could you remind the Court what
18 a graphics processing task, and what a general compute task
19 are?

20 A. Yeah. Graphic processing tasks typically
21 involve vertex processing, pixel processing, geometry
22 processing; and at the higher level would be light,
23 shading, rasterization, stuff like that.

24 Q. All right.

25 Moving to the final dependent claim, Claim 20,

1 were you able to determine if Stuttard disclosed that the
2 shader core is configured to receive the plurality of tasks
3 based on a priority associated with each of the plurality
4 of tasks?

5 A. Yes, sir.

6 Again, on page 11, lines 16 to 25, it's
7 disclosed by Stuttard that the threads are assigned
8 priorities relative to one another, and that these
9 priorities could actually be used to prioritize tasks with
10 respect to each other; and therefore the high priority
11 tasks will get faster execution compared to the lower
12 priority tasks.

13 In fact, as part of the overall scheduling
14 that's described in detail in the Stuttard reference, the
15 priority of the task is one of the important factors.

16 Q. All right.

17 For the record, the quote from Stuttard is at
18 page 11, lines 16 to 25, on slide 154.

19 A. Yes, sir.

20 Q. Based on your review of the dependent claims,
21 were you able to determine whether or not those claims were
22 disclosed or rendered obvious?

23 A. Yes, sir. In my view, they are either
24 anticipated or rendered obvious by the Stuttard reference.

25 Q. Okay -- and --

1 A. Therefore, they are invalid.

2 Q. On slide 155, it seems to indicate that there's
3 no check mark for anticipation for Claim 19; is that
4 correct?

5 A. Yes, sir.

6 Q. All right.

7 Moving to secondary considerations of
8 nonobviousness --

9 A. Yes, sir.

10 Q. -- are you prepared to discuss that?

11 Did you review the section in Dr. Hart's expert
12 report directed to secondary considerations of nonobvious
13 with respect to the '381 Patent?

14 A. Yes, sir, I did.

15 Q. Did any of Dr. Hart's arguments or alleged
16 evidence change any of your opinions that the asserted
17 claims are obvious?

18 A. No, sir, they did not.

19 Q. Why not?

20 A. For two reasons.

21 First of all, the claims themselves do not
22 require asynchronous task dispatch, which is Dr. Hart's
23 claim, that -- and AMD's position, that is the main
24 invention of the '381.

25 If you look at the language of the claim, you

1 don't see this asynchronous task dispatch described there
2 at all or captured.

3 There is also no analysis that the secondary
4 considerations -- secondary consideration products practice
5 the claims.

6 And that's in two senses.

7 One is that there is no support that any of the
8 claims actually practice -- are practiced by the alleged
9 products.

10 Furthermore, the systems that have received the
11 praise or the success stories about them are about the full
12 system. The full system has many different attributes, and
13 it's not clear that, in fact, the praise or the success is
14 due to anything that relates to '381, and could be due to
15 many other factors, considerations.

16 Q. What is asynchronous task dispatch?

17 A. So this is a well-known concept, at least since
18 1970s and '80s, people have been talking about asynchronous
19 job dispatch or asynchronous task dispatch.

20 The idea is that you have a set of requesters
21 that send requests for processing. These requests get
22 stored someplace, and then a set of worker threads come,
23 get assigned some of the tasks, and execute them.

24 This is done in a nonblocking fashion so that a
25 dispatcher, job requester, will just make a request and go

1 on its own merry way, not wait. And then the shader -- the
2 worker threads come and do the execution of the
3 corresponding task.

4 So it's well-known, and I did not find this idea
5 captured in the language of the asserted claims in any way.

6 MR. JOHNSON: All right. I have no further
7 questions at this time.

8 THE WITNESS: Thank you.

9 MR. RIZK: Good morning, Your Honor. May I
10 proceed?

11 JUDGE ELLIOT: Yes.

12 MR. RIZK: Thank you.

13 JUDGE ELLIOT: Yeah, we're on the public record.

14 CROSS EXAMINATION

15 BY MR. RIZK:

16 Q. Good morning, Dr. Pedram.

17 A. Good morning.

18 Q. I'd like to start with your opinion on the
19 '053 Patent validity based on Stuttard.

20 Mr. Doyle, if we could please pull up Claim 5 of
21 the '053 Patent, which is JX-1.

22 Let's start with the at least one memory device
23 element.

24 You see that up on the screen; correct, sir?

25 A. Yes, sir.

1 Q. Okay.

2 That's Element 1(a), is what we have been
3 referring to it as; correct?

4 A. 5(a), yes.

5 Q. 5(a), yes. Thank you.

6 You identified in Stuttard its cache unit 1024
7 satisfying this Element 1(a); correct?

8 A. Again, Element 5(a). Yes, correct.

9 Q. 5(a). I apologize. Yeah. Okay.

10 Element 5(a) requires the at least one memory
11 device to comprise first and second portions that are
12 operative to store plurality of pixel and vertex command
13 threads; correct?

14 A. Yes, sir.

15 Q. Okay.

16 The Court construed the term "command thread" to
17 mean a sequence of commands applicable to the corresponding
18 element; is that correct?

19 A. Yes, sir.

20 Q. An instruction is a type of command; correct?

21 A. Commands are higher level construct than
22 instructions, but in the extreme, yes, a command could be
23 also a type of -- could be an instruction.

24 Q. Sir, yes or no: An instruction is a type of a
25 command?

1 A. Yes, it can be.

2 Q. A person of ordinary skill in the art would
3 understand -- this is a yes or no question, so let me
4 restart.

5 Yes or no: A person of ordinary skill in the
6 art would understand that a sequence of instructions
7 applicable to the corresponding element would satisfy the
8 Court's construction of a "command thread"; correct?

9 A. Yes, it can. Yes.

10 Q. Okay.

11 You will agree with me that to satisfy Claim
12 Element 1(a), and again, yes or no question, to satisfy
13 Claim Element, I apologize, 5(a), all of the instructions
14 within the required plurality of vertex and pixel command
15 threads need not be stored in the memory device at the same
16 time; correct?

17 A. That is correct, yes.

18 Q. You will further agree with me that -- and,
19 again, yes or no: Stuttard does not expressly disclose
20 that the cache unit 1024 comprises first and second
21 portions operative to store a plurality of vertex and pixel
22 command threads as required by the claim language of
23 Element 5(a); correct?

24 A. No.

25 Q. Sir, yes or no.

1 A. No, sir. I can explain, but...

2 Q. Just a yes or no question.

3 A. No, sir.

4 Q. The answer is no? Okay.

5 Let's please pull up -- let's pull up CX -- I
6 apologize. Let's pull up CX-672, page 145, at lines 12
7 through 18, which is Dr. Pedram's deposition transcript.

8 I asked you at your deposition, "Looking at
9 Paragraph 112 of your report, you acknowledge that Stuttard
10 does not explicitly disclose that the cache unit 1024
11 stores pixel command threads and vertex command threads;
12 correct?"

13 You answered, "Yes, sir. That's what I said
14 there. Correct, yes."

15 I asked you that question, you gave me that
16 answer; correct?

17 A. Yes.

18 Q. Yes or no. Thank you.

19 A. But it's talking about "explicitly disclose" --

20 Q. Sir --

21 A. -- you asked me previously, "expressly
22 disclose." To me, there is a difference.

23 Q. Okay. It was a yes or no question, sir.

24 Let's switch to Element 5(b), which is the
25 arbiter element.

1 If we could please pull back up JX-1 at Claim 5.

2 Now, the claimed arbiter must make a selection
3 between a plurality of pixel and vertex command threads;
4 correct?

5 A. Yes, sir.

6 Q. Okay.

7 But as a person of ordinary skill in the art
8 with respect to the invention, you would agree with me that
9 the arbiter selection need not be based on thread type to
10 satisfy the claim requirements of the arbiter; correct?

11 A. Not only that --

12 Q. Yes or no, sir.

13 As a POSITA, you would agree with me that the
14 arbiter selection of a command thread need not be based on
15 thread type to satisfy the claim requirement of
16 Element 5(b)?

17 A. Yes.

18 Q. Okay.

19 Let's bring up the Markman Order in this case,
20 which is CX-1866, side by side with the claims, please. We
21 can navigate to CX-1866.19.

22 Okay. This is where -- let's bring up the full
23 page, please, Mr. Doyle. Thank you.

24 This is where the Court provides its
25 construction of the "arbiter" term; correct?

1 A. Yes.

2 Q. Okay.

3 Let's go to the next page of the Order, where
4 the Court provides its explanation. Let's zoom in to the
5 last paragraph of this page, which -- and continuing into
6 the next page, 21. Sorry, which will be page 17 of the
7 Markman Order. So last -- that full paragraph that starts
8 on CX-1866.20, and ends on the beginning of .21.

9 Let's highlight the sentence -- the second
10 sentence of the last paragraph there on page 16.

11 Okay. We have -- I don't know if we can
12 juxtapose the claim language as well. If not, we'll go
13 with this.

14 So we have the highlighted sentence here, and
15 I'll read it into the record. It says, "The claim itself
16 requires the selection of a single command thread from
17 among at least four such threads, two or more pixel threads
18 and two or more vertex threads, so the selection must be
19 based at least in part on considerations other than merely
20 command thread type."

21 Did I read that correctly, sir?

22 A. Yes, sir.

23 Q. Let's go back to -- I want you to keep this
24 highlighted sentence in your mind, because I'm going to
25 refer to it in my questioning.

1 You didn't apply the guidance in the highlighted
2 sentence as a person of ordinary skill in the art in your
3 assessment of the prior art in this case, and whether the
4 claimed arbiter requirement is met by Stuttard's thread
5 scheduler? Yes or no.

6 A. I did apply this --

7 Q. Okay.

8 Well, let's pull up --

9 A. -- meaning and claim construction.

10 Q. Thank you, sir.

11 Let's pull up your deposition transcript,
12 CX-0672, at page 195, lines 16, through 196, line 7.

13 At your deposition, I asked you, "Okay. And
14 the -- in your report, you don't cite to any evidence that
15 the alleged arbiter thread scheduler 1025 and thread
16 processors 1026 are configured to select between at least
17 two pixel command threads and at least two vertex command
18 threads for a total of two threads, do you?

19 Answer: No, I do not." (As read.)

20 I asked you that question, you gave me that
21 answer; correct, sir?

22 A. Yes, but you asked for a total of four threads.
23 That's not what the Judge's Order was. This is not exactly
24 four threads. That's what threw me off.

25 The statement the Judge had provided was "at

1 least four threads." You are talking about exactly four
2 threads, and that was confusing to me. That's why I did
3 not agree to it.

4 Q. Okay.

5 I ask you to give me yes or no answers to my
6 questions, please. If you can't give me a yes or no
7 answer, you can say, I can't provide a yes or no answer.

8 Do you understand?

9 A. Sure.

10 Q. Okay. Thank you.

11 I then asked you, "And that's not a requirement
12 you applied as a person of ordinary skill in the art
13 determining whether or not the Claim Limitation 1(b) was
14 met; correct?"

15 You answered, "I didn't even consider it. I did
16 not apply that requirement to choose one thread from among
17 four different threads, two of them pixel type and two of
18 them vertex type. I did not consider it, and I did not
19 opine on it."

20 I asked you that question, and you gave me that
21 answer? Yes or no, sir.

22 MR. JOHNSON: Your Honor, objection.

23 THE WITNESS: Yes.

24 MR. JOHNSON: Improper impeachment.

25 JUDGE ELLIOT: Sustained.

1 BY MR. JOHNSON:

2 Q. All right. Let's go back to the Markman Order.
3 Actually, we don't need to pull it back up.

4 You have that highlighted sentence in the ALJ's
5 Markman Order in mind; correct?

6 A. Yes, sir.

7 Q. Okay.

8 Let's pull up Claim 5 of the '053 Patent,
9 please. I want you to keep the ALJ's guidance that you saw
10 from the highlighted sentence in mind, and focus on the
11 last element of Claim 5, which is the plurality of command
12 processing engines element.

13 You will agree with me that each of the claim
14 processing engines must be operative to process whichever
15 thread is provided to it by the claimed arbiter, be it a
16 pixel command thread or a vertex command thread if you
17 apply the ALJ's guidance in that highlighted sentence? Yes
18 or no.

19 A. Yes, sir, I do.

20 Q. You testified yesterday that a unified shader is
21 a command processing engine that processes both pixel and
22 vertex threads; correct? Yes or no.

23 A. Yes, sir.

24 Q. Yesterday, you played an animation. I'd like to
25 bring up RDX-4.26. You played an animation that was on

1 this slide, and we can go ahead and play it, Mr. Doyle, if
2 you don't mind.

3 And that animation showed Stuttard's processing
4 system processing vertex and pixel threads at the same
5 time.

6 Do you remember that?

7 A. In different processing blocks, yes.

8 Q. Okay. In different processing blocks.

9 It's your opinion that the different processing
10 blocks in Stuttard process pixel and vertex threads at the
11 same time; correct?

12 A. It can, yes.

13 Q. I'm told that we haven't received animations in
14 the slides, so we're apparently unable to play them. So I
15 apologize to the Court.

16 But you recall the animation that I'm referring
17 to?

18 A. Yes, sir, I do.

19 Q. Okay. Thank you.

20 Now, let's go to your opinion on the evidence
21 you identified in support of Stuttard as disclosing the
22 claimed at least one memory device element. If we can
23 bring up RDX-4.32, please.

24 This is one of the two slides -- sorry, 4.33,
25 please. Thank you.

1 This is one of the two slides that you identify
2 and cite to as providing -- where you cite to evidence
3 supporting your opinion that Stuttard discloses the at
4 least one memory device element; correct?

5 A. Yes, sir.

6 Q. Okay. And you cite to, as one of the cites,
7 RX-0416, pages 23 to 24, which is Stuttard page 2023 to
8 21-7, in support of this proposition that the processing
9 blocks of Stuttard process both pixel and vertex data which
10 requires storage of both command threads type.

11 Am I correct?

12 A. Yes, sir.

13 Q. Okay. Now, the cited-to section of Stuttard,
14 what it actually describes is the vertex processing portion
15 of Stuttard's disclosure of a linear graphics pipeline;
16 correct?

17 A. It describes that also, yes.

18 Q. Okay. You will agree with me that Stuttard
19 discloses a linear graphics pipeline; correct?

20 A. How do you define linear graphics pipeline?

21 Q. Well, I define it in the manner we have been
22 using in this case, and the manner that you have used it in
23 your deposition testimony in this case.

24 Do you not recall?

25 A. Can you refresh my mind, please?

1 Q. Yes.

2 Let's pull up CX-0672 at -- that's your
3 deposition transcript -- page 166, line 9, through 168,
4 line 11.

5 During your deposition, I had asked you, to
6 refresh your recollection, "In this disclosure, that
7 appears to be between 2023 to 21-7, that disclosure that
8 you're relaying on in 22-4 to 32 only happens after the
9 vertex processing has been completed; isn't that correct?"

10 And then you responded, "Yes, there is a linear
11 graphics pipeline described here with a particular ordering
12 between vertex and pixel processing, but we are talking
13 about a system that is trying to render a three-dimensional
14 image on a two-dimensional screen..."

15 I just want to note, does that refresh your
16 recollection of what a linear graphics pipeline is?

17 A. Can I read the rest of it also, please?

18 Q. Of course.

19 MR. JOHNSON: Objection. I would just say he
20 needs to show the entire answer. He can't just read a
21 portion of the answer.

22 MR. RIZK: Okay.

23 JUDGE ELLIOT: Okay. Well, I'll sustain the
24 objection because if you're trying to refresh his
25 recollection, that's not how you do it.

1 MR. RIZK: Okay. Thank you, Your Honor.

2 BY MR. RIZK:

3 Q. Do you recall what a linear graphics pipeline
4 is? We can take this down.

5 A. No, I was going to read the rest of it.

6 Q. Okay. All right. I'll move on to the next
7 question.

8 Stuttard discloses three discrete phases,
9 correct, of a graphics pipeline? Yes or no.

10 A. Yes.

11 Q. Okay. The first phrase is the geometry
12 processing phase; correct? Yes or no.

13 A. Again, I'd like to see the excerpt you are
14 referring to. I vaguely remember that -- the phased nature
15 of the Stuttard system; but exactly what the phase ordering
16 is and so on, maybe you can show me.

17 Q. Okay. I'm just asking you if you recall.

18 So do you recall if Stuttard discloses three
19 discrete phases in the graphics pipeline, phase A being
20 geometry processing phase, phase B being the binning and
21 phase 3 being rasterization? Yes or no.

22 A. No, not as such. I mean, there is a lot of
23 description there.

24 What I remember is vertex processing,
25 rasterization, pixel processing; but you used different

1 terms, so it could be, but I just don't remember the exact
2 wording now.

3 Q. Well, we'll get into it. You'll agree with me
4 that Stuttard discloses that after the geometry processing
5 phase and before the rasterization phase, the Stuttard
6 system performs binning; correct?

7 A. Again, I would like you to refresh my mind. If
8 you can put up the corresponding excerpt from Stuttard,
9 that would be appreciated, sir.

10 Q. All right. Let's pull up Stuttard, Figure 9,
11 please, and that's on page 136 of RX-416.

12 Now, this is one of the figures you discussed
13 yesterday; and in this figure, Stuttard at Figure 9 shows
14 the process of Stuttard's system; correct?

15 A. I don't believe I discussed Figure 9 in my
16 presentation yesterday. Did I?

17 Q. This figure shows a -- I'm going to try to
18 pronounce this -- binitired after geometry processing and
19 before pixel processing; correct?

20 A. I'm sorry, what part are you referring to?

21 Q. I'm referring to -- do you see, if we could
22 highlight the word "binitired." Do you see that?

23 A. Yes, I see.

24 Q. That's a processing step that occurs after
25 geometry processing, but before the pixel processing;

1 correct?

2 A. I don't see pixel processing. Where is the
3 pixel processing block here, that you are referring to,
4 sir?

5 Q. Do you know what binitired is?

6 A. Do I know what?

7 Q. Do you know what it is, what the binitired
8 reference means?

9 A. Not really, the binitired. I mean I know the
10 binitization process, but binitired, it just escapes my
11 mind.

12 Again, I really suggest -- I ask that if you
13 have a specific question about this, show me the
14 appropriate excerpt in the Stuttard so that it refreshes my
15 mind.

16 I read this reference many months ago, and I
17 remember most of it, but I did not make use of this Figure
18 9 in my presentation, and I'm not sure if I remember the
19 details now.

20 Q. You don't recall. Okay. That's fine.

21 You will agree with me, at least, that in
22 Stuttard's linear graphics pipeline, the process of pixel
23 processing occurs after geometry processing; correct?

24 A. I know pixel processing occurs after vertex
25 processing. That, I know.

1 Q. Okay. Thank you, sir.

2 A. Sure.

3 Q. So between those two phases, both pixel
4 processing and geometry processing, Stuttard's processing
5 blocks are identified as block parallel; agree or disagree?
6 Yes or no.

7 A. I remember the term block parallel, but I'd like
8 to see the context.

9 Q. Okay. Before -- I'll bring up the context, but
10 before I do that, your understanding of block parallel is
11 that all of -- in a block parallel phase, all of Stuttard's
12 processing blocks are operating on the same type of data.
13 Different data, but of the same type; correct?

14 A. Not necessarily; no, sir.

15 Q. Do you know one way or the other?

16 A. To me, the processing -- as I understand it, and
17 consistent with the specification in the Stuttard
18 reference, there are eight processing blocks, for example,
19 within Stuttard's system.

20 Each of the processing blocks is SIMD, so it can
21 run single instruction, multiple data. Same instruction
22 sequence is processing different data items. But the
23 different processing blocks are independent of each other,
24 and they can be doing different tasks.

25 There was explicit disclosure, we have seen it,

1 on page 11, column 25 -- I'm sorry, line 25-something, that
2 clearly showed that three different tasks, general I/O
3 control to the activity and 3D activity tasks, could be
4 running at the same time on different processing blocks of
5 Stuttard.

6 Q. Thank you, sir. Thank you.

7 So you just mentioned SIMD. Yes or no: You
8 will agree with me that the processing elements of a SIMD
9 would all run the same exact thread at any given moment in
10 time?

11 That's a yes or no question, please.

12 A. Yes, if there is --

13 Q. Sir, thank you. I have my answer.

14 A. No, I'm not -- I didn't say yes to your
15 answer -- I was --

16 Q. Sir --

17 JUDGE ELLIOT: Okay. Hold on.

18 Q. -- if you can't answer yes or -- sorry, Your
19 Honor.

20 JUDGE ELLIOT: Hold on.

21 So if you can't -- if you are asked for a yes or
22 no answer, and you can't answer yes or no, just say I can't
23 answer yes or no.

24 Don't interrupt the witness.

25 MR. RIZK: Thank you, Your Honor. I apologize.

1 JUDGE ELLIOT: Go ahead.

2 THE WITNESS: Sir, I was trying to -- I cannot
3 answer yes or no. I can provide more details.

4 BY MR. RIZK:

5 Q. Okay. In fact, you will agree with me that all
6 of Stuttard's processing blocks together form a SIMD? Yes
7 or no, or you can't answer the question.

8 A. No, sir, I disagree.

9 Q. Okay.

10 Let's please pull up CX-1867.5, which is
11 Stuttard, and let's zoom in to the very first paragraph
12 after the summary of the invention, which is found on lines
13 15 to 23, please. If we can get that whole summary of the
14 invention. There we go.

15 I'm going to just read this into the record, and
16 I'd like you to confirm that I have read it accurately.

17 It states, "According to one aspect of the
18 present invention, there is provided a data processing
19 apparatus comprising a SIMD (single instruction, multiple
20 data) array of processing elements, wherein the processing
21 elements are operably divided into a plurality of
22 processing blocks, the processing blocks being operable to
23 process respective groups of data items."

24 Did I read that correctly, sir?

25 A. Yes, sir, you read it correctly.

1 Q. Okay.

2 So Stuttard discloses that the SIMD, made up of
3 all of these array of processing elements, is divided into
4 multiple blocks? Yes or no.

5 A. I can't answer yes or no.

6 Q. Thank you, sir.

7 In fact, Stuttard expressly discloses that all
8 of its processing blocks together operate on a common
9 received instruction at any given moment in time? Yes or
10 no.

11 A. It's not a yes or no answer, sir.

12 Q. So your testimony is that that is not how
13 Stuttard operates? Yes or no.

14 A. No, it does not.

15 Q. Okay.

16 Let's pull up Stuttard, and RX-416.5, and let's
17 zoom in to lines 25 to 33, please.

18 Okay. I'll read this into the record.

19 It says, "According to another aspect of the
20 present invention, there is provided a data processing
21 apparatus comprising an array of processing elements, which
22 are operable to process respective data items in accordance
23 with a common received instruction, wherein the processing
24 elements are operably divided into a plurality of
25 processing blocks having at least one processing element,

1 the processing blocks being operable to process respective
2 groups of data items."

3 Did I read that correctly? Yes or no.

4 A. Yes, you did.

5 Q. Thank you, sir.

6 A. It's just one embodiment.

7 Q. Let's turn to RDX-4C.31, which is the other
8 slide that you cite to in support of Stuttard satisfying
9 the claimed at least one memory device element.

10 You cite to page 11 of Stuttard -- I'm sorry.

11 It's not 31. Let's go forward one slide, please, 32.

12 Thank you.

13 You cite to Stuttard 11:16-25 in support of this
14 proposition that the memory element is satisfied; correct?

15 A. Yes, sir.

16 Q. Okay.

17 But you left out a piece of Stuttard that
18 appears after this excerpt that you have at 11:16-25.

19 Why don't we put Stuttard up side by side, same
20 page and expand the selection to line 35. So let's get 16
21 all the way down to 35, please. Let's highlight the very
22 last sentence of the last paragraph.

23 That last sentence reads, "In this particular
24 example, the same instruction stream" -- the same
25 instruction stream -- "is supplied to all of the processing

1 blocks in the system."

2 Did I read that correctly, sir?

3 A. Yes, sir.

4 Q. Thank you.

5 A. It's just an example.

6 Q. That's referring to the example shown in
7 Figure 4? Yes or no.

8 A. Sure, yes.

9 Q. Thank you.

10 Stuttard uses the phrase "instruction stream" to
11 refer to a thread; correct? Yes or no.

12 A. Yes, I believe so.

13 Q. Okay.

14 Now, you would agree with me, and this is a yes
15 or no question, that if all of the processing blocks 106 in
16 Stuttard at any given moment in time either process pixel
17 or vertex threads, but not both, then it is not necessarily
18 true that Stuttard's cache unit would store both pixel
19 threads and vertex threads at the same time?

20 A. I disagree.

21 Q. Okay. Let's pull up your transcript, and see
22 about that.

23 We can pull up 177, line 9, to 178 line 5,
24 please.

25 Okay. I'm going to read part of the question,

1 which starts on line 13, but you can have the full question
2 in front of.

3 I asked you at your deposition, "You would agree
4 with me that if the processing blocks 106 of Stuttard at
5 any given moment in time either process pixel or vertex,
6 but not both, then it's not necessarily true that the cache
7 unit stores pixel and vertex threads at the same time?"

8 (As read.)

9 You answered, "So when the processing -- so when
10 you say 'the processing blocks 106,' all of them?"

11 I answered, "Yes, yeah."

12 And then you answered, "All of the processing
13 blocks in the Stuttard's GPU are doing, say, only vertex
14 processing, there is no task that was swapped out for this
15 new task to run, then the answer would be yes, but consider
16 that there was another task that was."

17 I asked you that question, you gave me that
18 answer? Yes or no.

19 A. Yes, I did, but I said, if there was no --

20 Q. Thank you.

21 A. -- task that was swapped out for the new task to
22 run.

23 Q. Thank you, sir.

24 A. That's not true, what you are saying.

25 Q. All right. Let's shift gears to the

1 '381 Patent, please, and we're going to stay on the shader
2 core element in your -- what you said about the processing
3 blocks in your testimony.

4 Let's bring up Claim 15 of the '381 Patent, and
5 also RDX-4.139.

6 There are a few problems with your Stuttard
7 testimony for the '381 as well, but I'm going to focus on
8 the shader core because we're talking about the processing
9 blocks.

10 You identify Stuttard's processing blocks 106 as
11 the alleged shader core; correct? Yes or no.

12 A. Yes, sir.

13 Q. Okay.

14 On this slide that we have up on the screen, you
15 have highlighted in yellow the sentence that talks about
16 maintaining processing of simultaneously active program
17 threads; correct?

18 A. Yes, sir.

19 Q. Okay.

20 But you left out, you didn't highlight the next
21 sentence that says, "In this particular example, the same
22 instruction stream is supplied to all of the processing
23 blocks in the system"? Yes or no.

24 A. Yes.

25 Q. Thank you, sir.

1 A. It's just an example.

2 Q. You relied on this -- on the highlighted
3 sentence, in part, to explain to the Court that Stuttard's
4 processing blocks execute multiple tasks simultaneously;
5 correct? Yes or no.

6 A. Yes, I did.

7 Q. Okay.

8 In fact, you will agree with me that there's no
9 express disclosure in Stuttard of multiple tasks executing
10 at the same time on the processing blocks? Yes or no.

11 A. To me, there is --

12 Q. Sir, it's a yes or no question. Yes or no.

13 Do you want me to repeat the question?

14 A. Please do.

15 Q. Okay. Thank you.

16 There is no -- you will agree with me that
17 there's no express disclosure in Stuttard of multiple tasks
18 executing at the same time on the processing blocks 106?
19 Yes or no.

20 A. It's not a yes or no.

21 Q. Okay.

22 Let's -- respectfully, I disagree.

23 Let's pull up your transcript at 268/23 to
24 269/8.

25 I asked you at your deposition, "So, in fact, in

1 fact, sir, there really is no disclosure -- express
2 disclosure in Stuttard of multiple tasks executing at the
3 same time on the processing blocks 106; correct?"

4 You answered, "Clarification for me: 'At the
5 same' time means what? Concurrently? At the same exact
6 instance in time?"

7 Answer, "Yes." It's reflected as a question.

8 "There is" -- sorry.

9 The answer is, "There is time multiplexing, but
10 otherwise, you're right."

11 Did I read that correctly, sir?

12 MR. JOHNSON: Objection, Your Honor.

13 Your Honor.

14 JUDGE ELLIOT: Oh, I'm sorry. Yes.

15 MR. JOHNSON: Improper impeachment. Objection,
16 Your Honor.

17 JUDGE ELLIOT: Give me a moment.

18 Are you saying that the question was not the
19 same?

20 MR. JOHNSON: Yes, Your Honor.

21 JUDGE ELLIOT: Overruled.

22 BY MR. RIZK:

23 Q. The multiple threads that are running on a
24 single SIMD would never pertain to more than one task;
25 correct? Yes or no.

1 A. Can you repeat the question again, please?

2 Q. Multiple threads running on a single SIMD would
3 never pertain to more than one task? Yes or no.

4 A. That's correct. Yes, sir.

5 Q. All right. Let's pull up Claim 15, please.
6 Let's bring up CX-1249C, which was Exhibit 3 to your
7 deposition transcript. Okay.

8 Now, you provided in your deposition -- I asked
9 you what an engine was, and we wrote down -- I wrote down
10 what you told me you believed a single -- the minimum
11 capabilities were for a singular engine.

12 Do you recall that?

13 A. Yes, sir, I do.

14 Q. Okay.

15 This exhibit is reflective of what we wrote
16 down, memorializing your understanding of the minimum
17 capabilities of a singular engine? Yes or no.

18 A. It's not complete, sir, no.

19 Q. Okay.

20 A. You have not written everything I said.

21 Q. Okay.

22 You added, later on, additional limitations,
23 including processing, I believe?

24 A. Yes, sir, I did.

25 Q. Okay.

1 Well, let's focus on what you wrote down
2 initially, or what I wrote down reflecting what you told
3 me.

4 A. What you wrote down, sir.

5 Q. You said that a singular engine must be
6 configured to do any one of the following tasks:

7 Load state data associated with each of the
8 plurality of tasks, or receive from a scheduling module
9 associated with a second processing unit a plurality of
10 tasks, or facilitate or enable another engine in the
11 plurality of engines to perform 1 or 2.

12 Did I read that correctly?

13 A. Yes, sir.

14 Q. Okay.

15 It's your testimony that a component that
16 facilitates or enables another engine in performing the
17 receipt of tasks or loading of state data, but doesn't
18 itself receive a task from a scheduling module or load
19 state data can be considered a claimed engine? Yes or no.

20 A. What I have said --

21 Q. Sir, please, if you can't answer my question
22 yes --

23 A. It's not a yes or no.

24 Q. Thank you.

25 The '381 Patent doesn't explicitly provide that

1 if a component facilitates or enables another engine in the
2 plurality of engines, that it can be considered an engine?
3 Yes or no.

4 A. I'm sorry. Can you repeat the question, please?

5 Q. The '381 Patent does not explicitly disclose
6 that if a component facilitates or enables another engine
7 to load tasks or receive a task, that it could, too, be
8 considered an engine? Yes or no.

9 A. No, it doesn't read in a literal way.

10 Q. Thank you, sir.

11 Under your definition of engine, let's pull
12 up -- do you recall in the '381 Patent -- we're not going
13 to pull up anything.

14 Do you recall in the '381 Patent there's
15 preprocessing logic that receives tasks? Yes or no.

16 A. I'm sorry. Repeat the question again.

17 Q. There's preprocessing logic disclosed in the
18 '381 Patent that receives tasks? Yes or no.

19 A. I don't recall that.

20 Q. Okay.

21 Let's pull up -- actually, let's go back to
22 Stuttard, and let's talk about your alleged engine and
23 scheduling module.

24 For the claimed scheduling module, you identify,
25 you identify Stuttard's instruction fetch unit 1023 or the

1 thread scheduler 1025; correct?

2 A. Yes, sir.

3 Q. Okay. Then for the engines, you identify the
4 thread -- components of the thread manager, channel
5 controller, and array controller; correct?

6 A. Yes, sir.

7 Q. Okay. You will agree with me that all of the
8 thread manager, array controller and channel controller,
9 they're all associated with the same processing unit,
10 processing core 10? Yes or no.

11 A. It's not a yes or no answer.

12 Q. Okay. They're all part of the same processing
13 core 10? Yes or no.

14 A. It's not a yes or no answer.

15 Q. Thank you, sir.

16 A. I have to see it. Actually, if you show me the
17 figure, I will answer the question. Whether they are part
18 of it or not.

19 Q. It's in the reference. Thank you, sir.

20 You will agree with me, sir, that Jiao's system
21 only discloses a single command buffer? Yes or no.

22 We're turning to Jiao now.

23 A. I don't recall that, sir.

24 Q. Okay. So it's possible, you agree with me that
25 it's possible that Jiao's system only discloses a singular

1 command buffer? Yes or no.

2 A. I can't answer that.

3 Q. Okay. Well, let's pull up -- let's pull up Jiao
4 at column 4, lines 55 to 59. Okay.

5 The sentence that starts on line 59 says, "The
6 graphics processor system 100 may comprise a display device
7 102 written by display interface unit (DIU) 104 and memory
8 106, e.g., which may comprise a display buffer, frame
9 buffer, texture buffer, command buffer."

10 Yes or no, at least in this disclosure of Jiao,
11 it does not disclose multiple command buffers?

12 A. I mean it uses command buffer and texture buffer
13 and frame buffer in the singular way.

14 Q. Thank you.

15 A. I don't think they're implying that there is a
16 singular frame buffer or a singular texture buffer;
17 therefore, it's not necessarily implying there is a single
18 command buffer.

19 Q. Thank you, sir. I would ask you to answer my
20 questions with yes or no in the future.

21 A. Thank you, sir.

22 Q. Your alleged scheduler module for Jiao is the EU
23 pool control? Yes or no.

24 A. Yes.

25 Q. And your alleged shader core in Jiao is the EU

1 pool? Yes or no.

2 A. I'm sorry. With respect to the scheduler for
3 Jiao, I believe I also identified the fetch unit.

4 Q. Okay. Let's -- I don't think you did, but let's
5 say it's the fetch unit and the --

6 A. No, no. Again, I want to see -- I'm sorry.
7 This is going -- Judge, if I could ask -- I mean, you are
8 going too much by memory. Can you show me the drawing
9 or -- I --

10 Q. I'm going to try -- I'm going to try it this
11 way, sir. Let me try to do it a little bit differently. I
12 will withdraw that question. I'm withdrawing that
13 question.

14 The EU pool control, okay, you know what that
15 is --

16 A. Yes, sir.

17 Q. -- and your alleged engines, the vertex shader,
18 pixel shader, programs, are part of the same graphics
19 processing unit? Yes or no.

20 A. Give me a moment, please.

21 Q. That's okay. We'll pull it up. I'll help you
22 out. So let's...

23 Let's pull up your deposition transcript at page
24 220, lines 22, through 221, line 9.

25 At your deposition, I asked you, "And those

1 alleged engines, 304, 306, and 310, and the EU pool control
2 vertex stream cache, 206, they all reside within the same
3 graphics processing unit."

4 You answered, "Yes, they are all receiving
5 graphics processing unit, I guess you're talking about --
6 where you're talking, which is a main -- there are numbers
7 associated with these.

8 They're part of 202. Right, a system called
9 202. Yes. They're all part of the same graphics processor
10 202. Correct?

11 Answer. Yes." (As read.)

12 Did I read that correctly?

13 A. Yes, you did.

14 MR. JOHNSON: Objection, Your Honor. Improper
15 impeachment.

16 JUDGE ELLIOT: Give me a moment.

17 Sustained.

18 Why don't you start over again with this
19 particular question.

20 MR. RIZK: I misread the question. Okay.

21 BY MR. RIZK:

22 Q. I asked you, "And these alleged engines, 304,
23 306 and 310, and the EU pool control vertex stream cache,
24 206, they all reside within the same graphics processing
25 unit; correct?"

1 You answered yes, they are all receiving
2 graphics processing unit 114, I guess you're talking
3 about -- or you're talking -- which is our main -- there
4 are numbers associated with these. They are a part of 202;
5 right?

6 That was my question.

7 And then you answered, "A system called 202,
8 but --"

9 And then I asked you: "Yeah, they're all part
10 of the same graphics processor, 202; correct?"

11 And you answered "yes." (As read.)

12 Did I read that correctly?

13 MR. JOHNSON: Objection, Your Honor. He's just
14 reading the transcript.

15 JUDGE ELLIOT: Sustained.

16 Are you trying to refresh his recollection?

17 MR. RIZK: Yes. I asked him before, Your Honor,
18 if he recalls if the EU pool control and the vertex shader
19 programs, which are the alleged engines, 304, 306 and 310,
20 are all part of the same GPU, and he said he doesn't
21 recall.

22 JUDGE ELLIOT: Oh, I don't see that. Hold on.

23 THE WITNESS: Sir, I have asked for the actual
24 specification so that I can look at the drawing.

25 JUDGE ELLIOT: I understand, Dr. Pedram, but

1 that's not how it works. He gets to ask the questions, and
2 the other side can object to them, and then I rule. I
3 can't make him ask questions in a certain way. Okay.

4 I don't think he said that. So why don't you
5 start over again on this particular question.

6 MR. RIZK: Okay.

7 BY MR. RIZK:

8 Q. Sir, the alleged engines, 304, 306 and 310, and
9 the EU pool control vertex stream cache all reside within
10 the same graphics processing unit? Yes or no.

11 A. Give me a moment, please, I need to check the
12 reference.

13 Q. Sir, I'm going to withdraw that question. I'm
14 going to ask you one last question. I think the answer was
15 clear from your deposition testimony what the answer is.

16 I'm going to ask you one last set of questions.

17 A. Yes, sir.

18 Q. What you identified as the engines in Jiao are
19 actually shader programs; aren't they? Yes or no.

20 A. It's not a yes or no.

21 Q. Okay. The shader programs that you identify,
22 actually Jiao discloses that they generate tasks? Yes or
23 no.

24 A. Again, it's not a yes or no. I can explain, if
25 you -- if I'm given the opportunity.

1 Q. Jiao doesn't expressly disclose how your alleged
2 vertex -- how your alleged shader programs, which you say
3 constitute the engines, receive tasks from the driver? Yes
4 or no.

5 A. It does explain it. It does disclose it. A
6 POSITA would know what it means, and what they explain.

7 Q. And the shader programs are actually executed on
8 the EU pool; correct? Yes or no.

9 A. I can't answer that.

10 Q. Okay. A task comprises shader programs? Yes or
11 no.

12 A. A task -- depends on the type of shader program.

13 Q. Okay. So you are alleging that the engines in
14 this case are the actual tasks, and that they move along
15 the graphics pipeline, and then get executed in the shader
16 core, in your alleged shader core.

17 That's your testimony today; is that true, sir?

18 A. Absolutely false.

19 MR. RIZK: Thank you, sir. I have no further
20 questions for the witness at this time.

21 Thank you, Your Honor. Thank you, Dr. Pedram.

22 THE WITNESS: Thank you.

23 JUDGE ELLIOT: Mr. Johnson, how long do you
24 think you will be?

25 MR. JOHNSON: Say 15 minutes.

1 JUDGE ELLIOT: Okay. Let's finish with
2 Dr. Pedram, and then we'll take a morning break.

3 REDIRECT EXAMINATION

4 BY MR. JOHNSON:

5 Q. Dr. Pedram, counsel asked you about the -- well,
6 first of all, for the record, we're on slide 139 of
7 RDX-0004; and on that slide contains a reference from
8 Stuttard at page 11, line 27, through page 12, line 7.

9 Earlier counsel asked you about the last
10 sentence that's unhighlighted in this paragraph. Do you
11 recall that?

12 A. Yes, sir.

13 Q. Does that last sentence change any of your
14 opinions?

15 A. No. In fact, it doesn't. I have a good
16 explanation whereby one can reconcile this particular
17 sentence, which is an example in Stuttard, with the rest of
18 the disclosure that clearly shows multiple tasks being run
19 simultaneously.

20 Q. Could you go ahead and provide that explanation
21 to the Court?

22 A. Sure.

23 So Stuttard's system comprises of eight
24 different processing blocks. Each of these processing
25 blocks is organized to act in a SIMD fashion; single

1 instruction, multiple data.

2 Therefore, only a single thread, stream of
3 commands or instructions, can run within any one of those
4 processing blocks.

5 But you could have multiple threads
6 corresponding to multiple tasks running on different
7 processing blocks.

8 Now, you could organize Stuttard's system so
9 that one thread runs on all of the eight processing blocks.
10 You could configure it to run different threads of the same
11 task at the same time. You could organize it to run
12 different threads of different tasks at the same time.

13 This is clearly disclosed in multiple places.
14 The examples that he has in terms of three different tasks,
15 a general I/O control, a 2D activity and a 3D activity task
16 being run simultaneously is a clear indication of that.

17 In view of all that, there is this one sentence
18 that says, "...the same instruction stream is supplied to
19 all of the processing blocks in the system." Yes, that's
20 an example. That's fine.

21 But in fact, we have eight thread processors.
22 Each thread processor is responsible to put together the
23 instructions and send it down to the different processing
24 blocks.

25 If, in fact, one instruction stream only was

1 going to run on that system, you didn't need eight thread
2 processors. They're all doing the exact same thing. You
3 would have only one thread processor that would take care
4 of all of the different processing blocks.

5 These thread processors do computations,
6 implement different types of looping and branching
7 conditions. They actually put together different
8 instruction streams that get dispatched.

9 So how could it be that you need eight
10 processing -- thread processors if you are going to run the
11 exact same stream all the time? That's not correct. This
12 cannot be the case.

13 Furthermore, if you look at the -- this active
14 thread, there is the disclosure -- there is one active
15 thread in the system, one active thread per processing
16 block. There could be eight active threads per eight
17 different processing blocks in the example system.

18 Q. All right.

19 Do all of Stuttard's processing blocks form a
20 SIMD?

21 A. No, sir, they do not.

22 Q. Why not?

23 A. Each one of them is organized as a SIMD, but not
24 all of them necessarily.

25 Again, as I said, it is possible to run the

1 exact same instruction stream on all of the processing
2 blocks. The Stuttard system does not exclude that. One of
3 the embodiments does support that, but, in fact, you could
4 run eight different instruction streams on eight different
5 processing blocks in the example that Stuttard describes.

6 Q. Earlier, you were asked to confirm whether or
7 not pixel processing occurs after vertex processing.

8 Do you recall that?

9 A. Yes, sir.

10 Q. Is that true?

11 A. Again, if you -- so these are systems that are
12 capable of doing graphics processing.

13 Your Honor, imagine you have a screen that's
14 already an image that's been rendered on a two-dimensional
15 screen, and there is a change in that screen, for example,
16 a cartoon character moves or an object actually gets
17 displaced.

18 You have two different tasks generated
19 corresponding to two different activities on that
20 already-rendered screen, for example.

21 So now, the first task goes in. It goes through
22 vertex processing, followed by pixel processing, and then
23 exits. It does the vertex processing using whatever
24 threads it needs. It gets to its pixel processing stage,
25 but now the next update comes. The next task arrives. And

1 the next task is some other part of the screen, some other
2 object has to be re-rendered, and that comes in. It
3 doesn't wait. It just goes in. There is available thread.
4 It's going to start its vertex processing while the
5 previous task is still doing the pixel processing.

6 So with respect to any one primitive being
7 rendered, there is a linear pipeline or a phased pipeline.

8 But respect to multiple objects being rendered
9 one after the other, this doesn't mean that you could not
10 have different threads, pixel and vertex threads, running
11 simultaneously, they just correspond to different tasks,
12 graphics processing tasks.

13 Q. All right.

14 A. I've said this very clearly in my deposition.
15 We went through this pages and pages, and I explained it.

16 Q. CX-1249C.

17 You were asked some questions about this
18 exhibit, which is --

19 A. Yes.

20 Q. -- showing as CX-1249C.

21 Do you recall that?

22 A. Yes, sir.

23 Q. This was an exhibit that counsel introduced at
24 your deposition; correct?

25 A. Yes, sir.

1 Q. Did you write this?

2 A. No, sir, I did not.

3 Q. Who wrote it?

4 A. Mr. Rizk.

5 Q. Does it accurately reflect your testimony?

6 A. No, sir.

7 Q. Did you ever intend this to be a definition of
8 the word "engine"?

9 A. No, sir.

10 Q. All right.

11 You can take that down.

12 Can you bring up Claim 15 of the '381 Patent.

13 Just a few more questions, Your Honor. Almost
14 done.

15 Dr. Pedram, do you recognize Claim 15 of the
16 '381 Patent?

17 A. Yes, sir.

18 Q. Can you highlight "a scheduling module
19 associated with a second processing unit."

20 Do you recall this phrase, "a scheduling module
21 associated with a second processing unit"?

22 A. Yes, sir.

23 Q. What does "associated with" mean?

24 A. It has some kind of relationship with the second
25 processing unit. Data exchange, for example, would qualify

1 as association, establishing association.

2 Q. Does the claim require that "associated with"
3 means "part of"?

4 A. No, sir. That's not my reading.

5 Q. Does the claim require any other associations?

6 A. Yes. I mean, scheduling module might have
7 multiple associations with multiple processing units. It's
8 not a unique association that's required here.

9 Q. I don't think you heard my question, but other
10 than the scheduling module associated with the second
11 processing unit, does the claim require any of the other
12 components to have associations?

13 A. No, sir.

14 Q. Okay.

15 Can a recited component have more than one
16 association under the claim?

17 MR. RIZK: Objection, Your Honor. Leading.

18 JUDGE ELLIOT: Sustained.

19 THE WITNESS: I already answered this --

20 JUDGE ELLIOT: Hold on. You don't need to
21 answer that.

22 BY MR. JOHNSON:

23 Q. Does the claim require command buffers?

24 A. No, sir.

25 MR. JOHNSON: I have no further questions, Your

1 Honor.

2 JUDGE ELLIOT: Very well.

3 MR. RIZK: I have no further questions, either,

4 Your Honor.

5 JUDGE ELLIOT: Very well.

6 Anything for TCL?

7 MR. PATARIU: No, Your Honor.

8 JUDGE ELLIOT: Very well.

9 Dr. Pedram, thank you very much.

10 THE WITNESS: Thank you, sir.

11 (Witness excused.)

12 JUDGE ELLIOT: Okay. Let's take our morning

13 break. I have 10:31. We'll come back at 10:45. 10:45.

14 (A recess was taken at 10:31 a.m., after which
15 the hearing resumed at 10:46 a.m.)

16 MR. JOHNSON: Could we have some more time, Your
17 Honor?

18 JUDGE ELLIOT: How much time do you need?

19 MR. JOHNSON: Ten minutes?

20 JUDGE ELLIOT: Oh, okay. Fine.

21 So let's start again at 10:55. 10:55.

22 MR. JOHNSON: Thank you.

23 (A recess was taken at 10:47 a.m., after which
24 the hearing resumed at 10:55 a.m.)

25 JUDGE ELLIOT: Are you okay? Do you need more

1 time?

2 MR. JOHNSON: We're at an impasse on three
3 issues, so we'll have to have a rule on those.

4 JUDGE ELLIOT: Okay. Well, who wants to present
5 the issue first?

6 MR. MEUNIER: Well, I think it's our objection,
7 Your Honor, so.

8 JUDGE ELLIOT: Come on up and tell me.

9 MR. MEUNIER: Thank you. My name is Bill
10 Meunier, Your Honor.

11 There's three primary objections we have with
12 the slides that we got last night about Dr. Manocha's
13 proposed testimony here.

14 The third one is the biggest. I'll just
15 summarize them, and then ask your permission to actually
16 explain what I'm actually talking about.

17 One is in Dr. Manocha's report, he only alleged
18 anticipation for claims 7 and 10 under Sorgard, and now
19 they want to present an obviousness theory on those claims.

20 The second issue is they're still presuming
21 Sorgard for Claim 9, which as I read your motion in limine
22 order, they were precluded from doing because the
23 prehearing brief was solely based on a new argument.

24 The third one is the biggest; and last night, we
25 got their slides, and there's a brand new theory under

1 Sorgard that's not in their prehearing brief, not in his
2 report, and not discussed at the deposition.

3 So with your permission, I'd like to kind of
4 just explain each one of those by showing you what's
5 actually in the documents, and what's not.

6 JUDGE ELLIOT: Okay. Tell me which, which
7 motions in limine are we talking about?

8 MR. MEUNIER: Sure. It was motion in limine
9 Number 5, Order number 68.

10 JUDGE ELLIOT: Okay.

11 MR. MEUNIER: Do you want me to start with that
12 one, Your Honor?

13 JUDGE ELLIOT: Whichever one you want to start
14 with.

15 MR. MEUNIER: Okay. Jimmy, can we put up
16 Paragraph 186 and Paragraph 234 from Dr. Manocha's report,
17 please.

18 So Your Honor, you can see here, we have the two
19 leading paragraphs for each of these theories. For FXT1
20 it's clear that Dr. Manocha is saying that it's anticipated
21 or obviousness for FXT1 for these claims.

22 It says, "In my opinion, FXT1 disclosed or at
23 least rendered obvious Claims 7-11 and rendered obvious
24 claim 12 of the '628 Patent in view of the POSITA's
25 knowledge."

1 But you contrast that with his Sorgard position
2 where it was only anticipation for Claim 7, 8, 10, and 11.
3 It is my opinion that Sorgard disclosed Claims 7, 8, 10,
4 11, and at least rendered obvious Claims 9.

5 Right now, what they're trying to do is present
6 an obviousness argument under Sorgard for not only Claim 9,
7 which is the only one still in play that they asserted
8 obviousness in his expert report, but also Claims 7 and 10.

9 JUDGE ELLIOT: Okay. I'm sorry. So the one on
10 top --

11 MR. MEUNIER: Sure.

12 JUDGE ELLIOT: -- which one is which?

13 MR. MEUNIER: Yeah. I'm sorry, Your Honor.

14 The one we're objecting to is the bottom one, is
15 Sorgard. This is from Dr. Manocha's expert reports.

16 The point is, for Sorgard, in his expert report,
17 he only asserted anticipation for Claims 7 and 10 under
18 Sorgard. Above that is an example of what he said for a
19 different reference when he was saying obviousness for all
20 of the claims on that one.

21 So that one is just there to contrast what he
22 said.

23 JUDGE ELLIOT: Okay. I understand.

24 MR. MEUNIER: So that would be number one.

25 JUDGE ELLIOT: Okay. So is there -- you're

1 anticipating he's going to testify differently based upon a
2 demonstrative.

3 MR. MEUNIER: That's correct, Your Honor.

4 JUDGE ELLIOT: Okay. Show me the demonstrative,
5 please.

6 MR. MEUNIER: For example, Jim, can you put up
7 slide RDX-0002C, number 49. That's the lead-in slide to
8 his analysis. It's only under 103, and that carries
9 through for Claims 7, 9 and 10 of the '628 Patent for
10 Sorgard.

11 JUDGE ELLIOT: That's it? Just this? Just the
12 reference to 103?

13 MR. MEUNIER: Well, no. We can go to RDX--- can
14 you go to slide 75, please, Jim.

15 So this is the summary of all of the analysis
16 between those two slides, and it's Sorgard renders obvious
17 Claim 7 of the '628 Patent.

18 JUDGE ELLIOT: Okay. We don't have any idea
19 which elements he thinks are not disclosed anymore --
20 expressly disclosed, that is.

21 MR. MEUNIER: That's true.

22 JUDGE ELLIOT: Okay. So I'm going to overrule
23 your objection on this, but you can renew it when we get to
24 what he says, because --

25 MR. MEUNIER: Okay.

1 JUDGE ELLIOT: -- because I have no indication
2 of exactly why he has changed his stance on this; but
3 presumably, we'll find out. Okay.

4 MR. MEUNIER: Thank you, Your Honor.

5 JUDGE ELLIOT: Mr. Johnson.

6 MR. JOHNSON: Can I address that one before we
7 move to another one?

8 JUDGE ELLIOT: Sure. Go ahead.

9 MR. JOHNSON: Your Honor, just a couple of quick
10 issues.

11 First of all, if you see that subheading C says
12 invalidity of Claims 7 through 12 in view of -- I'm sorry,
13 B. He reversed them on me.

14 B, invalidity of Claims 7 through 12 of the
15 '628 Patent. In view of Sorgard and a POSITA's knowledge.
16 That's textbook obviousness language.

17 I think he's reading too much into the word
18 disclosed. The fact of the matter is, he's going to be
19 testifying about whether or not they're disclosed to a
20 person of ordinary skill in the art.

21 Maybe they're disclosed expressly, which would
22 be anticipation, but maybe they're disclosed to a person of
23 ordinary skill in the art in the way they view it and
24 interpret the claim; that would be obvious. I think
25 they're reading too much into the word disclosed.

1 Second, Your Honor, if they had an issue with
2 this, it was in our prehearing brief, just this way. In
3 fact that's the language. They didn't bring a MIL on it,
4 so it's waived.

5 JUDGE ELLIOT: Okay. Hold on. I opened up your
6 prehearing brief in anticipation that this would be an
7 issue. Give me a moment, please.

8 Okay. Well, that's a good point. On page 92 of
9 Respondents' prehearing brief, they're not saying there's
10 anticipation.

11 MR. MEUNIER: That's right, Your Honor.

12 If you remember, we did move to strike -- we did
13 move for a reason, but we didn't move for this reason based
14 on the obviousness because we thought -- we thought that
15 your previous order about obviousness on his report, on
16 what was disclosed and what was not in the contentions
17 would cover this.

18 But I don't -- it's not my understanding that
19 there's a rule that says we've waived every objection if we
20 haven't done a motion in limine.

21 JUDGE ELLIOT: Okay. Give me a moment. Let me
22 review my order on the motion in limine, Order 68.

23 Okay. Well, this doesn't -- the discussion --
24 what you've said, Mr. Johnson, does not change my ruling.

25 I'm going to overrule the objection for now, but

1 I will entertain objections on a question-by-question
2 basis.

3 I think that the use of disclosed in Paragraph
4 186 of Dr. Manocha's expert report, is a little bit sloppy,
5 or it could simply be that you just narrowed down your
6 case. I don't know.

7 But in any event, the really important thing in
8 here is what does he say on the witness stand, and to what
9 extent are we talking about obviousness or anticipation.

10 I really don't understand, based on the
11 prehearing brief, that they're asserting anticipation
12 anymore. Okay. But we'll see. We'll see what they --

13 MR. MEUNIER: Thank you, Your Honor.

14 JUDGE ELLIOT: Okay.

15 So what's the next issue?

16 MR. MEUNIER: The next issue, Your Honor, is --
17 maybe it's just a clarification if -- there seems to be a
18 disagreement about what your Order 68 meant with regard to
19 Sorgard and Claim 9.

20 Jim, if we could pull up page 14 of the Order.

21 Your Honor, we've excerpted a little bit of it
22 here, and I think you have it in front of you; but it says,
23 "The motion is granted. Contrary to Respondents'
24 suggestions, the theories involving Sorgard and Claim 9 are
25 materially different from their expert report and

1 prehearing brief. In the prehearing brief, Respondents
2 exclusively rely on a hypothetical fading pattern..."

3 And it goes on from there.

4 So it was our understanding that with the --
5 what the arguments in the prehearing brief exclusively
6 relying on that new fading pattern, with odd numbers of
7 paths, that they weren't supposed to be presenting Sorgard
8 for Claim 9 at that point.

9 I think that's a disagreement about how far that
10 Order goes, Your Honor.

11 JUDGE ELLIOT: Okay.

12 MR. MEUNIER: Just to follow that up, Your
13 Honor, I think on the next page, if we go to page 15 --
14 Jim, please -- just that first paragraph, because this is
15 going to be relevant to the -- I think the third argument
16 we're going to have, you also make the point that the -- to
17 the extent they try to rely on what was in Dr. Manocha's
18 report as supporting the Claim 9 argument, you made the
19 fact that he doesn't seem to be clearly alleging that the
20 disjoint subsets of the same texture block would be of
21 different size.

22 I point that out in that that is going to be
23 very relevant, I think, to the next argument, Your Honor.

24 But I think the key point here is, did your
25 order, as stated, say that it was the prehearing brief

1 argument regarding Sorgard and the obviousness of Claim 9,
2 exclusively relied on a new argument, the odd number of
3 fading patterns.

4 Excuse me. Fading paths.

5 JUDGE ELLIOT: Okay. Well, let me just -- I
6 didn't -- in the order, I didn't order any particular
7 relief beyond simply the granting of the motion, okay.

8 So I didn't specify here's what's being struck,
9 here's what's being prohibited. I just said, motion
10 granted.

11 The relief requested was preclude Respondents
12 from arguing or offering untimely expert testimony or
13 evidence relating to Claim 9, that Sorgard discloses that
14 the number of interpolation paths can be varied, and such
15 paths would necessarily cover different numbers of texels
16 per path, thus meeting the different size requirement for
17 the disjoint subsets.

18 So, I mean, is there -- I'm not sure what's
19 unclear about that. I mean, I granted the relief you
20 requested.

21 So, Mr. Johnson, do you want to be heard on
22 this?

23 MR. JOHNSON: Yes, Your Honor.

24 Let me see if I can pull up the prehearing
25 brief.

1 What paragraph is that?

2 So, Your Honor, what we understood to be
3 changing was we added in the prehearing brief
4 additionally -- so the paragraph that starts, additionally,
5 you could change the number of interpolation paths. What's
6 in the first paragraph is that you could change the number
7 of elements in a path.

8 They're two different arguments. We understood
9 them to be arguing about the additional argument that we
10 added, which was changing the number of interpolation
11 paths, and that's what we understood the Order to be
12 addressing, was the number of interpolation paths, not the
13 fact that you could change the number of elements within a
14 path, as cited at 12, lines 47 to 48, in the reference.

15 If you then -- if you could pull up or split the
16 screen and put Paragraph -- is it 222 from his expert
17 report?

18 Read the first paragraph of this, and put the
19 first paragraph of his expert report up at 222.

20 As you can see, Your Honor, if you look at the
21 first part of 222, it is almost verbatim what the first
22 paragraph is in the prehearing brief.

23 So we have that argument, which is fully
24 supported by his expert report. And then we added a new
25 argument, which, we agree, is not.

1 So we understood you were striking the new
2 argument, which is the only thing they complained about.

3 All we're doing on the slide and presenting to
4 the Court today is that exact quote that is consistent
5 between both the prehearing brief and his Paragraph 222, at
6 12:47-48. That's all that's on the slide.

7 JUDGE ELLIOT: Okay.

8 So show me what -- is the issue -- again, I
9 mean, to the extent that this is an issue of what the
10 demonstrative says, I can rule on that now based on what
11 the demonstrative says, but you need to show it to me.

12 But as far as the questioning of Dr. Manocha
13 goes, I -- it's going to depend upon the questions, so...

14 MR. JOHNSON: I can show you slide 77, Your
15 Honor.

16 Can you bring up slide 77.

17 Exact quote. That's all that's there, which was
18 consistent between the prehearing brief and his expert
19 report.

20 JUDGE ELLIOT: Okay. That's the only one?

21 MR. JOHNSON: That's it. We dropped the
22 interpolation paths, which was the second argument, which
23 we believe you struck.

24 JUDGE ELLIOT: Well, I think this was -- I think
25 that's fairly incorporated into his expert report, and it

1 doesn't get into the whole issue of that one paragraph on
2 page -- let's see, give me a moment here -- page 97 of the
3 Respondents' prehearing brief where they give examples of
4 two paths of eight texels each, 4 of 4, and then a 5 and a
5 6. 5, 5, 6 for three paths.

6 That whole discussion, I think, is out.

7 MR. JOHNSON: We're not going to present that
8 path.

9 JUDGE ELLIOT: Okay.

10 MR. JOHNSON: The different path numbers.

11 JUDGE ELLIOT: Okay.

12 So I'm going to overrule the objection so far,
13 but, again, if -- depending upon the question, I'll
14 entertain another objection.

15 MR. MEUNIER: Thank you, Your Honor.

16 JUDGE ELLIOT: Was there another one?

17 MR. MEUNIER: I'm afraid so, but it is the last
18 one, but it is probably the most important one.

19 JUDGE ELLIOT: Okay.

20 MR. MEUNIER: So, as I said, there's a new
21 argument very clearly presented in the slides we received
22 last night that's not in the prehearing brief, not in the
23 expert report.

24 Jim, if you could put up the prehearing brief,
25 the Respondents' prehearing brief, please, at page 93.

1 I'm going to as briefly as possible show what
2 they have said before, and what they're saying now, Your
3 Honor. That's at least what I'm going to try to do.

4 So you can see under Claim 7(b), this is from
5 the '628 Patent, and they're applying -- this is their
6 Sorgard argument, what are they saying are the two or more
7 disjoint subsets? Right here, they're saying, the 4-by-4
8 sub-block to the right shows four interpolation paths
9 between the different endpoints.

10 This is consistent with your Motion in Limine,
11 Your Honor.

12 They're pointing to a single 4.4 sub-block as
13 having the different disjoint subsets. One disjoint subset
14 might be the path from 0 to 4, the other might be 1 to 5,
15 whatever it is, but that's the only thing they're pointing
16 to here.

17 If we can go to page 96, please, Jim, of the
18 same brief. The bottom paragraph.

19 Now, the other issue -- an issue we had raised
20 during discovery and that they're addressing here is that
21 because they're looking at different paths in the same
22 subset, what they call or identify as the index value,
23 there's a first index value and a second index value that's
24 claimed in Claim 7, they point to the same thing, the same
25 number for a fading pattern as satisfying both of those.

1 We pointed that out.

2 Here, they say, that doesn't matter, and
3 although Claim 7 recites two index values for two texels,
4 it does not require that the index values be different.

5 They never said in their prehearing brief, no,
6 no, no, there's actually one index for one fading pattern,
7 and another index for a different fading pattern, because
8 we're talking about different sub-blocks. They just
9 refuted that it needed to be two different index values.
10 They pointed to the same one, and they never pointed to a
11 second one.

12 But now, if we look at the slides -- can we go
13 to slide 61, please, Jim, from Dr. Manocha's deck that we
14 received last night.

15 Now, instead of the paths being -- in the
16 disjoint subsets being in a single 4-by-4 block, there's
17 this new theory that, no, there's one 4-by-4 block on the
18 left that has the first disjoint subset, and now there's a
19 second 4-by-4 block on the other side that has the second
20 disjoint subset.

21 That's new. That's not what was in their
22 prehearing brief and not in his report.

23 Can we go to 71, please, Jim.

24 So now, they've got a first index value being
25 the number for this fading pattern, Your Honor. Number

1 one.

2 Go to 73, please, Jim.

3 But now, they've got a second index value that's
4 a different fading pattern, because instead of pointing to
5 the same 4-by-4 block as including both disjoint subsets
6 and having the same alleged index value, now they've got a
7 brand new theory, different 4-by-4 blocks have different
8 disjoint subsets, and that's why there's different index
9 values.

10 In the prehearing brief, they didn't mention
11 anything about there actually being a second index value.
12 They just said, it doesn't matter, when they were relying
13 on the index value of the fading -- of the fading pattern,
14 Your Honor.

15 I'm sorry, that was fast or maybe it didn't seem
16 fast, but that's as quickly as I could do it.

17 JUDGE ELLIOT: All right. Give me a moment.
18 I'm going to have to re-read the prehearing brief.

19 I'm sorry. Could you go back to the previous
20 slide.

21 MR. MEUNIER: Of the prehearing brief, Your
22 Honor?

23 JUDGE ELLIOT: This one. No, no, this one.
24 This is what I was talking about.

25 Okay. Go to slide 73, please.

1 Please bear with me.

2 Okay. So you're saying that -- this is to
3 Mr. Meunier: You're interpreting what's on this slide,
4 this is 73, and then the previous one, 71, as there are --
5 for any particular -- you have a particular fading pattern,
6 and there's endpoints and there's texels for the fading
7 pattern, but then for a different fading pattern, there's
8 totally different disjoint subsets; is that what you're
9 saying their contention is now?

10 MR. MEUNIER: That's their theory now, Your
11 Honor.

12 JUDGE ELLIOT: Okay.

13 MR. MEUNIER: But to clarify that a little bit,
14 it's that for one 4-by-4 block, Sorgard might -- you might
15 pick fading pattern 1.

16 Their original theory was, okay, with that
17 4-by-4 block, there were two disjoint subsets in it, and
18 that number 1 satisfied both the first index value and the
19 second index value.

20 Now what they're doing is, yes, there's a 4-by-4
21 block that gets a fading pattern 1. But there can be
22 another 4-by-4 sub-block that gets a fading pattern 2, and
23 instead of saying that the disjoint subsets are all in that
24 first one, now they're dividing it up amongst different
25 subsets -- I'm sorry, different 4-by-4 sub-blocks, which

1 they didn't do before, and now they're pointing to two
2 different fading pattern numbers as the first and the
3 second, which they didn't do before. In fact, their whole
4 argument in the prehearing brief was, we don't need to
5 point to a different one.

6 JUDGE ELLIOT: Okay. I think I understand what
7 the objection is. All right.

8 Mr. Johnson.

9 MR. JOHNSON: Thank you, Your Honor.

10 I think they're reading a whole lot into just
11 our use of examples. So I'm going to try to address all of
12 his points as quickly as I can. I do appreciate the fact
13 this is very technical, and we're getting a chance to show
14 you about all the technical stuff early.

15 Can you bring -- what paragraph is it? 196.

16 Your Honor, this is from his expert report, and
17 I'm just going to try to start at the beginning.

18 We have identified that the block is an 8-by-4.
19 8-by-4. And that's consistent throughout, 8-by-4. So it's
20 not 4-by-4. The block that we're talking about is 8-by-4,
21 which means it's comprised of two 4-by-4s.

22 We then go through his report and use, as an
23 example for one of those 4-by-4s, one fading pattern, but
24 the block is 8-by-4, which means there must be two.

25 Go to the next thing -- go to the -- what's the

1 next paragraph?

2 See, Your Honor, the Sorgard reference discloses
3 that images are broken into blocks of 8-by-4, each is then
4 divided into two sub-blocks, and that's what's compressed.
5 That's the compression in green, is two sub-blocks at a
6 time, which means that each sub-block must get its own
7 fading pattern.

8 Now, we discussed -- we put through the
9 report -- we used one fading pattern just for discussion
10 purposes, but we were never -- we never limited it to one.
11 In fact, we have a whole sub-block. If we only had one,
12 then half of the block, we wouldn't have anything in it.

13 If you go down, there are other passages that
14 talk about all of the interpolation paths within a block.
15 That would be 8. We never said there's only 4 in a block.

16 I mean, I think it would be very long for me to
17 go through the whole report. I'm just trying to summarize
18 it for you. I can show you some examples, if you want.

19 With respect to the statement that he pulled up
20 in our prehearing brief, that was a statement simply to
21 rebut their argument that if we used the same index value,
22 that that would somehow take it out of the claim. It
23 doesn't. We don't think that the claim interpretation is
24 that there has to be two different ones.

25 The reason we said that is not because we were

1 going to use two different ones in the two sub-blocks, but
2 because Sorgard teaches that I could use the same one in
3 there, or I could use two different ones.

4 So even if I put the same fading pattern on both
5 sides, it would still work because I'm still picking an
6 index value for each block, for each sub-block.

7 So there's nothing inconsistent about what we're
8 doing now. We're simply -- to make it more illustrative in
9 the slides, Your Honor, for today, we actually picked two
10 different fading patterns, because if you're using the same
11 one, it's just difficult to see.

12 So we wanted to use two different, very
13 diametrically opposed ones to show you that two subsets
14 look different. I didn't want to confuse anybody by
15 pointing to the same sub-block and confusing about what
16 were subsets.

17 The fact of the matter is it's still consistent
18 with our argument. It could be the same index value or it
19 could be a different one. Our report is broad enough to
20 cover both.

21 JUDGE ELLIOT: Okay. So Mr. Meunier, it sounds
22 to me -- oh, yes. You have something else to add?

23 MR. JOHNSON: I have one further argument, Your
24 Honor.

25 JUDGE ELLIOTT: Yes.

1 MR. JOHNSON: Later on in the claim, it talks
2 about independently or individually decompressing. In
3 those sections we clearly talk about decompressing based on
4 the algorithms that it shows. Those are done per block.
5 The only way to have got individually would have been
6 showing individual based on the different blocks.

7 So -- sub-blocks.

8 So it's inherent, Your Honor, throughout that we
9 are using one fading pattern in the report to simply be
10 illustrative of what's going on in half of the block,
11 because otherwise it becomes very redundant.

12 JUDGE ELLIOT: Okay. So, Mr. Meunier, it sounds
13 like they're not alleging that two different fading
14 patterns, and two different blocks are what constitute two
15 different indexes, and two different -- you know, that go
16 through two different subsets.

17 MR. MEUNIER: I would -- I -- well, I don't
18 think that's accurate, Your Honor.

19 MR. JOHNSON: Well, Your Honor, we are. That is
20 a possibility. It's broad enough that you can have --
21 because within a block, you can have eight paths. Then I
22 could pick any two in those eight to be the two disjoint
23 subsets.

24 I picked two in each block simply for
25 illustration.

1 What he's saying is we're limited to two within
2 one block because that's the illustration that we used in
3 the report.

4 JUDGE ELLIOT: In your prehearing brief, though,
5 the only examples you give are just within one 4-by-4
6 block, I think.

7 MR. JOHNSON: But we still call the block the
8 8-by-4 block, and that was just to represent what would
9 have been a fading pattern for one half. It's not meant to
10 be exclusionary.

11 JUDGE ELLIOT: Well, I have to confess,
12 Mr. Meunier, I'm not sure I see why this makes much of a
13 difference. But --

14 MR. MEUNIER: Well, if I may, Your Honor --

15 JUDGE ELLIOT: Go ahead.

16 MR. MEUNIER: It's a brand new theory as to why
17 there's a first and second indices, for example. There's a
18 brand new theory about what the disjoint subset is in.

19 We heard about his expert report. He didn't say
20 anything about what's in the prehearing brief.

21 But in addition, what he pointed to within the
22 expert report, he didn't point to the aspects where they
23 identify what the two disjoint subsets are, and there,
24 they're pointing specifically to the 4-by-4 block. The
25 paths in there are the disjoint subsets, because the paths

1 are nonoverlapping and disjoint. Even for that limitation,
2 it's the 4-by-4 block.

3 I think it is a big difference, Your Honor.
4 That's why they're changing what they said in the
5 prehearing brief to what they're doing now.

6 JUDGE ELLIOT: Could you put up the entirety of
7 the expert report, Paragraph 196, please. I'm sorry, the
8 previous page. The previous page, 196.

9 Okay. Then -- I'm sorry, go to that diagram
10 again on the next page, please. Thank you.

11 Okay. Let me see Paragraph 197.

12 Okay. Let me see -- let me see 198. You don't
13 have to blow it up. Let me just take a look at.

14 MR. MEUNIER: If I may, Your Honor, 198 was on
15 the next page.

16 JUDGE ELLIOT: Hold on. Go to the next page,
17 page 80 of the report, please. Don't blow it up, though.
18 Let me just see it. Okay.

19 Well, the -- we're going to have to be alert to
20 this, but I'm going to hold Dr. Manocha to his expert
21 report.

22 I don't see anything in here suggesting that you
23 can identify two different indexes and two different
24 disjoint subsets by looking at two different 4-by-4 blocks.
25 That's just not there.

1 MR. JOHNSON: Could I just point one thing out
2 in Paragraph 198. Can we go back to 198.

3 Your Honor, what's important here -- or 197 --
4 it says, we're talking about decompressing the block, the
5 texture block, right. The block is the 8-by-4; and then in
6 198, it talks about dividing each 4-by-4.

7 So now we're just talking about dividing each
8 half of the 8-by-4. We never said, though, that the block
9 that we're referring to is a 4-by-4. So there has to be --
10 JUDGE ELLIOT: But he did.

11 MR. JOHNSON: So there has to be two 4-by-4s.

12 JUDGE ELLIOT: I understand. But he didn't say
13 anything about that. I don't see anything in here where he
14 says you -- that the block is 8-by-4, and therefore, you
15 can look at the whole 8-by-4 block to identify --

16 MR. JOHNSON: Going to 196. 196.

17 This paragraph is the paragraph where we define
18 a block. This is the ultimate paragraph where a block is
19 defined for the claim.

20 We only identify 8-by-4 texture block 2. So
21 it's an 8-by-4. That's the block. It's going to be
22 comprised of two 4-by-4s, and then we go on to just discuss
23 a 4-by-4 as illustrative for one half of the block.

24 JUDGE ELLIOT: Well, I think Mr. Meunier is
25 right, that this is a new way of looking at it. Maybe it

1 is simply illustrative, but he doesn't say that in his
2 expert report.

3 He analyzes -- he mentions that there's an
4 8-by-4 block. That's the basic block that's compressed and
5 decompressed in Sorgard.

6 But then he goes on to only identify the
7 relevant elements in a single 4-by-4 block at a time.

8 Okay. Fine. Then maybe that is just an example. I don't
9 see that anywhere in his report.

10 So as far as the testimony goes, an objection to
11 a question like, now, what about the other half of this
12 8-by-4 block, where do you find the index that corresponds
13 to the second texel and the second disjoint subset, I would
14 sustain an objection to that.

15 There's a separate issue, though, which is, is
16 your theory new, and are you going to pursue it in your
17 post-hearing briefs; and instead of just saying, oh, well,
18 you know, the 4-by-4 is just illustrative.

19 That's a whole separate issue because the way I
20 usually handle that is if you raise that argument in your
21 post-hearing -- your opening post-hearing brief, then an
22 objection I presume I will get from Complainants on that,
23 and then I'll have to determine whether or not it's outside
24 the scope of your prehearing brief.

25 But I can't resolve that yet.

1 Sitting here right now, though, it does look to
2 me like the only thing that you've done so far is just
3 focus on one half of the 8-by-4 block, and found everything
4 you need, all of the elements in just that one half.

5 MR. JOHNSON: Very well, Your Honor.

6 MR. MEUNIER: Thank you, Your Honor. That
7 was --

8 JUDGE ELLIOT: Okay. All right.

9 MR. JOHNSON: Your Honor, just one housekeeping
10 measure.

11 JUDGE ELLIOT: Yes.

12 MR. JOHNSON: Our slides have a lot of these
13 two-block things in them. I'll be happy to elicit the
14 testimony about one half. I simply just don't have the
15 time to go and change all of the slides for you real quick.

16 JUDGE ELLIOT: That's fine. I can -- I'll
17 ignore that, but do try to do that -- I like to have you
18 submit slides at the end as evidence.

19 MR. JOHNSON: I can change them before we submit
20 them.

21 JUDGE ELLIOT: Okay. That's fine.

22 MR. JOHNSON: Thank you, Your Honor.

23 So do you want to go ahead and proceed, Your
24 Honor?

25 JUDGE ELLIOT: Yes.

1 MR. JOHNSON: Call Dr. Manocha to the stand.

2 THE WITNESS: Good morning, Your Honor.

3 JUDGE ELLIOT: Good morning.

4 Sir, I need to swear you in.

5 Whereupon--

6 DINESH MANOCHA, PhD,

7 having been first duly sworn, was examined and testified as

8 follows:

9 (Clarification requested by the Realtime Stenographer.)

10 DIRECT EXAMINATION

11 BY MR. JOHNSON:

12 Q. Please introduce yourself to the Court.

13 A. I am Dinesh Manocha.

14 Q. Which patent are you going to be addressing
15 today?

16 A. I'll be talking about this patent with the last
17 three digits of '628.

18 Q. Did you prepare some demonstratives to use
19 today?

20 A. Yes, I prepared slides.

21 Q. Are they shown on the screen as RDX-0002C?

22 A. Yes, they are.

23 Q. All right.

24 Looking at slide 2, can you please briefly
25 describe your education, starting with your undergraduate

1 degree?

2 A. I received my Bachelor's Degree in Computer
3 Science and Engineering in 1987 from the Indian Institute
4 of Technology, and I received my Master's in Computer
5 Science in 1990, and my Ph.D. in computer science in 1992
6 from the University of California at Berkeley.

7 Q. Can you please, then, describe your work
8 experience, starting with where you currently work.

9 A. I'm currently on the faculty at the University
10 of Maryland at College Park, where I have the title of Paul
11 Chrisman Iribe Professor. I'm also a distinguished
12 University Professor of Computer Science, and Electrical
13 and Computer Engineering.

14 Before that, I worked for about 26 years at the
15 University of North Carolina at Chapel Hill, where I
16 retired in 2018 to join the University of Maryland.

17 Q. All right.

18 Do you conduct research currently?

19 A. Yes.

20 Q. How large is your research group?

21 A. About 25 students and post-docs.

22 Q. Does any of the research that you currently do
23 relate to the subject matter of the '628 Patent?

24 A. Yes.

25 Q. Could you briefly describe that.

1 A. So I have been conducting research in computer
2 graphics and realtime rendering, also use of textures.

3 Q. Do you teach any classes?

4 A. Yes, I do.

5 Q. Do any of those classes relate to the subject
6 matter of the '628 Patent?

7 A. Yes. I teach undergraduate and graduate classes
8 on computer graphics, which cover topics of textures.

9 Q. Have you published any articles?

10 A. Yes.

11 Q. Do any of those articles relate to the subject
12 matter of the '628 Patent?

13 A. Yes. I have published many papers on computer
14 graphics and texture compression.

15 In fact, many of my papers turn into software
16 products, which are on texture compression, which are quite
17 widely used by industry.

18 Q. Are you a named inventor on any patents?

19 A. Yes.

20 Q. About how many?

21 A. About 15.

22 Q. Other than your experience with the Patent
23 Office with your own patents, do you have any other
24 connection or experience with the Patent Office?

25 A. Yes. I have been invited by the US PT0 to give

1 invited talks to patent examiners on state-of-the-art in
2 computer graphics multiple times.

3 Q. Okay.

4 Have you reviewed the Court's definition of "a
5 person of ordinary skill in the art" for this case?

6 A. Yes.

7 Q. As of the time of the invention of the
8 '628 Patent, did you possess at least the level of ordinary
9 skill in the art as articulated by the Court?

10 A. Yes.

11 Q. Did you form any opinions related to the
12 validity or invalidity of the asserted claims of the
13 '628 Patent in this case?

14 A. Yes.

15 Q. Moving to slide 3, does this accurately
16 reflect --

17 A. Yes.

18 Q. -- your opinions in this case?

19 A. Yes.

20 Q. All right.

21 Moving to slide 4, are these the discussion
22 points that you would like to go over today with the Court?

23 A. That is correct.

24 Q. All right. So I want to begin by just quickly
25 moving to the '628 Patent.

1 Shown on slide 6 is JX-0002.

2 Do you recognize this document?

3 A. Yes.

4 Q. What is it?

5 A. It's the cover page of '628 Patent that I
6 reviewed.

7 Q. Did you review the entire patent?

8 A. Yes.

9 Q. Did you review all the intrinsic record related
10 to the patent?

11 A. Yes.

12 Q. Okay.

13 Could you remind the Court briefly what the
14 general technology is that the '628 Patent is directed
15 toward?

16 A. So the claims of '628 describe a texture
17 decompression method.

18 Q. Okay.

19 What is a texture?

20 A. So as you probably have been hearing this week,
21 textures are used in computer graphics to generate
22 realistic images.

23 So, in this example, you see an animal shape on
24 the left, but to generate the image on the right, I want to
25 exhibit the surface details. And those surface details are

1 captured by this texture -- this square-like shape in the
2 middle.

3 Q. Okay.

4 So the '628 Patent only -- well, let me ask you:
5 On this image on the slide, slide 8, which portion does the
6 '628 Patent deal with?

7 A. It only deals with the compression of the
8 texture, the middle element.

9 Q. All right.

10 So is texture compression something that's been
11 known in the art prior to the '628 Patent?

12 A. Oh, yes.

13 Q. Okay.

14 About how early did texture compression enter
15 the field?

16 A. Some -- earliest reference that I have seen goes
17 back to the late '70s. I show this nice, classic paper
18 from 1979.

19 And in the '90s and early 2000, Your Honor, this
20 field got a lot of attention, and there were lots of
21 techniques proposed.

22 And by 2006, in fact, this topic was even taught
23 in classrooms. I will show here, it was even a subject of
24 undergraduate thesis.

25 Q. Did you review the claims of the '628 Patent to

1 form your opinions?

2 A. Yes.

3 Q. All right.

4 Slide 10 shows Claim 7.

5 Do you recognize it?

6 A. Yes.

7 Q. All right.

8 It's one of the asserted claims in the case?

9 A. That is correct.

10 Q. So based upon your review of the patent itself
11 and the disclosure, do the claims -- do the asserted claims
12 cover the entirety of what's disclosed within the
13 '628 Patent?

14 A. No.

15 Q. Okay.

16 Can you give me an example of something that was
17 disclosed, but is not claimed.

18 A. So the specification of '628, Your Honor, talks
19 about compression methods. They also talk about something
20 like the shape and the size of subsets.

21 There's no mention on the shape in the claim,
22 and there is no limit on the size of the subset, except the
23 subset has to be smaller than the block.

24 Q. All right.

25 So I have heard you mention today several

1 different terms, like "texture" and "subset," and I see
2 those in the claim.

3 Are you aware that the Court has construed
4 certain -- or issued a claim construction order in this
5 case?

6 A. Yes.

7 Q. Did you review it?

8 A. Yes.

9 Q. Did the claim construction -- sorry.

10 Did the Court's claim construction order address
11 any of the terms that are at issue in the '628 Patent?

12 A. Yes. I remember there was one term, and it's
13 shown as "unpacked," and the construction is "extracted."

14 Q. Okay.

15 Did you apply that construction when forming
16 your opinions?

17 A. Yes.

18 Q. For all the terms that were not addressed by the
19 Court, what construction did you apply?

20 A. Your Honor, I just used the plain and ordinary
21 meaning.

22 Q. How did you determine the plain and ordinary
23 meaning for each term?

24 A. So, as a person of ordinary skill in the art,
25 you know, I used my interpretation of this term at the

1 timing.

2 I also looked at all the intrinsic evidence, and
3 I made sure that my understanding of the term is consistent
4 with the -- what was in the intrinsic evidence.

5 Q. Based upon your review, was the disclosure
6 consistent with what you understood the terms to mean?

7 A. Yes.

8 Q. Did you find anything in the disclosure that was
9 inconsistent with what you believed the terms to mean?

10 A. No.

11 Q. All right.

12 I'd like to look at a few terms, since we're
13 going to have to talk about them today, and have you walk
14 us through them.

15 I would like to start with the term "texel."

16 Can you explain to the Court what that is.

17 A. So texel, Your Honor, is the smallest unit of a
18 texture image. It's just like having a pixel on your
19 display.

20 Q. Then what is a texture block?

21 A. So a texture block, Your Honor, is nothing else
22 but a simple plurality of texels.

23 Q. Then what is a disjoint subset?

24 A. So a subset is also nothing else but a plurality
25 of cell texels. The reason I mentioned smaller, because,

1 Your Honor, according to the claim, the subset has to be
2 smaller than the block.

3 Q. What does the term "disjoint" mean?

4 A. So we have two or more subsets, Your Honor, and
5 "disjoint" implies that they have no overlap or no common
6 texels.

7 Q. All right.

8 So I want to switch gears and talk about some of
9 your opinions, starting with your opinions related to
10 patent-eligible subject matter.

11 Are you ready to do that?

12 A. Yes.

13 Q. In general, can you tell me what your opinion is
14 with respect to the asserted claims on this issue?

15 A. I believe, you know, the asserted claims lacks,
16 you know, any patent-eligible subject matter, and I can
17 explain that in more detail.

18 Q. Okay.

19 With respect to hardware that's recited in
20 Claim 7, can you identify what hardware is recited.

21 A. It just refers to two very generic components
22 that I have shown in yellow, a processor and the memory,
23 Your Honor.

24 Q. All right.

25 Looking only at the claim that's on the page,

1 can you tell me, what is the processor and memory supposed
2 to be configured to do?

3 A. Very generic operations. The processor receives
4 some data from the memory, and applies some very simple
5 generic operations.

6 Q. Okay.

7 Based on your review of the claim, can you tell
8 me what your conclusions were with respect to the patent
9 eligibility as shown on slide 18?

10 A. So this claim, the Claim 7, really describes an
11 abstract idea that you receive data and you decompress it.
12 That's it, Your Honor.

13 If you see in application, I don't see any
14 inventive step. You know, it's describing using a very
15 generic processor, which was very common at the time of
16 this patent, performing very generic operations. There is
17 no special arrangement or order of steps. I don't see any
18 improvement in terms of a computing device. So I saw no
19 inventive step in these claims.

20 Q. Do the claims require any specialized hardware?

21 A. No.

22 Q. Does the processor that's recited -- is it your
23 understanding that it has to be some sort of a specialized
24 or unconventional processor?

25 A. No.

1 Q. Does the memory have to be some sort of special
2 or unconventional memory?

3 A. No.

4 Q. Does the processor and memory that's recited and
5 needed for this claim, would it perform in any unexpected
6 way in order to be able to carry out the configurations
7 required by the claim?

8 A. No.

9 Q. All right.

10 I'd like to move on to your opinions related to
11 the prior art.

12 Before I do that, Your Honor, I just want to
13 know, because we have a lot of prior art to go through,
14 each one is kind of its own module. So I don't know when
15 you want to break for lunch. I'm happy to go through one
16 module. Probably take 30 minutes. And then --

17 JUDGE ELLIOT: Okay. Let's shoot for 12:15 to
18 break for lunch.

19 MR. JOHNSON: All right. I'll do my best. I'm
20 losing my voice.

21 BY MR. JOHNSON:

22 Q. All right. So let's begin by talking about your
23 first set of opinions.

24 Shown on slide 20 is a picture of RX-394. Can
25 you tell me what that is?

1 A. So this is the cover page of a white paper
2 introduced by 3dfx in 1999.

3 Q. If I refer to this paper as FXT1, will you know
4 what I'm talking about?

5 A. Yes.

6 Q. Can you very briefly identify for the Court what
7 the FXT1 technology was all about?

8 A. So as you see in the title, FXT1 White Paper
9 also described a texture compression as well as
10 decompression methodology, Your Honor.

11 Q. Was there anything new or unique about the FXT1
12 texture compression technology?

13 A. Yes. I think the FXT1 White Paper was very
14 innovative because at that time it proposed a novel way to,
15 you know, partition the texels and compress.

16 Around this time, 1999, the prior art would
17 retrieve and decompress using blocks of uniform size, say,
18 8-by-8.

19 But FXT1 introduced some novel flexibility in
20 terms of that.

21 Q. So was this FXT1 technology discussed or cited
22 by others in the industry?

23 A. Yes, it was. Here are some references I have
24 shown, RX-1671, 1656 and 1672, which clearly cited this
25 white paper.

1 Q. All right. So let's move on to your analysis.

2 Did you review FXT1 and form an opinion with
3 respect to the elements of Claim 7?

4 A. Yes.

5 Q. So I'd like to walk through each element of the
6 claim, and have you explain your opinions.

7 Okay?

8 A. Sure.

9 Q. So, starting with the beginning of the claim,
10 does FXT1 disclose a computer processing system comprising
11 a processor and a memory?

12 A. Yes, it does.

13 Q. Can you walk me through that?

14 A. So here is, you know, one of the pages from the
15 FXT1 White Paper. You see a figure. Can I zoom onto this
16 figure?

17 So as you can see, this is a -- just copy this
18 figure from RX-0394. It's a white paper. I clearly will
19 show you the 3dfx next generation processor. So it clearly
20 identifies the processor, we can see in this red color. It
21 also identified many memory, there is a CD-ROM, there's a
22 frame buffer, and there's also the memory in the chipset,
23 and some caches in the CPU, and next generation processor.

24 Q. Do you know who Dr. Lastra is?

25 A. Yes.

1 Q. Who is he?

2 A. I believe AMD's expert.

3 Q. Did you understand that he issued a rebuttal
4 report to your expert report?

5 A. Yes.

6 Q. Did you review his report and his deposition
7 transcript?

8 A. Yes, I did.

9 Q. Did Dr. Lastra dispute that these limitations
10 are disclosed?

11 A. Not this limitation.

12 Q. All right. So moving to the next limitation,
13 which I'm going to highlight on slide 26.

14 Within the processor, were you able to determine
15 that the processor was configured to receive a compressed
16 texture block?

17 A. Yes. I would like to show that.

18 So you see the two boxes on the right of this
19 figure, Your Honor. So I've highlight the first one in
20 yellow, and it clearly says that the textures were stored
21 on the CD-ROM memory in a compressed form. They are
22 decompressed during the runtime application.

23 Here I show a compressed texture goes from the
24 CD-ROM to the next generation processor.

25 If you highlight the box on the top right, it

1 also clearly mentioned that this particular processor
2 decompressed that texture, and this texture travels using
3 this AGP 4x bus. The processor clearly received a
4 compressed texture block.

5 Q. On slide 26, in the figure shown for
6 RX-394.0006, in the top right-hand corner, you just
7 mentioned a box that you've highlighted in yellow.

8 It says FXT1 is decoded in hardware, and
9 available on all future 3dfx products.

10 Do you see that?

11 A. Yes.

12 Q. What is it that that statement, that the FXT1 is
13 decoded in hardware mean to you?

14 A. Well, it clearly shows, you know, that FXT1 is a
15 scheme; and decoded, Your Honor, is another way of saying
16 decompressing the compressed texture in the hardware.

17 Q. Just so it's clear on the record, these boxes
18 around the figure with the arrows, did you add those to the
19 figure, or are those in the original paper?

20 A. They are actually in this original white paper.
21 I copied all of these boxes exactly from the white paper.

22 Q. All right. Moving to the next limitation, which
23 I have highlighted on slide 27.

24 The claim has two wherein clauses. We're going
25 to look at the first one. It says, "Wherein, the

1 compressed texture block includes two or more disjoint
2 subsets."

3 Were you able to find that in the FXT1
4 disclosure?

5 A. Yes, I do.

6 I can illustrate that.

7 So as I see in this reference, RX-0394, this
8 FXT1 expressly discloses that its texture compression works
9 by taking an image, and dividing into -- I'll use different
10 colors, 4-by-4 and/or 4-by-8 texel blocks.

11 So a person of ordinary skill in the art could
12 take an image and divide the entire image into 4-by-4 texel
13 blocks which I refer to as CC_MIXED shown on the left, or,
14 Your Honor, it could take the entire image and divide it
15 into 4-by-8 texel blocks, which I refer to as CC_HI in the
16 middle, or it could take an image, Your Honor, and divide
17 it into a combination of 4-by-4 as well as 4-by-8 texel
18 blocks.

19 Q. Are each of the representations you made
20 supposed to represent an image?

21 A. Each of them is a decomposition of an image into
22 blocks, yes.

23 Q. So it appears to me, if my math is correct, that
24 each of these images is 24-by-24; is that correct?

25 A. That is correct, because on the left, they are

1 4-by-4 blocks, and you can see there are six along the
2 horizontal axis, Your Honor, and six on the vertical; so
3 yes, it comes out to be 24-by-24.

4 Q. Why did you select 24-by-24 to show?

5 A. It's only an example. You can take any image,
6 you know, and divide it into such blocks. I just chose one
7 example.

8 Q. Does FXT1 limit the size of an image?

9 A. No. It should be at least as big as one block.
10 That's all it's saying.

11 Q. Okay.

12 So you could have used a much larger image or a
13 much smaller image; is that what are you saying?

14 A. That is correct.

15 MR. MEUNIER: Objection, leading, Your Honor.

16 JUDGE ELLIOT: Oh, hold on. Sustained.

17 BY MR. JOHNSON:

18 Q. Is there any limitation in FXT1 as to what size
19 of image you could have used as an example?

20 A. Well, as I said, you know, if you look at the
21 thing, it divides an image into multiple 4-by-4 and 4-by-8
22 blocks.

23 So image should be, I would say, at least 4-by-4
24 or 4-by-8, but there is no other size limitation.

25 Q. Okay. So the minimum size is 4-by-4?

1 A. That is correct.

2 Q. All right. So taking one of these examples that
3 you've given, can you now identify for me what you're
4 calling the texture block and the disjoint subsets within
5 that?

6 A. Sure. So let me take the example on the
7 right-hand one. This is the one I illustrated.

8 So I'm going to show you that in this case, you
9 know, the entire boundary in yellow, I will refer to this
10 as an example of texture block of the '628 Patent.

11 Here, now, I find two subsets, which are
12 referred to as texel blocks in the FXT1 White Paper as
13 shown. You know, the blue corresponds to 4-by-8, and the
14 red corresponds to 4-by-4 texels.

15 Q. Are the subsets that you've identified, are they
16 disjoint?

17 A. Yes, they are. You can see there is no overlap
18 between them.

19 Q. So I notice in the quote up above that it says,
20 "Dividing an image into texel blocks."

21 Why is it that you identified the image as the
22 texture block for the claim, and the texel block for the
23 subset?

24 A. Yes. So let's show you -- this is -- if you
25 look at the Claim 7 on the left, Your Honor, the texture

1 block in the Claim 7 on the left is what I referred to as
2 image, and the subset in the Claim 7 I refer to as texel
3 block.

4 Your Honor, honestly speaking, this is simple
5 semantics.

6 So you know, there was a lot of work in '90s and
7 2000 on texture compression, lots of references; but there
8 was no standard terminology and nomenclature.

9 So if you look at all of the reference, you find
10 terms, like, "blocks," "subsets," "partitions,"
11 "interpolation part," "regions."

12 In fact, I could even find references where
13 these terms are used, but they all convey a functionality,
14 you know, they refer to a plurality of texels.

15 Q. Did you review Dr. Lastra's rebuttal report and
16 deposition testimony on this particular issue?

17 A. Yes, I did.

18 Q. Did he agree with this interpretation that
19 you've provided of FXT1?

20 A. No.

21 Q. What was his position?

22 A. So his position is that, like in the table I
23 showed, that he -- his argument is the image cannot be a
24 block.

25 In fact, he claims, you know, that a block has

1 to be -- he use the word a "modest size," which he defines
2 to be something like 12-by-12 texels or less.

3 Q. Okay.

4 Do you agree with his claim construction of
5 "modest size"?

6 A. No.

7 Q. Why not?

8 A. So I have multiple reasons for that.

9 Your Honor, the '628 Patent doesn't really
10 define a block. It's only plurality of texels. There is
11 no blocks as a requirement or restriction, you know, it
12 gives all kinds of examples.

13 I look at the specification of '628, it does not
14 limit a block to a modest size such as 12-by-12 or smaller.
15 In fact, Your Honor, I did not even find the word "modest
16 size" in the specification of '628.

17 Q. Okay.

18 But if we were to assume, just for the moment,
19 that Dr. Lastra is correct, and it has -- and a block
20 should be -- as claimed, should be of modest size, 12-by-12
21 or less, did you also provide an opinion in your report
22 that would cover that construction?

23 A. Yes, I did.

24 Q. Okay.

25 Can you please explain that.

1 A. So yes. Can we advance the slide.

2 So, remember, I mentioned earlier this thing.

3 So this is the list of examples that I showed you a few
4 slides earlier.

5 So, remember, this texture block, which had
6 24-by-24 texels detailed. So I could take this 24-by-24
7 texel block, and divide it into smaller texel blocks of
8 size 8-by-8, as I have shown here.

9 So now I have, you know, the smaller blocks of
10 8-by-8 texels, and one of them has these two subsets.

11 Q. Does Claim 7 limit the size of the texture
12 block?

13 A. No.

14 Q. Does Claim 7 limit the size of any of the
15 disjoint subsets?

16 A. Only thing it says is that since there are two
17 subsets, so, Your Honor, the subset has to be smaller than
18 the texture block size. That's all.

19 Q. Does the word "image" appear in Claim 7?

20 A. No.

21 Q. So what's your basis for your conclusion that a
22 person of ordinary skill would have been motivated to make
23 these additional partitions or to use a block of 8-by-8 as
24 you've shown?

25 A. There are many reasons, I listed that.

1 So, you know, it would have been obvious to any
2 person of ordinary skill in the art, Your Honor, that other
3 blocks are available.

4 The process I just illustrated, Your Honor,
5 where I took the 24-by-24 block and partitioned it into
6 8-by-8 texel block, what I'm doing is nothing else, Your
7 Honor, but a very well-understood conventional partition
8 technique with a very predictable result that I showed you,
9 and it would have been desirable to break up a large image
10 into smaller sets of data to improve the performance in
11 many cases.

12 Q. Just so I'm clear, earlier, you said, a minimum
13 size image in FXT1 was 4-by-4; correct?

14 A. Based on the blocks, that is correct.

15 Q. So an image in FXT1, then, could have been just
16 the 8-by-8 block you have shown with the red and blue
17 subset in it; correct?

18 MR. MEUNIER: Leading, Your Honor.

19 THE WITNESS: That is correct.

20 MR. JOHNSON: He already testified to that, Your
21 Honor, I'm simply confirming.

22 JUDGE ELLIOT: Hold on.

23 I'll allow it. Overruled.

24 MR. JOHNSON: Thank you.

25 BY MR. JOHNSON:

1 Q. So the image in FXT1 could have been simply the
2 8-by-8 block you've shown with the red and blue subset in
3 it?

4 A. Yes.

5 Q. Okay.

6 All right. Moving to the next limitation, in
7 the wherein clause, it says, "Wherein the compressed
8 texture block includes two or more disjoint subsets into
9 which data in the compressed texture block is to be
10 unpacked."

11 Did you analyze this with respect to FXT1?

12 A. Yes, I analyzed it. In fact, I used AMD's
13 interpretation in this case.

14 Q. What interpretation was that?

15 A. That is, Your Honor, shown on the top right,
16 that it's -- that extracting the data into the disjoint
17 subsets, that we just highlighted, whose order is
18 maintained through decompression would satisfy this
19 requirement.

20 Q. So I'd like to know what's shown at the bottom
21 of slide 34.

22 What is the picture on the bottom left of the
23 slide?

24 A. So this is an example I have taken from the FXT1
25 White Paper, RX-0394.

1 On the left, it shows the texture image, the
2 original, uncompressed image.

3 Q. What is represented by the middle image?

4 A. So the middle, you know, this shows how I would
5 like to apply the FXT1 algorithm, Your Honor, on this one.

6 So, you know, I used this decomposing into
7 block -- texel -- or subsets of 4-by-4 and 4-by-8 texels.

8 Q. All right.

9 So what is the arrow going from the first image
10 to the middle graphic represent?

11 A. So the arrow from the left image to the middle
12 kind of shows that how -- you know, how I would partition
13 the image to -- into different subsets so I can apply the
14 FXT1 compression scheme.

15 Q. Is the graphic in the middle intended to
16 represent a compressed or an uncompressed texture block?

17 A. Can you just repeat the question? I missed --

18 Q. Is the graphic in the middle intended to
19 represent a compressed or uncompressed texture block?

20 A. So, in the middle, it shows how you partition
21 the image into, you know, different size subsets. That is
22 used for compression and the same information later used
23 for decompression.

24 Q. All right.

25 Then what is shown -- what are you trying to

1 represent with the image on the right?

2 A. So, Your Honor, this example, also from the FXT1
3 White Paper, so we show the original texture image, we show
4 how compression is applied. And on the right, we
5 illustrate the reconstructed image after decompression has
6 been applied to the compressed representation.

7 Q. What did you conclude by looking at the
8 uncompressed versus decompressed image?

9 A. So, Your Honor, you can see, if you compare the
10 two images, they look very, very similar, which indicates,
11 you know, that this particular scheme was able to do a very
12 good job of compression, and almost preserve all the
13 features in this reconstruction.

14 Q. What data was extracted under this -- first --
15 strike that.

16 You understand that the Court construed
17 "unpacked" to be "extracted"?

18 A. That is correct.

19 Q. So what data is extracted here?

20 A. So, you know, if you -- in this FXT algorithm,
21 reconstructing a block using the CC_MIXED and CC_HI
22 algorithm would actually partition it into 4-by-4 and
23 4-by-8 disjoint subsets, and that would actually satisfy
24 the limitation.

25 So we're extracting the 4-by-4 and 4-by-8

1 subsets here.

2 Q. Why would it satisfy the limitation?

3 A. Could you repeat the question?

4 Q. Why would it satisfy the limitation?

5 A. Right.

6 So the limitation is about, you know, that
7 extracting data into disjoint subsets, the order is
8 maintained. The very fact that we're able to perform such
9 a high-quality reconstruction means the order has to be
10 maintained, because if the order was not maintained, you
11 would not have achieved a high-quality reconstruction like
12 this.

13 Q. Okay.

14 Moving to the next wherein clause in 7(b), as
15 shown on slide 35, were you able to determine if FXT1, if
16 the two or more disjoint subsets include a first subset
17 having a first set of color endpoints, and a second subset
18 having a second set of color endpoints?

19 A. Yes, I did. And I can illustrate here.

20 So the FXT1 methodology discloses, you know,
21 many compression algorithms. Two of those compression
22 algorithms is what I have highlighted on this slide.

23 The CC_MIXED applied to a 4-by-4 subset, and
24 CC_HI applied to a 4-by-8 subset. Now, each of the subsets
25 corresponding to 4-by-4 and 4-by-8, you know, have

1 information that can explicitly store the color endpoints,
2 two color endpoints, and that these color endpoints are
3 used to interpolate the rest -- the colors of the other
4 texels in that particular subset.

5 So each subset would have its own set of color
6 endpoints.

7 Q. Okay.

8 Just for the record, you're quoting from
9 RX-394.0006, as shown on slide 36.

10 Moving to the next slide, 37, were you able to
11 determine if FXT1 discloses individually decompress each of
12 the two or more disjoint subsets to form texels?

13 A. Yes.

14 Q. Could you please explain.

15 A. So, as I mentioned, FXT1, Your Honor, uses
16 compression algorithm; but each of those compression
17 algorithm, like CC_MIXED or CC_HI, is applied independently
18 to each subset. So it applies the compression algorithm
19 independently with subset.

20 Now, decompression is nothing else but kind of
21 doing the inverse of the compression operation. Since the
22 compression is applied independently, therefore, the
23 decompression can also be applied independently to each
24 subset, Your Honor.

25 So since it's applied independently, you see the

1 subsets also decompress independently.

2 Q. All right.

3 Moving to the next limitation, which I have
4 highlighted on slide 39, this talks about the decompression
5 process, and there's two determining clauses.

6 Do you see that?

7 A. Yes.

8 Q. Were you able to, to form an opinion as to
9 whether or not FXT1 discloses these two determining
10 clauses?

11 A. Yes, I do.

12 Q. All right. Well, let's walk through the first
13 one.

14 A. Sure.

15 So Your Honor, here I am copying from this
16 reference, RX-0394.0007. At the top, it basically shares
17 that how decompression is applied. So I'm going to this
18 Claim 7(d), you know, talks about the first and second
19 subset.

20 Here I have highlighted the first subset, which
21 is CC_MIXED, and I have used colors, Your Honor, between
22 the terms in the claim on the left and to identify the
23 corresponding terms in the description of the CC_MIXED.

24 So the first texel in the claim, I have clearly
25 shown the CC_MIXED algorithm for each texel. It says

1 interpolation. I say interpolation. It talks about color
2 endpoints in the claim, and I have identified two RGB 565
3 colors. It talks about index value, and the CC-MIXED
4 algorithm, Your Honor, uses 2-bit index values.

5 Q. Is that index value used to determine the color
6 endpoints?

7 A. That is correct.

8 So the index value is used to determine -- you
9 know, it uses the endpoints index value for the color of
10 all the texels in this 4-by-4 block.

11 Q. Is the index value used to interpolate the color
12 between endpoints?

13 A. That is correct.

14 Q. Can you determine or interpolate the color
15 between endpoints without that index value?

16 A. No.

17 Q. Okay. Going to the second determining clause,
18 can you walk us through that?

19 A. So Your Honor, I'm just kind of showing the same
20 thing. But in the second subset is, Your Honor, the CC_HI,
21 which happens to have this -- this subset had 4-by-8
22 texels.

23 Again, you know, I have used a very similar
24 color scheme to show the correspondence.

25 The second texel, Your Honor, in the Claim 7

1 corresponds to for each texel. The second disjoint subset,
2 Your Honor, is that 4-by-8 texel block.

3 In this case, again, I identified color
4 endpoints in yellow, Your Honor, as two RGB 555 colors. In
5 the CC algorithm, Your Honor, we use now a 3-bit index
6 value.

7 Q. Did you review Dr. Lastra's report with respect
8 to the limitation 7(d) and 7(e)?

9 A. Yes, I did.

10 Q. Did Dr. Lastra agree with you with respect to
11 these limitations?

12 A. So Dr. Lastra did not say anything special about
13 (d) and (e) limitation.

14 You know, his whole concern is that any
15 limitation that involves subset, his concern is with the
16 term subsets.

17 Q. Okay. Based on your review of the disclosure in
18 FXT1, what conclusion did you reach with respect to
19 Claim 7?

20 A. So my conclusion is, you know, that FXT1, you
21 know, discloses or at least renders obvious all of the
22 Claim 7 of the '628 Patent; so therefore, I believe these
23 claims are invalid.

24 MR. JOHNSON: Your Honor, I have two very small
25 claims to handle, and we could be done with FXT1, or we

1 could break now.

2 I'm perfectly fine either way because I'm about
3 to shift gears.

4 JUDGE ELLIOT: Yes. What do we have, 12:16.

5 Okay. Let's come back at 1:30. 1:30.

6 During our break, Dr. Manocha, please don't
7 discuss your testimony with anyone.

8 THE WITNESS: Yes, sir.

9 MR. RENAUD: Your Honor, if I might.

10 JUDGE ELLIOT: Yes.

11 MR. RENAUD: One housekeeping matter.

12 JUDGE ELLIOT: Yes.

13 MR. RENAUD: Yesterday you asked how we were
14 doing, and I said we were a little behind. Today with the
15 Manocha back-and-forth, which I know both sides were active
16 in, I think we're going to be a little short, possibly, on
17 time. So I was wondering if we could maybe take a shorter
18 lunch today, Your Honor?

19 JUDGE ELLIOT: Can someone explain to me how
20 we're going to be short on time? I mean, how long are you
21 going to put your rebuttal experts on for?

22 MR. RENAUD: Well, we'll come back with the
23 timekeeping, Your Honor. We're going to do it right now.
24 Yesterday when we did it, we thought it was really tight on
25 time; but it depends on how much time the other side

1 intends to use.

2 So Jordan and I are going to caucus and try to
3 figure out how much time is actually left.

4 JUDGE ELLIOT: Okay. I would rather go late --

5 MR. RENAUD: Okay.

6 JUDGE ELLIOT: -- than shorten the lunch break
7 for now.

8 I mean, if you can convince me that I should
9 shorten the lunch break, I will; but right now, I don't --
10 I mean, I don't see it.

11 MR. RENAUD: Let us report back to you after
12 lunch, Your Honor, if there's an issue.

13 MR. COYLE: Your Honor, they're entitled to the
14 15 extra minutes in light of your NEXT Advocate ruling
15 yesterday. So we could go to 5:00 today. We're otherwise,
16 I think, prepared to finish in the 15 hours that you've
17 allotted to the Respondents in your Ground Rules.

18 JUDGE ELLIOT: Okay. Well, adding 15 minutes to
19 the end of the day is nothing as far as I'm concerned,
20 so...

21 Okay. Well, tell me -- give me an update when
22 we come back from lunch, but we seem to be zooming through
23 this, as far as I tell. Apparently, I'm wrong.

24 MR. RENAUD: We will, Your Honor.

25 JUDGE ELLIOT: Okay.

1 MR. RENAUD: Thank you.

2 MR. COYLE: Thank you.

3 (A recess was taken at 12:18 p.m., after which
4 the hearing resumed at 1:30 p.m.)

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1 A F T E R N O O N S E S S I O N

2 MR. RENAUD: Your Honor, I have a short update.

3 JUDGE ELLIOT: Yes, please.

4 MR. RENAUD: Mr. Coyle is going to join.

5 So the counting that I have, Your Honor, is we
6 basically have three hours left today of courtroom time,
7 and I think six hours tomorrow, giving us nine. When we
8 add up the witnesses, we come to 8.7. And if we take the
9 average time for shared objections and the rest, that's
10 been 15 minutes a day, that's a half hour.

11 That puts us at 9.2, and we have nine hours. So
12 that presumes that, you know, we stay on the present pace.

13 So our suggestion would be, Your Honor, if it
14 was possible, would be to go to 5:15 today, and that way,
15 if there's an unexpected 10 or 15-minute dispute about
16 objections or whatnot with Dr. Hart or Dr. Lastra tomorrow,
17 we're comfortably going to have the time to finish. At
18 least that would be my recommendation, but I know Mr. Coyle
19 may have other thoughts.

20 MR. COYLE: The only other thought, Your Honor,
21 is that the time allocation was correct based on our best
22 estimates a month ago.

23 I think we'd have a better sense at the end of
24 the day today how much time we're actually going to need
25 tomorrow.

1 So I would suggest we adjourn at 5:00, as you
2 said at the beginning of the lunch break, and then we'll
3 pick it up tomorrow morning and see how much time we need
4 to ask for for Your Honor at that time.

5 JUDGE ELLIOT: You seem to be fixated on 15
6 minutes, Mr. Coyle.

7 MR. COYLE: 15.

8 MR. RENAUD: One other item, Your Honor. I'm
9 sorry.

10 JUDGE ELLIOT: No, no. Tell you what, let's go
11 until 5:15. We'll go until 5:15.

12 MR. RENAUD: Thank you.

13 JUDGE ELLIOT: Just to be on the safe side.
14 It's fine with me. I mean, if it's a problem with someone
15 else, tell me, but I have no problem with going until 5:15
16 just to make sure we get everything done.

17 MR. RENAUD: Just so Your Honor knows, we will
18 have one more NEXT Advocate tomorrow as well. We'll have a
19 junior lawyer taking one of the examinations.

20 JUDGE ELLIOT: All right.

21 MR. RENAUD: Okay. Thank you.

22 JUDGE ELLIOT: So other than Dr. Manocha and
23 then Complainants' rebuttal experts, who else do we have?

24 MR. COYLE: We are bringing back Mr. O'Neil,
25 Your Honor, after Dr. Manocha finishes, and then we are

1 calling Mr. Olson, who is a representative of third-party
2 ARM, at the end of our rebuttal case.

3 JUDGE ELLIOT: Okay.

4 MR. COYLE: So we have Manocha, O'Neil, Olson,
5 and then we'll be done with our case, then it goes back to
6 Complainants, Your Honor.

7 MR. RENAUD: Then we have Lastra, we have Hart,
8 and then we have -- depending on what happens with
9 Mr. Olson, we have Mr. Pomianowski as a potential rebuttal
10 witness on the issues that Mr. Olson is presenting on.

11 JUDGE ELLIOT: Is this all about the license
12 issue?

13 MR. RENAUD: Yes, as to Mr. Pomianowski.

14 JUDGE ELLIOT: Okay.

15 MR. RENAUD: Then Dr. Levitt also may come back
16 on the license issue as well.

17 JUDGE ELLIOT: Okay. Very good.

18 MR. RENAUD: Thank you, Your Honor.

19 MR. COYLE: Thank you.

20 JUDGE ELLIOT: Okay. Dr. Manocha, come on up,
21 please.

22 THE WITNESS: Good afternoon, Your Honor.

23 MR. JOHNSON: Okay, Your Honor. Are you ready
24 to proceed?

25 JUDGE ELLIOT: Yes. Go ahead.

1 MR. JOHNSON: Thank you.

2 CONTINUED DIRECT EXAMINATION

3 BY MR. JOHNSON:

4 Q. I believe before the break, we were about to
5 look at the dependent claims as part of your analysis with
6 respect to FXT1.

7 So did you form an opinion with respect to the
8 additional limitations found in Claims 9 and 10 with
9 respect to FXT1?

10 A. Yes.

11 Q. Okay. So let's look at each of those quickly.

12 With respect to Claim 9, what is the basis for
13 you concluding that the computer system of Claim 7 wherein
14 the "the two or more disjoint subsets have different
15 sizes"?

16 A. So please advance.

17 So, Your Honor, before that, I mentioned that
18 FXT1 uses two compression methods, CC_MIXED and CC_HI, and
19 I clearly showed that CC_MIXED was based on 4-by-4 texel
20 blocks, and CC_HI was based on 4-by-8 texel block.

21 So it's very obvious these texel blocks
22 correspond to the subsets and they have different sizes and
23 they are clearly shown to be disjoint.

24 Q. Again, what does "disjoint" mean?

25 A. "Disjoint" means, Your Honor, that there are no

1 overlapping between them, no common texels, sir.

2 Q. All right.

3 Moving to the limitation of Claim 10, does FXT1
4 disclose that the processor is "further configured to
5 independently decompress each of the two or more disjoint
6 subsets"?

7 A. Yes, it does. I can illustrate that here.

8 So, Your Honor, I have shown the same thing, in
9 RX-0394, from FXT1 White Paper, as I mentioned that, you
10 know, the compression scheme in FXT1, Your Honor,
11 compresses each texel block, each subset independently.
12 And since the decompression is kind of doing the inverse
13 process, Your Honor, so therefore, it also decompresses
14 each of the subsets independently, as I've shown here.

15 Q. Okay.

16 A. I have shown that for the two disjoint subsets
17 right here.

18 Q. All right.

19 So based on your review of the FXT1 disclosure,
20 did you form a conclusion with respect to Claims 9 and 10?

21 A. Yes, I did. My conclusion was these two
22 dependent claims are also invalid, Your Honor.

23 Q. All right. I'd like to move on, then, to the
24 next reference.

25 Looking at slide 50, there's a picture of the

1 first page of RX-393.0002.

2 Do you recognize that?

3 A. Yes, I do. It's the cover of this Patent '402,
4 which I referred to as Sorgard in my report.

5 Q. All right.

6 Can you please describe briefly what the
7 technology is that is disclosed in Sorgard.

8 A. So, Your Honor, Sorgard also, you know,
9 discloses a compression/decompression method. And I'll
10 just walk through this method with a few illustrations.

11 It takes a texture image, and it decomposes into
12 multiple 8-by-4 blocks, Your Honor, as shown on this
13 particular figure.

14 What it does is it takes each 8-by-4 block and
15 further decomposes it into two sub-blocks, you know, with
16 also the plurality of pixels shown left and right, 4-by-4
17 each.

18 Now, the goal is to compress each sub-block, and
19 Sorgard uses what it calls fading patterns. There are
20 eight of them, which are shown on the right. You can see
21 eight fading pattern corresponds to 16 texels, and you have
22 within each fading pattern, you see these lines, they're
23 nothing else but interpolation parts which cover four
24 texels, and they have two endpoints each.

25 So it basically looks at each sub-block, and

1 tries to use the color pattern to figure out the best of
2 the eight fading patterns, which I listed here.

3 So, in this case, for example, it will take the
4 fading patterns shown with the index 1 -- can you advance
5 the slide, please -- might go to the left sub-block, and in
6 my example I have shown here, this is in column 33, lines
7 23 to 28, of the Sorgard patent, that the fading pattern
8 corresponds to 7, let's say, is the best example to match
9 that side sub-block for compression.

10 Q. Okay.

11 MR. MEUNIER: I'm going to object, Your Honor.
12 This is what we talked about this morning, talking about
13 different fading patterns going to the different
14 sub-blocks.

15 JUDGE ELLIOT: Give me a moment.

16 All right, Mr. Johnson.

17 MR. JOHNSON: Well, first of all, Your Honor,
18 we're not yet to his analysis. We're simply describing the
19 technology in the background, so I didn't really see that
20 as objectionable. We haven't gotten to the claims yet.

21 I think what AMD was objecting to is that they
22 think a new theory is there based on the claim language.

23 So I'm not sure that it's objectionable just to
24 tell you what is in Sorgard.

25 But second of all, Your Honor, I was able to

1 find another sentence in the expert report that I failed to
2 raise this morning, and I'd like to raise it now, if you
3 would just allow that.

4 JUDGE ELLIOT: Okay. Show me.

5 MR. JOHNSON: Sure.

6 If you could pull up Paragraph 209 from his
7 report -- actually, Paragraph -- starting with 208. 208
8 and 209.

9 I'll just do this very quickly, Your Honor. I
10 know we have already went over it.

11 So, in 208, all I'm trying to show is that we
12 have clearly identified subsets as interpolation paths in
13 general. Just interpolation paths. That's how we've
14 defined them, subsets as interpolation paths.

15 As I explained this morning, the block we
16 expressly showed as the 8-by-4 block, and that each one of
17 those is divided in 4-by-4.

18 Then we go to the illustration, which we talked
19 about. In 209, Sorgard illustrates the general
20 decompression formula for a 4-by-4, and we talk about that.

21 Then can you pull up 210.

22 We then explain in 210 how you specifically use
23 the index value and the interpolation of formulas to find a
24 color or colors for each half, which has been defined as a
25 subset, but the last sentence is important, "...and this

1 process would repeat for each interpolation path within the
2 block," the block was defined as 8-by-4, "to form texels
3 covering the entire block," that means both 4-by-4 subsets.

4 So he expressly says that it's going to be all
5 paths within the entire 8-by-4 block.

6 JUDGE ELLIOT: I don't know. Doesn't say
7 8-by-4. He talks about four texels and one disjoint
8 subset, and I'm not convinced.

9 In any event, I think -- I'll overrule the
10 objection. I don't think that we're getting into this
11 particular subject just yet.

12 The mere fact that you've got the two 4-by-4
13 blocks next to each other is not -- that doesn't address
14 the issue.

15 So go ahead.

16 MR. JOHNSON: Thank you.

17 BY MR. JOHNSON:

18 Q. All right. So based on your review of Sorgard,
19 did you form an opinion with respect to the elements of the
20 claims?

21 A. Yes, I did.

22 Q. Did you look at Claim 7?

23 A. Yes, I did.

24 Q. All right. I want to walk through that.

25 So with respect to the first limitation shown on

1 slide 56, computer processing system comprising a processor
2 and a memory. What were you able to determine with respect
3 to the Sorgard disclosure and this limitation?

4 A. So advance the slide.

5 So here I have quoted two paragraphs from
6 Sorgard. At the top is column 19, from lines 10 to 14, and
7 you can see it clearly mentions the term, graphics
8 processor, which corresponds to the processor in Claim 7.

9 At the bottom, I have, Your Honor, from column
10 23, lines 37 to 39, which talks about computer program
11 product for use with a computer system, which clearly
12 indicates the memory of the claim.

13 Q. All right. Moving to the next limitation,
14 highlighted on slide 58, does Sorgard disclose that its
15 processor is configured to receive a compressed texture
16 block?

17 A. Yes, it does.

18 Again, Your Honor, this again paragraph at the
19 top from column 24, lines 41 to 47, at the bottom from
20 column 18, from lines 11 to 14, both from RX-0393.

21 So as I explained a few minutes ago, Your Honor,
22 Sorgard clearly discloses compressing and decompressing
23 8-by-4 blocks, so the processor must receive the 8-by-4
24 block in a decompressed version from the memory.

25 It's clearly mentioned here, you know, you can

1 see that at the top it talks about compressing, compressing
2 the texture data making the storage. At the bottom
3 paragraph, Your Honor, it clearly talks about decoding a
4 texture data block.

5 They clearly highlight that the processor
6 received a compressed texture block of the 8-by-4 texel
7 block.

8 Q. Just so the record is clear, because I'm not
9 sure if you said it, but on slide 59, it's showing quotes
10 from Sorgard from column 24, lines 41 to 47, and the second
11 quote from column 18, lines 11 to 14?

12 A. That is correct. Thank you.

13 Q. Moving to slide 60 in the next portion of the
14 claim, in 7(b), does Sorgard disclose that wherein "The
15 compressed texture block includes two or more disjoint
16 subsets"?

17 A. Sure. I can illustrate here.

18 So, Your Honor, I have mentioned, you know, the
19 original block is 8-by-4, and it consists of 4-by-4
20 sub-blocks, and that each of the sub-blocks is compressed
21 using a fading pattern.

22 And each fading patterns has four interpolation
23 parts, and each of those interpolation parts corresponds to
24 a subset.

25 As you can see, I have drawn two such examples

1 of fading patterns, Your Honor. The interpolation part of
2 the four -- the subsets cover four texels, and none of them
3 overlap.

4 So they're clearly disjoint subsets.

5 So these subsets could be in the same fading
6 pattern shown on the left or you can take one disjoint
7 subset for the left sub-block, and one disjoint subset for
8 the right sub-block.

9 And this is clearly explained in column 33, from
10 lines 22 to 28 where it talks about four interpolation
11 parts with four texels each which is nothing else but one
12 of the disjoint subsets.

13 MR. MEUNIER: Objection.

14 JUDGE ELLIOT: Sustained.

15 MR. MEUNIER: Objection, Your Honor.

16 JUDGE ELLIOT: Sustained.

17 MR. MEUNIER: They said they weren't going to
18 get into this when they started applying the claims, and
19 it's exactly what they're doing.

20 JUDGE ELLIOT: Sustained.

21 MR. JOHNSON: Your Honor, if I may. I have
22 not -- I expressed earlier that I wouldn't be able to
23 change the slides, but I will before, and because of the
24 prohibition on talking to the witness, I haven't been able
25 to talk to him about it.

1 I will elicit testimony of just one sub-block.

2 JUDGE ELLIOT: Okay. So clarify your question.

3 Okay. Make sure that he's answering it consistently with
4 what's in your prehearing brief.

5 But I'm going to strike that last answer because
6 I think that's what we talked about this morning.

7 MR. JOHNSON: I understand that. I just ask for
8 a little leeway because I haven't been able to talk to the
9 witness since the ruling.

10 BY MR. JOHNSON:

11 Q. Dr. Manocha, within -- let's just take, for
12 example, the sub-block that's on the left in the figure.
13 Okay?

14 A. Sure.

15 Q. So within that particular 4-by-4 sub-block
16 that's part of the entire 8-by-4 block, how many
17 interpolation paths are shown?

18 A. Four, as are shown in this example.

19 Q. How many subsets are within that one 4-by-4
20 block?

21 A. There will be four subsets, Your Honor, in the
22 left sub-block.

23 Q. Are each of those subsets disjoint?

24 A. Yes, they are. As you can clearly see, they
25 have no overlapping texels, so they are four disjoint

1 subsets in the left sub-block.

2 Q. Okay.

3 So could you have selected any two of those
4 disjoint subsets within the first 4-by-4 block, to satisfy
5 the claim language?

6 A. Sure.

7 Q. Okay. Moving to the next limitation, which is
8 that the wherein clause, and it says, "Wherein, the
9 compressed texture block includes two or more disjoint
10 subsets into which data in the compressed texture block is
11 to be unpacked."

12 Do you recall this limitation that we discussed
13 earlier?

14 A. That is correct.

15 Q. All right.

16 What interpretation did you use to --

17 A. I used the AMD interpretation which is
18 highlighted here.

19 Q. All right. What was that?

20 A. Well, Your Honor, it clearly says that
21 "extracting data into disjoint subsets whose order is
22 maintained through the decompression would satisfy this
23 requirement."

24 Q. Focusing on the sub-block on the left within the
25 8-by-4 block. Do you understand my question?

1 A. Yes, I do.

2 Q. What is your conclusion with respect to this
3 limitation? And try to limit your answer to just using the
4 4-by-4 block on the left?

5 A. So the left sub-block, show, Your Honor, four
6 disjoint subsets. So the way Sorgard's method reconstructs
7 the compressed block using these order -- maintains the
8 order of these subsets shown in the left sub-block.

9 Q. All right. If you had used -- again, only one
10 4-by-4 block, but you had used the right block, would your
11 answer have been the same?

12 A. That is correct.

13 Q. All right.

14 So based on Sorgard's disclosure, could you
15 explain, then, under the interpretation that you used, how
16 you came to your conclusion that it satisfies this claim
17 language?

18 A. Well, this interpretation says that you extract
19 the disjoint subsets. We have clearly shown the four
20 disjoint subsets in the left block.

21 So if we did not follow the order in this -- you
22 know, in this maintaining -- in compressing them, when we
23 reconstruct, we would not get a good reconstructed result.

24 The very fact that Sorgard method takes this
25 disjoint subset, use some compression and decompressed,

1 basically satisfy the limitation that order is maintained.

2 Q. When are these fading patterns or interpolation
3 paths assigned to the image?

4 A. They are during the -- when the compression is
5 performed. Remember, you take the image, Your Honor, you
6 divide it into 8-by-4 blocks, and then 4-by-4 sub-blocks.

7 So for each sub-block, the choice of, you know,
8 what interpolation paths the subset has chosen is the time
9 of compression.

10 Q. Is there data within the compressed texture
11 block that indicates all of the subsets?

12 A. That is correct. That follows from the -- you
13 know, from the -- when it selects the specific fading
14 pattern, that clearly specifies the four interpolation path
15 of the four subsets.

16 Q. When the data is decompressed, how does it know
17 where to find the subsets?

18 A. So you know, these interpolation paths or
19 subsets are -- there's a fixed pattern.

20 So when a decompression is being performed, the
21 decompressing process would know which specific pattern of
22 interpolation path or subset it is using. They're going to
23 fix in the whole scheme.

24 If, for example, the compression uses the left
25 sub-block -- the path on the left sub-block, the

1 decompressor would have explicit knowledge of the pattern
2 that is forced interpolation paths.

3 Q. Is there any data that's extracted in order to
4 define the subsets when it's decompressed?

5 A. As I mentioned, you know, the interpolation
6 paths and subsets are fixed with respect to each fading
7 pattern.

8 So the unique identification of the fading
9 pattern clearly mentions the interpolation paths and the
10 subsets.

11 Q. And that's within the compressed data block --
12 or the texture block?

13 A. That is correct.

14 Q. All right. When the image is -- or when the
15 compressed texture block is decompressed, does it still
16 maintain the disjoint subsets?

17 A. Yes, it does.

18 Q. Okay.

19 A. This is shown in -- you know, this figure is
20 from -- I apologize -- column 37, giving the exact
21 reference, line 45 to 52.

22 Q. All right. Moving to slide 63, the last wherein
23 clause, does Sorgard disclose "wherein two or more disjoint
24 subsets include a first subset having a first set of color
25 endpoints and a second subset having a second set of color

1 endpoints"?

2 A. Yes, it does.

3 Q. All right. I want you to focus your answer on
4 just the 4-by-4 block on the left side of the 8-by-4
5 complete block.

6 A. Sure.

7 So in the left sub-block, you know, there are
8 four interpolation paths, Your Honor, that we discussed. I
9 want you to put your attention to one of the four
10 interpolation paths where I have clearly identified the two
11 endpoints, Your Honor.

12 One of them corresponds to texel with label 2
13 shown in red, and one of them corresponds to texel label 6
14 in blue. So you can see for the interpolation path, I show
15 the two color endpoints.

16 Q. All right.

17 That -- what you described was for the, I'll say
18 the third arrow down in the 4-by-4 sub-block on the left;
19 is that correct?

20 A. Could you just repeat the question. I'm sorry.

21 Q. I'm trying to, I don't have a laser -- but
22 you're identifying the interpolation path that starts at
23 block 2, labeled 2 in red, and goes to block 6 in blue;
24 correct?

25 A. That is correct.

1 Q. So, just so I understand the figure, you've
2 circled -- or encased in yellow what you're calling the
3 color endpoints?

4 A. Yeah. For that particular path, I show the
5 color endpoints, and they are through the interpolation
6 path, and, Your Honor, each of them have similarly -- each
7 interpolation path has two color endpoints.

8 Q. So on the left-hand side of the 8-by-4 block,
9 you are highlighting two color endpoints on one particular
10 subset; correct?

11 A. That is correct.

12 Q. So within the 4-by-4 block, only on the left,
13 could you have highlighted a second subset within that
14 4-by-4 sub-block?

15 A. Sure.

16 There are -- Your Honor, there are four
17 interpolation paths. Let's look at the one at the top.
18 You see one interpolation starting at texel label 0, Your
19 Honor, and goes up to texel label 4.

20 So, in that case, the color associated, you
21 know, with those -- the texel label 0 and 4 represent color
22 endpoints in that case.

23 Q. Does each interpolation path contain two color
24 endpoints in the sub-block on the left?

25 A. That is correct.

1 Q. All right.

2 So what are you trying to show with slide 65?

3 A. So, in this case -- you know, we just talked
4 about, Your Honor, color endpoints. I wanted to illustrate
5 this further, and I explained this in my report, this
6 Figure 1 is from the Sorgard reference, and the text on the
7 right is what I copied from the same RX-0393, at column 33,
8 from lines 47 to 61.

9 I apologize, this figure is a little bit dense,
10 but it clearly shows that when you compress the 8-by-4
11 block by Sorgard, it has a 64-bit representation of the
12 compressed block.

13 This compressed information that is stored in
14 the memory has, you know, the color mode, color data, and
15 sub-block data.

16 So what I want to draw your attention is the
17 text on the right, which I got from column 33, that with
18 each color endpoint that we just discussed, it stores a
19 2-bit index in this 64-bit information.

20 So if there are eight color endpoints, you'll
21 have 2-bit index for each of them, it stores 16 bits. So
22 what I'm trying to convey here is that for each of the
23 color endpoints, Your Honor, we have discussed, that the
24 information is stored, and that is actually eventually used
25 to compute the color of these color endpoints.

1 Q. All right.

2 Let's move on to slide 66, and the next
3 limitation.

4 Does Sorgard disclose that the processor is
5 configured to "individually decompress each of the two or
6 more disjoint subsets to form texels"?

7 A. Yes, it does.

8 Q. Can you explain that.

9 A. So, Your Honor, here, I have taken some text
10 from RX-0393, which is the Sorgard patent, from column 13,
11 lines 39 to 45.

12 As you can clearly see, you know, it talks about
13 texture data elements, which, in this case, are the
14 interpolation paths or subsets, and since there's no
15 overlap between them, these texture elements are reproduced
16 independently, which is equal to saying they decompress
17 independently.

18 Q. All right. That quote that you referred to is
19 showing on slide 67 --

20 A. That is correct.

21 Q. -- for the record.

22 Moving on to limitations that are in 7(d) and
23 7(e), again, this is our decompression portion of the
24 claim, and it involves two "determining" steps.

25 Does Sorgard disclose each of these

1 "determining" steps?

2 A. Yes, it does.

3 Q. Can you explain.

4 A. Sure.

5 Let me illustrate that.

6 So, in this case, now, I have taken the same
7 RX-0393. I have copied some text from column 33, lines 62
8 to 67, and what I have done here is use a color highlight,
9 I show some phrase in the claim in some color and identify
10 exactly how, you know, they're mapped on to -- in the
11 Sorgard specification.

12 So, for example, the yellow mentioned texel
13 color, it references the colors are intermediate texture
14 elements.

15 The claim mentions interpolation, and Sorgard
16 uses linear interpolation.

17 And the claim mentions color endpoints, and
18 clearly, Sorgard mentions endpoint colors. Again, I've
19 used the purple color to just show the correspondence here.

20 This is, again, from column 33 of Sorgard.

21 Q. All right.

22 Moving to slide 70, what are you trying to show
23 on this side?

24 A. So, in this case, you know, let me just focus on
25 the left sub-block, that how you determine the color of the

1 first texel.

2 So, as I said, you know, the compression scheme
3 figures out the specific fading pattern for this, let's
4 say, the left sub-block.

5 And here, I showed that, you know, this is from
6 column 33, line 23-28, how is the color shown of the
7 endpoints. Earlier, I'd explained to you the texel 2 and 6
8 are the color endpoint, and I show how the color
9 determination is done.

10 I can expand more, too, in the subsequent
11 slides.

12 Q. Can you explain how the interpolation is done in
13 some more detail.

14 A. Sure.

15 So let's focus on this particular sub-block, and
16 the fading pattern, which I've discussed.

17 So this just happened to be, you know, fading
18 pattern with the index value of 1, shown on the top left.

19 So, in this case, we have already shown two
20 color endpoints, Your Honor, correspond to texel with label
21 2 and 6. I want to draw your attention to the phrase
22 "first texel," which is shown here, and if you -- just to
23 the coordinates, the coordinates of the first texel are
24 (1,2), which I have shown with the equation, and I
25 highlighted that equation. This is actually from -- this

1 whole thing is from column 34, lines 15-22.

2 I clearly show -- so you have the endpoint
3 colors, which we just discussed a few slides ago. The
4 (1,2) is the first texel there. Its color is computed
5 based on the specific formula. It takes the color of the
6 left endpoint and the color of the right endpoint, performs
7 the interpolation and computes the color.

8 Q. Okay.

9 Is there any relationship to the index value in
10 the color endpoints?

11 A. Yes, there is, because see, as I clearly showed,
12 the index values -- the throughput index value used in the
13 compressed for every sub-block for the interpolating fading
14 pattern.

15 In this example, I chose to show the index value
16 1. The index value 1 was used to figure out where these
17 endpoints are, and also the color of the endpoints, which I
18 explained before.

19 So the index value is used to figure out the
20 endpoint color, the one I have shown in my equation, and
21 that eventually definitely governs the color of the texel
22 shown as what's first texel.

23 Q. All right.

24 For the second "determining" step that's in the
25 claim, which is shown on slide 72, would you repeat that

1 process, but for a different interpolation path within the
2 sub-block on the left?

3 A. Sure. Let's focus, Your Honor, on the sub-block
4 on the left.

5 As I mentioned, there are four interpolation
6 paths. Let's choose the other interpolation path, which
7 is -- corresponds to -- on the left sub-block from texel
8 label 0 to texel label 4. We have the same endpoint
9 colors, which are determined based on the index. And the
10 other texel colors, Your Honor, will be determined by a
11 similar formula as shown, except, you know, the endpoint
12 colors in the formula will change.

13 So I don't have the equation here, but the same
14 process would be repeated, but we get a different formula
15 based on the index value.

16 Q. All right.

17 So I want you to just talk about on the left,
18 but my only question is: Each fading pattern has its own
19 index value; correct?

20 A. That is correct.

21 Q. And --

22 MR. MEUNIER: I'm sorry.

23 Objection. Leading, Your Honor.

24 JUDGE ELLIOT: Sustained.

25 BY MR. JOHNSON:

1 Q. How many index values are associated with each
2 fading pattern?

3 A. One.

4 Q. Can you interpolate any of the colors within a
5 fading pattern without knowing the index value?

6 A. No.

7 Q. Is each color endpoint -- strike that.

8 Are the interpolation formulas different for
9 each texel that you have to interpolate within a fading
10 pattern?

11 A. Yes, it is.

12 So just to explain further, on the left-hand
13 side, remember I had shown Your Honor the first texel whose
14 coordinates were (1,2). I give the formula for that texel
15 (1,2), and you can see I have shown those endpoint color 2,
16 endpoint color 6.

17 If I change the index value, instead of 1, I'll
18 use some other example, Your Honor, this formula would have
19 changed if I used different endpoints.

20 So these endpoint used in the mathematical
21 expression at the bottom are governed by the index value.

22 Q. But within one 4-by-4 sub-block, would each
23 color endpoint change for each interpolation pattern?

24 A. That is correct.

25 As we discussed earlier, that every

1 interpolation path has two color endpoints. So the color
2 points will change for each of them.

3 Q. You've identified a red endpoint 2 and a blue
4 endpoint 6 in the interpolation formula on the left; is
5 that correct?

6 A. That is correct.

7 Q. Okay.

8 Are those constants or variables within that
9 formula?

10 A. Well, so that interpolation path that we
11 specifically chose, two endpoints are fixed based on the
12 pattern, but the color associated with those endpoints, and
13 the choice of endpoints color of the endpoints would vary
14 depending on the index value used.

15 Q. That would be a function of the index value?

16 A. Absolutely, yes.

17 Q. All right.

18 Based on your review of Sorgard, did you form a
19 conclusion with respect to Claim 7?

20 A. Yes, I did.

21 Q. What was that?

22 A. Well, the claims are invalid.

23 Q. All right.

24 By "invalid," do you mean anticipated or
25 obvious?

1 A. Well, as I mentioned, you know, at least, maybe
2 it was not very articulate in my report, but Sorgard
3 renders obvious the Claim 7, it discloses or at least
4 renders obvious.

5 Q. All right.

6 With respect to --

7 MR. MEUNIER: Objection, Your Honor, to the
8 obviousness analysis and conclusion, for the reasons we
9 discussed earlier this morning. You just wanted me to
10 object at the time.

11 JUDGE ELLIOT: Okay. I'll sustain that.

12 Why don't you ask the question differently.

13 BY MR. JOHNSON:

14 Q. Did you find that all of the elements were
15 disclosed by Sorgard?

16 A. Yes, they were.

17 Q. All right. So with respect to the Dependent
18 Claims 9 and 10, did you do an analysis of these
19 limitations?

20 A. Yes, I did.

21 Q. With respect to Claim 9, does Sorgard disclose
22 that the two or more disjoint subsets have different sizes?

23 A. Yes, it does.

24 So, Your Honor, I have reproduced this text from
25 RX-093. This is on column 12, line 47 to 48. Sorgard

1 clearly mentions that the number of texture elements that
2 an interpolation path covers can be selected as desired.

3 So, in my example, I have only shown there were
4 four texels, but you could select more than four, less than
5 four; and therefore, we could have interpolation path to
6 different texels. Since each interpolation path
7 corresponds to a subset, we will have two or more disjoint
8 with different sizes.

9 Q. Moving to the limitations of Claim 10, does
10 Sorgard disclose the limitation that the processor is
11 further configured to independently decompress each of the
12 two or more disjoint subsets?

13 A. Yes, it does. And I'll show you here.

14 So, Your Honor, I have taken this text again
15 which I have shown earlier. This is from column 13, lines
16 39 to 45. I have shown the portion in yellow, Your Honor,
17 where it's clear where the texture data elements that are
18 to be reproduced independently. These texture data
19 elements correspond to the interpolation path.

20 So, they are reproduced, each of them is
21 reproduced in an independent manner.

22 Q. All right. Based on your review, did you find
23 that the limitations of Claims 9 and 10 were disclosed by
24 Sorgard?

25 A. Yes.

1 Q. All right. Moving to your next set of opinions,
2 did you review Dr. Lastra's report with respect to
3 secondary indicia of non-obviousness?

4 A. Yes, I did.

5 Q. Did you form any opinions with respect to
6 secondary indicia of non-obviousness?

7 A. Yes, I did, and that's clearly from my slide. I
8 clearly feel a lack of second indicia of nonobviousness in
9 Dr. Lastra's arguments.

10 Q. Okay. I'm going to change gears for just a
11 second, and I want to talk about your opinions with respect
12 to lack of written description. Okay?

13 A. Sure.

14 Q. Can you identify for me which term it is that
15 you -- is at issue?

16 A. It is.

17 Q. I'm sorry. I'll try to speak up.

18 Can you identify for the Court which term you
19 believe is at issue?

20 A. Sure. Can you advance the slide.

21 So Your Honor, we just went through Claim 7, and
22 you can see I've identified in Claim 7 that the term being
23 used individually decompress. I have highlighted that.
24 And also, the Dependent Claim 10, Your Honor, there it uses
25 the term independently decompress.

1 So my concern is the term individually
2 decompress in Claim 7 lacks in the description. I could
3 not find that somewhere in the '628 Patent specification,
4 but that's the main issue here.

5 Q. Okay. What is -- what are you trying to
6 identify by raising Claim 10?

7 A. So Your Honor, Claim 7 talks individually
8 decompress for which there is no written description.

9 Claim 10, Your Honor, which is a dependent claim
10 refers to independently decompress for which there is
11 claim -- there is written evidence, but since Claim 10 is
12 dependent claim of Claim 7, the scope of individually is
13 much larger, Your Honor -- you know, the scope of Claim 10.

14 So based on that, I came to the conclusion that
15 the term individually and independently do not have the
16 same scope.

17 Q. Did you -- based on your review of Dr. Lastra's
18 report on this issue, does he agree with you?

19 A. Dr. Lastra, in his -- I think his report or
20 deposition, offered some other construction for this term
21 individually, like, you know, one at a time or using
22 separate computational units.

23 Q. Where he did get that from?

24 A. I don't know, but in this -- Your Honor, in the
25 patent intrinsic evidence, I could not find this term. So

1 that's why I'm concerned, he probably got them from some
2 extrinsic evidence.

3 But you know, as I said, the specification does
4 not provide written description in the full scope of the
5 term as construed by AMD.

6 Q. All right.

7 Moving to your last set of opinions with respect
8 to the ASTC specification, do you recall those?

9 A. Yes, I do.

10 Q. All right. Can you just identify briefly what
11 your opinion is with respect to this issue?

12 A. So, Your Honor, I looked into some AMD
13 infringement claims. So in the infringement complaints,
14 AMD was relying on ARM, that's the company, ASTC's user
15 guide.

16 I looked at the ARM's ASTC user guide. I found
17 the documentation in that actually corresponds to the
18 requirements OpenGL ES 3.2.

19 So one of the first conclusions that I have
20 here, this is on the left I show you OpenGL ES, Version
21 3.2. ASTC is a compression format which is required. If
22 you look at this OpenGL ES 3.2, it references to the ASTC
23 format are described in the specific reference, ASTC
24 compressed texture image format chapter of the Khronos data
25 format specification.

1 So I used this reference to go and look into
2 Khronos data format specification for my analysis.

3 Q. All right. Moving to slide 88, what are you
4 showing on this slide?

5 A. So, Your Honor, I have just referenced RX-0020,
6 on the left, I just mentioned this is the cover image of
7 the specific Khronos data format specification, but since
8 we're dealing about the ASTC specification, those
9 particular specifications, you know, which came from OpenGL
10 ES 3.2, are specifically, Your Honor, in Chapter 23 of the
11 ASTC compressed texture image format. So I used this
12 specific chapter for my analysis.

13 Q. Moving to slide 89. You have the language of
14 the claims. What are you walking through here?

15 A. So I as mentioned, you know, I'm looking into
16 AMD's infringement claims, and you know, how it used -- as
17 I mentioned, it used, Your Honor, the ARM's ASTC
18 specification guide.

19 So you know, of course, we all know the claim,
20 need a processor and memory, you know, but we all know if
21 anybody is telling with ASTC texture decompression, you
22 need to have memory from where you get the compressed
23 representation, and the processor to perform the
24 decompression.

25 So it's very obvious that processor and memory

1 are necessary to perform ASTC's compression, which is, you
2 know, detailed in the Khronos data format specification.

3 Q. All right.

4 Moving to the next limitation on slide 90, what
5 are you showing here?

6 A. So, Your Honor, I'm trying to show the
7 correspondence between the reference that AMD uses for
8 their infringement claims. I said, you know, they use
9 ARM's ASTC user guide, where I have given the details of
10 RX-0066 and other things.

11 So, Your Honor, what I have shown here is the
12 Exhibit 43, you know, reference 8 and 9. I have copied the
13 relevant portions from ARM's ASTC user guide, and I pointed
14 that some terms in yellow, Your Honor -- like, for example,
15 ASTC divides the image into fixed size blocks of texels
16 which are compressed.

17 At the bottom, Your Honor, it talks about using
18 gradients and it specifically mentioned that each
19 compressed block used stores the endpoint colors for a
20 gradient.

21 So this is the specs in ARM's ASTC user guide,
22 Your Honor.

23 Q. Just so it's clear, what ARM documents is AMD
24 relying on in its infringement contentions?

25 A. That is correct.

1 Q. Can you identify which ARM documents AMD is
2 relying on in its infringement contentions?

3 A. Yes.

4 So this is the document at the top, ARM's ASTC
5 user guide, and the specific reference is, you know,
6 RX-0066. -- I think this refers to 0012-0018.

7 Q. All right. Sticking with element 7(b), what are
8 you showing on slide 91?

9 A. So, Your Honor, I mentioned, you know, that -- I
10 referred to the OpenGL ES 3.2, which is identified by
11 Khronos, I just mentioned a few slides ago, that the
12 Khronos ASTC specification was in chapter 23, Your Honor.

13 So now in this one, I took this reference, which
14 is RX-0020. I took that particular section in chapter 23.
15 This section, Your Honor, is on block and coding, 23.4, and
16 I highlight the portion that really matched up with what
17 AMD used in ARM's user guide to show the corresponding
18 documentation here on a partition the texels into multiple
19 sets, and each of the partitions we specify separate
20 endpoint.

21 So I'm trying to show for Claim 7(b), Your
22 Honor, that how what is given in ARM's ASTC user guide
23 matches with Section 23.4 of Khronos data format
24 specification.

25 Q. All right.

1 Moving to slide 92 and the element 7(c), 7(d)
2 and 7(e), what are you showing there?

3 A. So, Your Honor, I'm doing the same exercise in
4 the context of this specific, you know, claims, 7(c), (d)
5 and (e). Here again, I go back and point to what AMD
6 relies for infringement claims. I go to the same
7 reference, ARM's ASTC user guide, RX-006, from 12 to 18.

8 So, Your Honor, I have again copied that, you
9 know, those sections from the user guide which talks about
10 using gradients and during decompression that the color
11 value for each texel is generated by interpolating between
12 two endpoint colors based on the per-texel weight.

13 Q. All right. Moving to slide 93, and staying with
14 those same claim elements.

15 A. So just again --

16 Q. What are you showing here?

17 A. Just again, Your Honor, to show the matching.
18 Now, I go back to the document which is Khronos ASTC
19 specification which is RX-0020.

20 Your Honor, for those allegations related to
21 Claims 7(c), (d) and (e), I go to these sections of 23.7,
22 23.8, 23.9.

23 Your Honor, I'd like to draw your attention to
24 the portion highlighted in yellow which also says clearly
25 in Khronos data format specification that you read in color

1 point mode and endpoint data for selected partition
2 unquantize interpolate.

3 Again, it shows a matching correspondence
4 between ARM's ASTC user guide, and Khronos data format
5 specification.

6 Q. Based on your review of AMD's contentions, and
7 the Khronos document, what did you conclude?

8 A. So I conclude, you know, the fact that whatever
9 AMD used for infringement claims such as the ARM ASTC User
10 Guide, all of those -- all of those could match directly to
11 the, you know, the ASTC specification and the Khronos data
12 format specification.

13 Q. What are you showing on slide 95 with respect to
14 Claims 9 and 10?

15 A. So, Your Honor, I went through the exercise for
16 Claims 7(b), (c), (d), and (e), for the same kind of
17 matching, Your Honor, I'm looking at two dependent claims,
18 Claim 9 and Claim 10. Again, in this context, I'm really
19 focusing on AMD, these infringement, you know, issues.

20 And for Claim 9, AMD cites user guide with
21 RX-00612, that's the user guide, and below that, I give you
22 the exact reference in Section 23.4, which is RX-0020.246,
23 that clearly says in Khronos data format specification that
24 blocks can have different sizes or, later, use of blocks of
25 different sizes.

1 So that shows how the AMD allegation is paired
2 to Claim 9 in ARM's User Guide corresponds to Khronos data
3 format.

4 At the bottom, Your Honor, again, very similar
5 exercise for Claim 10, you know, which was dealing with
6 independent decompression, AMD cites ARM ASTC's user guide,
7 again, in this case, the same reference, RX-006.001-008.

8 And then the bottom, I, again, point to the
9 specification -- the details in Section -- Chapter 23 of
10 ASTC specifications with Section 23.7, 23.8, 23.9, 23.11,
11 with all the details. Same citations there.

12 Q. Okay.

13 Based on your review, what did you conclude with
14 respect to Claims 9 and 10?

15 A. So my conclusion is very similar.

16 What AMD relies on with respect to the
17 infringement claim, it relies on some documentation in
18 ARM's ASTC user guide, but what it relied on, you know,
19 corresponds to the -- you know, the requirements of -- with
20 OpenGL ES 3.2 and Khronos data format specification.

21 MR. JOHNSON: Okay. I pass the witness, Your
22 Honor.

23 MR. MEUNIER: May I start, Your Honor?

24 JUDGE ELLIOT: Go ahead.

25 CROSS EXAMINATION

1 BY MR. MEUNIER:

2 Q. Hello, again, Dr. Manocha. I want to focus on
3 your testimony concerning the meaning of the block. Okay?

4 A. Sure.

5 Q. In your opinion, the '628 Patent does not define
6 the term "block"; correct?

7 A. It just refers to a plurality of texels, but
8 that is correct.

9 Q. But in your opinion, a POSITA, a person of
10 ordinary skill in the art, who has read the '628 Patent,
11 it's your opinion that a POSITA would understand that
12 "block," as used in the '628 Patent, could refer to an
13 original texture image, not a division of that original
14 texture image; correct?

15 A. Sir, the block is a plurality of texels, as I
16 define in my presentation, and '628 gives a lot of examples
17 of different block sizes, and saying the block size could
18 be variable. It says that very clearly.

19 Q. I'm asking you yes or no questions, Dr. Manocha,
20 I'd like a yes or no answer, or as the Judge has indicated
21 a number of times, if you think you can't answer it yes or
22 no, you just let me know. Okay?

23 So the answers are yes, no, or I can't answer
24 that yes or no.

25 Do you understand?

1 A. Sure.

2 Q. All right. So I'll ask it again.

3 Is it your opinion that a person of ordinary
4 skill in the art who has read the '628 Patent would
5 understand that "block" can refer to an original image,
6 rather than a division of that original image?

7 A. Yes, it can.

8 Q. So let's take a look at what the '628 Patent
9 would actually say to a POSITA, what a POSITA would read in
10 the '628 Patent about "block."

11 You agree that in the background of the
12 '628 Patent, the '628 Patent purports to describe some
13 prior art, block-based texture compression schemes;
14 correct?

15 A. That is correct.

16 Q. One of the prior art block systems, a block
17 system discussed in the '628 Patent, is DXTC; right?

18 A. Yes.

19 Q. Jimmy, can we go to the '628 Patent, column 2,
20 line 24, please.

21 So here's the '628 Patent, and what it says
22 about DXTC, at least in part, is DXTC is, quote, "...a
23 block-based texture compression scheme..."; correct?

24 A. Yes.

25 Q. The background of the '628 Patent also discusses

1 FXT1; correct?

2 A. Yes.

3 Q. FXT1 is one of the prior art references you
4 testified about earlier today; right?

5 A. Just a small clarification, if you allow, sir.

6 Yes, the block -- the '628 Patent refers to
7 FXT1, but in my testimony, when I mentioned FXT1, I was
8 referencing the specific white paper published in 1999,
9 whose cover image I showed.

10 So my FXT1 means that particular white paper.

11 Q. Let's go to the '628 Patent, column 2, line 46,
12 regarding FXT1, please, starting at line 46.

13 It says, "FXT1 is a competing compression scheme
14 with DXTC."

15 The patent says that; correct?

16 A. That is correct.

17 Q. The patent also says, reading to the next line,
18 and referring to FXT1, "It," FXT1, "essentially extends
19 DXTC with some additional block types that can be mixed
20 within any given image..."

21 Did I read that correctly?

22 A. That is correct.

23 Q. So the '628 Patent is telling a POSITA that FXT1
24 is an extension of DXTC with some additional block types;
25 correct?

1 A. That's correct.

2 Q. Let's go to '628 Patent, column 4, line 51.

3 Let's keep looking at what the '628 Patent actually tells a

4 POSITA.

5 A. Okay.

6 Q. Here, the '628 Patent is telling a POSITA that

7 the '628 Patent's invention is a refinement of block-based

8 image compression techniques, such as DXTC, and

9 specifically, let's look at it together, the '628 Patent

10 says, "To address this challenge, the present invention

11 further refines block-based image compression techniques,

12 such as DXTC, with a flexible method for pre-compression

13 partitioning of texture blocks."

14 '628 Patent tells a POSITA that; correct?

15 A. That's correct.

16 Q. Let's go to column 5, line 66, of the

17 '628 Patent.

18 The '628 Patent also tells a POSITA that the

19 '628 Patent invention, again, is a refinement of

20 block-based texture compression approaches, specifically

21 here, it says, "As noted above, the present invention

22 represents a further refinement of block-based texture

23 compression schemes, such as DXTC"; right?

24 A. That's correct.

25 Q. Okay.

1 Now, let's go to '628 Patent, column 6, line 1.

2 Here's where the '628 Patent tells a POSITA some
3 of the things that its invention has in common with those
4 block-based compression schemes that it's been talking
5 about.

6 Specifically, quote -- '628 Patent telling a
7 POSITA. And what does the '628 Patent tell a POSITA?
8 "Like DXTC, the basic compression algorithm implemented in
9 a preferred embodiment divides or splits the image..."

10 It says "image" there; right?

11 A. Yes.

12 Q. "...divides or splits the image up into discrete
13 blocks..."

14 It says it's dividing the image into blocks;
15 right? That's what the '628 Patent says?

16 A. In this one, yes.

17 Q. Right.

18 This is in the '628 Patent; right?

19 A. Yes.

20 Q. This is part of the intrinsic evidence that you
21 said you reviewed?

22 A. Yes.

23 Q. Like DXT, the basic -- excuse me, "Like DXTC,
24 the basic compression algorithm implemented in a preferred
25 embodiment," of the '628 Patent, "divides or splits the

1 image up into discrete blocks of pixels (e.g., 4-by-4 pixel
2 or 8-by-8 pixel blocks) and compresses them."

3 That's something that the '628 Patent tells a
4 POSITA it has in common with block-based compression, like
5 DXTC; right?

6 A. I'm just reading the sentence. It says, "Like
7 DXTC," just "like," because using DXTC is one of the
8 examples, if I'm reading this correctly. Such as DXTC, but
9 just using DXTC is one example.

10 Am I correct?

11 Q. I'm going to ask the question, and the question
12 is going to be this: This says that, like DXTC, the
13 embodiment in the '628 Patent splits an image; right?

14 A. Divides or splits the image, that's correct.

15 Q. It splits the image up into discrete blocks;
16 right?

17 A. That is correct.

18 Q. This is -- a POSITA who read the intrinsic
19 record would have read that; right?

20 A. Sure.

21 Q. Let's go to '628 Patent, column 6, line 18.

22 Again, here's the '628 Patent confirming to a
23 POSITA that like, with other block-based texture
24 compression schemes, in the '628 Patent embodiment, an
25 original texture image is split or divided into blocks.

1 Specifically, it says, "Initially, an original texture to
2 be compressed is received in a texture compression engine."

3 Do you see that?

4 A. Yes.

5 Q. And that original texture would be a texture
6 image; right?

7 A. Just -- you introduced -- I don't see the term
8 "texture image" here, sir.

9 Q. Can we go to Dr. Manocha's deposition
10 transcript, at page 352, lines 2 through 13. Actually,
11 let's start on, sorry, the previous page, at 18, so we know
12 exactly what we're talking about, because exactly what we
13 were talking about in this deposition is the quote I just
14 read.

15 So question, it says, and I just read this to
16 you earlier, about two seconds ago, "As with other
17 block-based texture compression screams, the original
18 texture is then split or divided into original blocks of
19 pixels according to step 305.

20 Did I read that correctly?"

21 Your answer was, "That is correct."

22 My question was, "So that's describing an
23 original texture. That would be the texture image; right?"

24 And your answer was, "Yes."

25 Correct?

1 A. Sure.

2 MR. JOHNSON: Objection, Your Honor. It's not
3 the question he asked before. It's improper impeachment.

4 JUDGE ELLIOT: Sustained.

5 MR. MEUNIER: Let's finish that quote, and then
6 I'll ask the question again, and let's see if you are
7 consistent with your deposition that time.

8 BY MR. MEUNIER:

9 Q. So going back to the '628 Patent, column 6,
10 lines 18 through 22. It says, "Initially, an original
11 texture to be compressed is received in a texture
12 compression engine. As with other block-based texture
13 compression schemes, the original texture is then split or
14 divided into original blocks..."

15 Did I read that correctly?

16 A. That's what is shown in yellow. That is
17 correct.

18 Q. Right. You're going to agree this time that
19 when it refers to the original texture, that's the original
20 texture image; right?

21 A. So all I'm seeing in, this says original
22 texture, and your question, if you showed me in my
23 deposition, was a different question.

24 So all I'm getting is original texture. That's
25 what I see here. I don't see the word texture images.

1 Q. So you don't understand sitting here right now
2 that when this says, "as with other block-based texture
3 compression schemes, the original texture," you don't
4 understand that that original texture would be the texture
5 image?

6 A. That would be one interpretation, yes.

7 Q. It's the interpretation you gave at your
8 deposition, as I just read; right?

9 A. Okay. Yes.

10 Q. All right. We're moving on.

11 Let's go to -- let's stay here.

12 Column 6, lines 18 through 22, the '628 Patent,
13 again telling a POSITA exactly how to use these terms, it's
14 describing splitting a texture image into original blocks;
15 correct?

16 A. That's correct.

17 Q. All right. It's saying that this applies both
18 to the '628 Patent and other block-based schemes; correct?

19 A. What I'm reading is "as with other block-based
20 texture compression schemes, original texture"... yes.

21 Q. And the '628 Patent?

22 A. Can you repeat your question, sir. I want to
23 make sure because '628 Patent has other embodiments, and I
24 want to talk about the specific embodiment.

25 Q. I'm going to move on. I'm going to move on.

1 So after that, it's still your position that a
2 POSITA reading the '628 Patent wouldn't understand that
3 it's necessarily -- that a block is necessarily a division
4 of an image, it's your position that a POSITA reading those
5 passages would understand that a block could be the image
6 itself; is that right?

7 A. As I said, that is one possibility, yes.

8 Q. Let's go to the '628 Patent, column 6, line 5,
9 please.

10 Here, after laying out the similarities between
11 block-based compression in the '628 Patent, here the
12 '628 Patent lays out some of the differences between its
13 invention and block-based schemes. Specifically -- and I'm
14 going to pronounce this right wrong, I mean wrong, so I'm
15 going to apologize ahead of time.

16 "However, rather than mechanic --
17 mechanistically -- someone knows what that means --
18 compressing the regular texture blocks. So instead of
19 compressing the regular texture blocks, the present
20 invention introduces the idea of further subdividing or
21 partitioning the block internally into subsets of different
22 shape and size before compression."

23 Did I read that correctly?

24 A. Just let me just pay attention.

25 Q. Besides my pronunciation.

1 A. That's okay. Can I just read it, just to --

2 Q. Sure.

3 A. (Reading sotto voce).

4 That is correct.

5 Q. It's your testimony that a POSITA, reading this,
6 would understand that the block can describe the original
7 texture image; right?

8 A. As I said, that is one possibility.

9 Q. It's also your testimony that a POSITA, reading
10 this, would understand that the subset which is described
11 here as a partition of the block, your position is that a
12 POSITA reading this would understand that the subset can
13 actually be that block; correct?

14 A. Just to clarify, sir, Your Honor, I mentioned
15 that the Claim 7 said a block is subdivided or partitions
16 two or more disjoint subsets. And I think I mentioned very
17 clearly that in Claim 7, the subset has to be smaller than
18 the block, because the original block is divided two or
19 more subsets.

20 So according to Claim 7, sir, I don't think
21 subset can be exactly equal to the block.

22 (Clarification requested by the Realtime Stenographer.)

23 A. It has to be smaller than the block in the
24 Claim 7.

25 Q. Jimmy, can we go to slide 29 of Dr. Manocha's

1 slide deck.

2 So we're looking at RDX-0002C slide 29. Are you
3 with me?

4 A. Yes, sir.

5 Q. There's a little block in the middle that says
6 Claim 7, and then FXT1; do you see that?

7 A. Yes, sir.

8 Q. It's interestingly labeled semantics. Do you
9 see that?

10 A. Yes, sir.

11 Q. Under your version of semantics, you're equating
12 Claim 7, texture block, with an image for FXT1; right?

13 A. That is one relationship, yes.

14 Q. Well, it's the relationship you testified about
15 today; right?

16 A. Of course.

17 Q. Okay. The other relationship you testified
18 about is that under -- using semantics, Claim 7, subset can
19 be the texel block of FXT1; right?

20 A. That is correct.

21 Q. All right. Can we go back to line 6. I'm
22 sorry, column 6, line 5 of the '628 Patent, Jim.

23 So now that we've established that you did say
24 that a subset could be a block, let's read this again.

25 Again, the '628 Patent is telling a POSITA,

1 starting at line 6, "the present invention introduces the
2 idea of further subdividing or partitioning the block
3 internally into subsets of different shape and size before
4 compression."

5 I read it again correctly; right?

6 A. That is correct.

7 Q. Let's turn to FXT1, please. Jim, if you could
8 get page 6 of FXT1 up, please.

9 Let's look under the header of how FXT1 texture
10 compression works. Are you with me?

11 A. Yes, sir.

12 Q. First line: "FXT1 texture compression works by
13 dividing an image into multiple 4-by-4 and/or 4-by-8 texel
14 blocks."

15 Did I read that correctly?

16 A. That is correct.

17 Q. FXT1 here is describing an image; correct?

18 A. In this case, yes.

19 Q. And dividing that image into texel blocks;
20 correct?

21 A. If you are literally reading the sentence, that
22 is correct.

23 Q. FXT1 calls the image an image in this sentence;
24 right?

25 A. That is correct.

1 Q. And FXT1 doesn't call the original image a
2 block, does it?

3 A. So it's not --

4 Q. I'll leave it to this sentence --

5 A. I cannot answer that yes or no.

6 Q. Okay. In this sentence, does FXT1 call the
7 image an image? I'm sorry, an image a block?

8 A. In this specific sentence, no.

9 Q. In your theory of how FXT1 discloses or makes
10 obvious the '628 Patent claims, you're mapping the image
11 discussed in this sentence to the claimed block, aren't
12 you?

13 A. Sir, I can't give yes or no because I show you
14 many examples, and I also show you arguments. I showed
15 that as one example so I -- I showed many cases, and I gave
16 multiple arguments, so I cannot give you yes or no
17 precisely.

18 Q. You testified about your position today; right?

19 A. Yes, sir.

20 Q. Okay.

21 So I'll make it simple.

22 Is one of your positions that the image -- the
23 word image that's used in this sentence maps to the claimed
24 block of the '628 Patent claims?

25 A. That is correct. Can I --

1 Q. I got you.

2 A. Texture block, that's right.

3 Q. That sentence also refers to texel blocks;
4 right?

5 A. With all due respect, the difference between
6 texture block in Claim 7 and texel block in FXT1, texture
7 and texel, they are two different terms in the --

8 Q. Let's just focus on the word blocks there. The
9 word blocks is at the end of that sentence in FXT1.

10 You're not mapping that blocks to the claimed
11 block in the '628 Patent, Claim 7, are you?

12 A. As I said, mentioned in my testimony, the texel
13 block in FXT1 maps to the disjoint subsets of Claim 7.

14 Q. So you're not mapping the block from FXT1 that
15 we're looking at here to the claimed block, you're mapping
16 the FXT1 block to the claimed subsets; right?

17 A. Just so -- I agree with you, but just to
18 qualify, I mapped the texel block to subsets. If you
19 prefer the word texel block and texture block, because the
20 reference in FXT1 and '628 are different interpretations.

21 Q. Yeah, I didn't say texel, so I don't know what
22 you are talking about. We're going to move on.

23 Actually -- hey, Jim, can you go to the
24 paragraph below that, please for the first block -- yeah,
25 the first scheme. CC-MIXED.

1 That refers to texel block, too; right? 4-by-4
2 texel block, CC-MIXED. Do you see that?

3 A. That is correct.

4 Q. Again, you're mapping that to the subset?

5 A. The texel block maps to the subset. That is
6 correct.

7 Q. Can you go to the one below that, Jim, please.
8 CC-HI. You can guess my question. It's a 4-by-8 texel
9 block. You're mapping that 4-by-8 texel block not to the
10 claimed compressed block, but to the claimed disjoint
11 subsets; right?

12 A. Yes. It is one of the disjoint subsets, that is
13 correct.

14 Q. You also testified that in your opinion, there's
15 a written description problem with individually compressed;
16 do I have that right? From the Claim 7 of the '628 Patent?

17 A. That is correct.

18 Q. So let's talk about how independent
19 decompression and individual decompression, so independent
20 on one hand, individual on the other hand, let's talk about
21 how they relate.

22 You agree that if something is independently
23 decompressed, it's also necessarily individually
24 decompressed; right?

25 A. Could you repeat that question slowly and

1 carefully because you are using two terms, I want to be
2 very careful?

3 Q. If something is independently decompressed,
4 independently, it's also necessarily individually
5 decompressed; right?

6 A. Just to -- the context of the claims of '628; am
7 I correct?

8 Q. Sure.

9 A. Yes, but as I showed in my slide, the
10 independent --

11 Q. Just yes or no, Your -- I'm sorry.

12 A. In that context, independent decompress is a
13 subset of individually decompressed.

14 Q. So if something is independently decompressed,
15 it's necessarily individually decompressed; right?

16 A. That is correct.

17 Q. Let's go to the '628 Patent, Figure 5, please,
18 Jim. So this is JX-0002.

19 So we've established that if something is
20 independently decompressed, it's necessarily individually
21 decompressed.

22 Let's look at Figure 5.

23 Figure 5 has a block 510; do you see that?

24 A. That is correct.

25 Q. One of the things in there is about a partition

1 defining one or more disjoint subsets.

2 So the idea of disjoint subsets is introduced
3 right there; right?

4 A. Yes.

5 Q. Okay.

6 Then let's go to the bottom block, 520, where it
7 says, "Independently decompress each subset..."

8 Did I read that right?

9 A. That is correct.

10 Q. And independently decompressing each subset is
11 necessarily individually decompressing each subset; right?

12 A. Okay. I --

13 Q. Yeah.

14 A. I want to understand the question. As I
15 maintain, the scope of individually is more than the scope
16 of independently decompress. That's my understanding. So
17 I want to understand what your question is exactly here.

18 Q. I'll make it easy because you already said that
19 independently was individually.

20 This -- is the '628 Patent disclosing
21 independently decompressing the disjoint subsets, isn't it?

22 A. Independently decompress each subset, that is
23 correct.

24 Q. All right. One more thing.

25 In your opinion, a POSITA would understand a

1 disclosure concerning compression, so I'm -- you got me so
2 far, a disclosure concerning compression applies to
3 decompression because decompression is the inverse of the
4 compression operation.

5 Do you agree with that?

6 A. Yes.

7 Q. The '628 Patent confirms that; right?

8 Jim, can we go to the '628 Patent, column 8,
9 line 38, please.

10 This is the '628 Patent confirming your inverse
11 theory.

12 A. That is correct.

13 Q. I haven't said it yet, sorry.

14 It says, "Decompression of texture blocks that
15 have been compressed according to the present methods
16 involves essentially working backwards."

17 Did I read that correctly?

18 A. That is correct.

19 Q. One of the compression methods disclosed in the
20 '628 Patent includes individually compressing two or more
21 disjoint subsets, doesn't it?

22 A. Could you repeat the last question slowly
23 because I think I heard -- if I heard you saying
24 "individually compressed," did I get that right?

25 Q. I am saying "individually," and I will say it

1 slowly.

2 One of the compression methods disclosed in the
3 '628 Patent includes individually compressing two or more
4 disjoint subsets; right?

5 A. Yes.

6 MR. MEUNIER: I don't have any further questions
7 right now, Your Honor. Thank you.

8 Thank you, Dr. Manocha.

9 THE WITNESS: Thank you, sir.

10 Thank you, Your Honor.

11 JUDGE ELLIOT: Oh, not yet.

12 THE WITNESS: Oh, I'm sorry. I apologize.

13 MR. JOHNSON: I'll try to be quick, Your Honor.
14 I don't have much voice left anyway.

15 REDIRECT EXAMINATION

16 BY MR. JOHNSON:

17 Q. Earlier, we discussed your two theories with
18 respect to FXT1; correct?

19 A. That is correct.

20 Q. Can we bring up his slide deck.

21 Slide 26. I'm sorry, that's not it.

22 I don't need the slides. Just take it down for
23 a second.

24 With respect to FXT1, your first theory, could
25 you just remind the Court what the block was.

1 A. Okay.

2 So just one clarification I want to get. When
3 you mentioned "FXT1," it's the white paper I showed in my
4 presentation; right?

5 Q. That's correct.

6 A. During cross-examination, you know, the opposite
7 counsel showed a sentence about FXT1 from '628.

8 My interpretation is the FXT1 that is referenced
9 in '628, I don't know what it refers to because the
10 statement that it mentioned about FXT extension DXTC, I
11 disagree with that statement.

12 So I just want to make sure, because there's no
13 reference to the FXT1 in the '628. I refer to the white
14 paper.

15 Q. Okay. Thank you.

16 My question is, and I'll try to focus it, but I
17 just want to talk about the first theory and -- that
18 counsel talked to you about, which is where the image is a
19 block. Okay?

20 A. Sure.

21 Q. All right.

22 If you can bring up Claim 7 of the '381 Patent.

23 Is there anything in Claim 7 that limits the
24 size of the texture block?

25 A. No.

1 Q. Does Claim 7 recite an image?

2 A. No.

3 Q. Does Claim 7 recite an original image?

4 A. No.

5 Q. Is there anything in Claim 7 that requires the
6 block to be a subpart of an image?

7 A. No.

8 Q. When looking at the '628 Patent specification,
9 did you find anything that limited the size of an original
10 image?

11 A. No.

12 Q. Did you find anything in the '628 Patent
13 specification that limited the block to any particular
14 size?

15 A. No.

16 Q. Can you bring up column 6, line 1, starting at
17 line 1. Highlight block of pixels, e.g. 4-by-4 to paren.

18 Could a block be 8-by-8 pixels based on this?

19 A. Sure. It's clearly mentioned here.

20 Q. Take that down.

21 Does FXT1 limit the size of an original image?

22 A. No limit size, except it has to be as big as one
23 block. That's all.

24 Q. Could the image size in FXT1 be an 8-by-8 image?

25 A. Sure.

1 Q. Can you bring back up Claim 7.

2 What is the unit recited in Claim 7 that's
3 actually being decompressed?

4 A. So, really, Claim 7, Your Honor, the thing, that
5 basic unit is a subset. That's the reading the importance
6 of Claim 7. The important unit is a subset.

7 Q. Does Claim 7 recite decompression of the block
8 as a unit?

9 A. No.

10 Q. Referring back to FXT1, what is the group of
11 texels in FXT1 that's being decompressed?

12 A. It uses the term "texel block."

13 MR. JOHNSON: That's it, Your Honor. I'm done.

14 JUDGE ELLIOT: Very well.

15 Anything for TCL?

16 MR. PATARIU: No, Your Honor.

17 JUDGE ELLIOT: All right. Thank you.

18 THE WITNESS: Thank you very much, Your Honor.

19 Thank you, ma'am.

20 (Witness excused.)

21 JUDGE ELLIOT: My intention is to take a break
22 about 3:15, so who's next?

23 MR. ROUTH: Your Honor, Realtek is calling Kevin
24 O'Neil.

25 MS. MCCONIHE: Complainants have an objection

1 that we wish to be heard on prior to the testimony of
2 Mr. O'Neil.

3 JUDGE ELLIOT: Okay. Go ahead.

4 MS. MCCONIHE: The objection is that
5 Mr. O'Neil -- that Respondents are seeking the testimony of
6 Mr. O'Neil because they -- well, we're not quite sure what
7 they're seeking from Mr. O'Neil because they haven't
8 followed any of the rules required, and now we're at a
9 significant disadvantage.

10 They failed to follow the standard rules by not
11 applying for a trial subpoena, not providing any indication
12 of the testimony sought, and we reasonably expected that
13 they did not intend to call Mr. O'Neil in their
14 case-in-chief.

15 Therefore, we are not on notice that we needed
16 to prepare him, or to take other steps to object to their
17 failure to follow the rules.

18 They have not provided any justification at all
19 for the failure to follow these rules that everyone else
20 needs to follow, and even now, we still do not know what
21 they intend to ask Mr. O'Neil about or whether it's
22 relevant or reasonably within the scope of the issues in
23 this investigation.

24 So allowing Mr. O'Neil to testify is going to
25 reward Respondents for the failure to follow the rules, and

1 significantly prejudice Mr. O'Neil and Complainants.

2 JUDGE ELLIOT: All right.

3 On the issue of lack of trial subpoena, I will
4 excuse that because he's been here the whole time. I don't
5 see any need for a trial subpoena.

6 Mr. Coyle.

7 MR. COYLE: Thank you, Your Honor.

8 You will recall that Complainants called
9 Mr. O'Neil on Monday. We stood up to do our
10 cross-examination, and there was some discussion about our
11 cross-examination exceeding the scope of our direct
12 examination, at which time, counsel -- Mr. Routh suggested,
13 if it solves the problem, Your Honor, we'll call him back
14 in our direct case.

15 There was no objection at that time from AMD
16 that we call him back in our direct case.

17 That night, Your Honor, Monday night, we
18 informed AMD that we would be calling him after Dr. Manocha
19 stood down off the stand. We confirmed that again by
20 e-mail last night. I met and conferred with Ms. McConihe
21 during the lunch break, and explained again that we would
22 be calling him and explained the relevance of his
23 testimony.

24 She said nothing about objecting to us calling
25 him at that time.

1 Your Honor, we did identify him in our
2 prehearing statement. We said that we would call him for
3 adverse direct in addition to cross-examination.

4 So I don't know why there's any surprise here at
5 all, Your Honor. We've been clear since the time that we
6 served our pre-hearing statement that we would conduct an
7 adverse direct of him, and throughout the entire week at
8 trial, Your Honor, it's been understood that we would
9 recall him at the end of our rebuttal case.

10 MS. MCCONIHE: Your Honor, may I respond?

11 JUDGE ELLIOT: Yes.

12 MS. MCCONIHE: We still do not have an
13 identification of the testimony that's sought from
14 Mr. O'Neil.

15 To the extent that there was a meet-and-confer
16 on the lunch hour, there was a discussion of -- of an
17 exhibit that the Respondents wished to add to the record.

18 So we still are not aware of what the testimony
19 is that they are seeking from Mr. O'Neil, and we have not
20 been able to properly prepare him, except for the material
21 that he covered on his direct examination.

22 MR. COYLE: May I speak to that briefly, also,
23 Your Honor, unless --

24 JUDGE ELLIOT: So you say that you identify him
25 in your prehearing statement as possibly being the subject

1 of adverse direct.

2 Did you put down, you know, what you wanted to
3 talk to him about, what you wanted to ask him about?

4 MR. COYLE: We didn't at that time, Your Honor;
5 and since then, the facts have changed dramatically. The
6 way that that changed was that on the Saturday night before
7 trial began -- that is, this past Saturday -- Complainants
8 produced a license agreement relating to a license that
9 they first identified in an attachment to their Complaint,
10 and yet failed to produce through the entirety of the
11 investigation -- first produced that on Saturday night,
12 which necessitated us taking his deposition again on the
13 Sunday night before trial began, Your Honor.

14 MR. RIZK: Your Honor, I apologize. But we need
15 to be on the confidential record for this.

16 JUDGE ELLIOT: Okay.

17 MR. RIZK: Thank you.

18 JUDGE ELLIOT: The AMD confidential?

19 MR. RIZK: Yes, and I'd ask -- yeah. AMD, and,
20 yes, third-party confidential as well.

21 JUDGE ELLIOT: Very well.

22 MR. RIZK: Thank you.

23 (Whereupon, the trial proceeded in confidential
24 session.)

25

1 O P E N S E S S I O N

2 DIRECT EXAMINATION

3 BY MR. BENSON:

4 Q. Good afternoon.

5 A. Good afternoon.

6 Q. Can you please state your name for the record?

7 A. Thomas Jeremy Olson.

8 Q. Who is your current employer?

9 A. I work for ARM.

10 Q. What is your current position at ARM?

11 A. I work in the GPU products division. My
12 function is to work with outside standards bodies,
13 primarily the Khronos Group, to create, promote, and
14 maintain the graphics standards that are supported by our
15 GPUs.

16 Q. Do you have a title currently at ARM?

17 A. I am a distinguished engineer.

18 Q. How long have you been at ARM?

19 A. Since 2009.

20 Q. Now, the role you described a moment ago, has
21 that changed materially since 2009?

22 A. Not significantly.

23 Q. Where do you currently reside?

24 A. San Jose, California.

25 Q. Did you come out here just for the hearing

1 today?

2 A. Yes.

3 Q. Well, thank you. We appreciate that.

4 Have you been in a courtroom before?

5 A. Never.

6 Q. First time?

7 A. Yes.

8 Q. Can you briefly describe your educational

9 background?

10 A. I have a Bachelor's Degree in Electrical
11 Engineering from the Johns Hopkins University, and a Ph.D.
12 in computer science from the University of Rochester.

13 Q. What was the subject of your doctoral
14 dissertation?

15 A. I created a neural network-based model of visual
16 motion perception in humans.

17 Q. Have you ever taught any classes?

18 A. I was on the faculty of the University of
19 Virginia from 1989, when I received my Ph.D., until 1995.

20 Q. What types of classes did you teach there?

21 A. Lots of introductory programming. I also taught
22 graduate-level classes in computer vision, robotics,
23 artificial intelligence.

24 Q. I think you mentioned a moment ago that you have
25 a role in Khronos as part of your job at ARM?

1 A. Yes, I do.

2 Q. Can you summarize that again?

3 A. I represent, in addition to my responsibility
4 working with Khronos to create standards, I represent ARM
5 on the board of directors, which is called the promoters.

6 Q. When did you first become involved in Khronos?

7 A. Around 2001, I was tasked by my employer at the
8 time, Texas Instruments, to forecast the future
9 requirements for graphics in mobile devices.

10 I determined that a new organization, the
11 Khronos Group, which was very small at the time, was likely
12 to drive the technology forward. I advised Texas
13 Instruments, that we should join, and we did, and I began
14 representing them at that time.

15 Q. When was that, again?

16 A. Well, I became aware of them in 2001. I believe
17 the first meetings we had were in 2002.

18 Q. When did Khronos start?

19 A. Khronos had a bit of a pre-history developing
20 standards for audio/video synchronization around 2000-2001,
21 but it really didn't become a force in the industry until
22 2002, when the OpenGL ES effort started.

23 Q. About how long have you served on the board of
24 directors for Khronos?

25 A. I attended meetings as Texas Instruments'

1 alternate representative starting in 2004, with some gaps.
2 I became a regular board member when I moved to ARM in
3 2009.

4 Q. Have you been a member of the board since then,
5 continually?

6 A. Ever since.

7 Q. What other positions have you held at the
8 Khronos Group?

9 A. So I joined, as I said, in 2002, with the intent
10 of promoting the OpenGL ES standard on behalf of my
11 employer, TI.

12 In 2006, the then-chair Neil Trevett resigned --
13 excuse me, yeah, 2006.

14 Neil Trevett, who was the chair at the time,
15 resigned to form a new group, and I stood for election and
16 was elected chair in 2006.

17 I served in that role until 2016; that is, as
18 chair of the OpenGL ES working group.

19 Contemporary with that, in 2012, I started a
20 group within Khronos to design a successor API, which would
21 replace OpenGL ES, and Desktop OpenGL, eventually. That
22 group I was elected chair in 2012.

23 In 2015, that group was renamed to the Vulkan
24 working group, and I remained chair or rather, I was
25 reelected under the new name, and continue to serve in that

1 role today.

2 Q. Can you describe briefly, what is the OpenGL ES
3 working group that you were the chair of?

4 A. So within Khronos, the body of members are
5 divided into working groups, where each working group is
6 responsible for a single standard or a series of standards,
7 you know, version 1.0, 1.1, et cetera.

8 So OpenGL ES is, the working group, is
9 responsible for the OpenGL ES standard, and for extensions
10 to it.

11 Forgive me if I'm -- is that enough, or...

12 Q. That's enough for right now.

13 A. Okay.

14 Q. Thank you, Mr. Olson.

15 How did you become the chair of the OpenGL ES
16 working group?

17 A. I was elected by the members.

18 Q. Can you identify some of the members of the
19 OpenGL ES working group while you were chair?

20 A. So Khronos is -- tries to bring together many
21 different facets of the industry. So we had various types
22 of members.

23 We had GPU vendors, including AMD, NVIDIA,
24 Intel, mobile graphics vendors including ARM, Imagination
25 Technologies, Qualcomm, Broadcom. We also had platform

1 companies. Apple was a member. Google was a member.

2 We had companies in the wireless industry,
3 including Ericsson, Nokia, Samsung, and we had software
4 developers including Adobe and Epic Games.

5 Q. These are the companies that elected you the
6 chair?

7 A. Yes.

8 Q. Were you subsequently re-elected or how did you
9 maintain your position of chair for ten years?

10 A. Khronos requires chairs to stand for election at
11 least every two years, or at most, at two-year intervals.
12 So I have done that.

13 Q. Why did you stop becoming the -- why did you
14 stop being the chair of the OpenGL ES working group?

15 A. So as I said, the new Vulkan standard which I
16 worked to create was intended to replace OpenGL and
17 OpenGL ES eventually. We launched that standard in 2016,
18 and it was very widely adopted, and very popular.

19 The workload of chair of the Vulkan group
20 increased enormously. I found I wasn't able to do justice
21 to two working groups at the same time. Since Vulkan was
22 clearly the future, I resigned as OpenGL ES chair.

23 Q. When was that?

24 A. 2016.

25 Q. Now, do you understand you mentioned earlier,

1 this is your first time in a courtroom?

2 A. Yes.

3 Q. Do you understand that your testimony today will
4 be based on your personal knowledge and experience?

5 A. Yes.

6 Q. Are you also testifying on behalf of ARM today?

7 A. Yes.

8 Q. Can you describe generally what the Khronos
9 Group is? We've heard this term a few times, but what is
10 its purpose?

11 A. Khronos, in marketing literature, describes its
12 purpose as connecting software to silicon. I should say,
13 it's an international consortium of roughly 120 members,
14 member companies.

15 By connecting software to silicon, they mean
16 that their primary mission is to create standards for
17 interoperability between application software that wants to
18 perform typically multimedia and graphics functions, and
19 the underlying hardware that executes those functions.

20 They also, in the context of designing or,
21 rather, to protect and promote these standards, they define
22 an intellectual property rights policy which ensures that
23 they are widely implementable and widely supported.

24 Q. Now, you mentioned an intellectual property
25 rights policy. For shorthand, can we sometimes refer to

1 that as the IPR policy today?

2 A. Certainly.

3 Q. You have mentioned OpenGL ES a few times, too.

4 Can you briefly describe what that is?

5 A. It is a standard, again, for interoperability
6 between graphics applications that want to perform
7 rendering functions, and the underlying GPUs that execute
8 those functions.

9 Q. Would you consider OpenGL ES an applications
10 program interface? We sometimes call that an API.

11 A. Yes, it would be.

12 By API, excuse me, we understand it's an
13 interface, as the word is included. It defines a set of
14 commands that the application can give to the GPU, and it
15 describes the operations that the GPU is required to
16 perform in response to those commands.

17 Q. How does a standard like OpenGL ES promote
18 interoperability as I believe you mentioned?

19 A. So the standard defines the command language
20 that is available, and the responses that the GPU gives
21 very precisely.

22 As a result, an application, which is written to
23 give commands to -- and perhaps developed against one GPU,
24 if it is then moved to run on a platform which supports a
25 different GPU, everything will work, because the response

1 of the other GPU will be exactly the same.

2 Q. You mentioned that Khronos has an IPR policy.
3 What is the purpose of the IPR policy established by
4 Khronos at a high level?

5 A. At a high level, the intent is to ensure that
6 parties wishing to implement the standard, and ship
7 products that incorporate the standard, can do so, have a
8 path to do so without paying royalties on any IP, on any
9 standards-necessary IP that is required to implement the
10 standard.

11 Q. Can you explain again at a high level, how does
12 Khronos as an organization implement that IPR policy?

13 A. So as I said, standards are developed in working
14 groups which are committees of engineers.

15 When a working group decides that its standard
16 is ready to be delivered to the public, they hold an
17 internal vote, and they send it to the board of promoters,
18 with a request that the board ratify this standard.

19 When the board votes to ratify, assuming they
20 do, under the IP rights policy, the act of ratification by
21 the board imposes licensing requirements and disclosure
22 requirements on all of the members of Khronos.

23 Q. What are those disclosure requirements; can you
24 elaborate on that?

25 A. Certainly.

1 The policy defines rather rigorously and at some
2 detail, what are necessary claims in a patent. An
3 engineer's understanding would be, a necessary claim is one
4 which any conformant implementation of the standard
5 necessarily infringe.

6 So the policy requires that members who have
7 necessary claims against a standard, which is being
8 ratified either, if they keep silent, they then are
9 considered to have granted a license to use those claims in
10 conformant implementations of the standard.

11 If they choose, they can withhold granting of
12 that license; but if they do, they must disclose precisely
13 what it is that they are withholding by identifying the
14 patents by number and by claim number, and by explaining
15 why they consider those claims to bear -- to be essential
16 to the standard.

17 Q. Is there a certain period of time in which that
18 IP disclosure has to be made?

19 A. Yes.

20 When a working group sends a standard to the
21 board, the board begins and announces a six-week review
22 period. During that period, any member can supply a
23 disclosure and express their intent to withhold the IP that
24 they disclose.

25 If they keep silent, and the board -- through

1 the period, and then the board subsequently votes, they
2 have granted the license. They are considered to have
3 granted that license.

4 Q. Now, is ARM a member of the Khronos Group?

5 A. Yes, we are.

6 Q. Are there different types of membership in
7 Khronos?

8 A. Yes. There are several, but the two that are
9 most relevant are contributors, who make up most of the
10 members. These are companies that have the right to
11 participate in a working group, to make contributions of
12 features to the APIs, and to vote in the working group on
13 what goes into the standard, and ultimately on the vote to
14 send it to the board for ratification.

15 Promoters are the other important class of
16 members. They have the same rights as contributors, but in
17 addition they have the right to appoint a member to the
18 board of directors.

19 Q. What type of a member is ARM?

20 A. We are a promoting member.

21 Q. How long has ARM been a promoter member of
22 Khronos?

23 A. Since 2002, which, as I said, is essentially the
24 start of the serious lifetime of the organization.

25 Q. Is AMD also a member of Khronos?

1 A. Yes, they are.

2 Q. What type of member is AMD, if you know?

3 A. They are also promoters.

4 Q. Do you know when AMD became a member?

5 A. AMD became members and promoters when they
6 acquired ATI Technologies, a Canadian graphics company, in
7 2006, and assumed the rights of ATI in the organization.

8 Q. I've seen another term in the documents called
9 an adopter.

10 Have you heard that term?

11 A. Yes.

12 Q. Can you explain what an adopter is?

13 A. So an adopter is not necessarily a member.

14 There is a Membership Agreement, which is one contract, and
15 there is an Adopters Agreement which is another.

16 Most adopters are members, but not all.

17 The Adopter Agreement is similar to the members
18 agreement in that it incorporates the intellectual property
19 rights policy as an Appendix.

20 So adopters do sign and commit themselves to the
21 terms of the IPR policy.

22 What adoptership gives a company is the right to
23 make submissions of a product to the conformance process.

24 So an adopter might create an implementation of
25 OpenGL ES, and then they become an adopter. They submit it

1 for ratification -- sorry, they submit it for conformance
2 testing.

3 If it passes conformance testing, it is then
4 considered a conformant implementation; and by virtue of
5 being that, it gains access to the license grants that are
6 made by members at ratification.

7 Q. Can an adopter also be a member of Khronos?

8 A. Yes. Frequently, as I said. Typically, they
9 are.

10 Q. Okay. I'd like to turn to the first document in
11 your binder, but we can have Ian pull that up.

12 A. Okay.

13 Q. RX-1288.

14 Now, just to make sure I have the
15 confidentiality correct, is this a publicly available
16 document, Mr. Olson?

17 A. I'm not certain.

18 MR. BENSON: Okay. So I think now, we should go
19 on the ARM and AMD confidential record.

20 JUDGE ELLIOT: Very well.

21 (Whereupon, the trial proceeded in confidential
22 session.)

23

24

25

1 O P E N S E S S I O N

2 MR. PATARIU: So, Your Honor, what's on the
3 screen now is CDX-8C at 29, but this is public.

4 This slide, along with slides 39 and 41, contain
5 a Figure 9 from a reference called Stuttard that has now
6 been annotated to show phases that were not identified or
7 explained in Dr. Hart's discussion of Figure 9 in his
8 report.

9 So Dr. Hart described each step in Figure 9 in
10 his report, but the steps were never grouped by Dr. Hart
11 into phases, including the vertex phase, binning or pixel
12 phase.

13 The word "phase" was never used in Dr. Pedram's
14 report.

15 The only place the word "phase" is used in
16 Dr. Hart's report is in Paragraph 120, to discuss
17 Dr. Pedram's testimony and whether a term "lighting and
18 shading" referenced in Stuttard would disclose whether one
19 of the command processing engines was a texture processing
20 engine.

21 It was not used at all to identify all the steps
22 in Figure 9, and whether they would fall into vertex
23 processing or pixel processing or binning or any other of
24 the phases that have been annotated here and referenced in
25 this bullet point text on slide number 29.

1 So that's the first of two issues. So...

2 JUDGE ELLIOT: Okay.

3 MR. MCNAMARA: So, Your Honor, the parties have
4 been using demonstratives throughout this that don't
5 expressly exist in the expert report. Respondents have
6 done that throughout their case.

7 To this particular issue, Dr. Hart talks at
8 length about Figure 9, walks through all of the steps of
9 Figure 9, and then each individual thing, right.

10 And you can see within the vertex phase of
11 Stuttard, there's vertex data to the graphics system,
12 there's graphics processing that converts vertex into
13 primitive data, and then he says, "The lighting" -- in
14 Paragraph 120 of his report, that, "Lighting and shading
15 relied on by Dr. Pedram performed during the vertex
16 processing phase, not during the alleged pixel processing
17 phase."

18 So then, down at the bottom of this, it talks
19 about a pixel phase, and the three bottom boxes all have to
20 do with pixel processing, which Dr. Hart will testify
21 about, and which he talked about when he went through
22 Figure 9.

23 So we think that Respondents have been on notice
24 of this. It's not a new theory. He talks about that
25 Stuttard talks, discusses -- or, sorry, processes all the

1 vertex instructions, then goes through this binning phase,
2 binning process, then processes all of the pixel
3 instructions.

4 And that sort of phased system is different than
5 what's disclosed in the '053 Patent, and, you know,
6 Stuttard itself uses the word "phase" in its disclosure.

7 So we think that it's a fair demonstrative to
8 help articulate the theories to the Court.

9 JUDGE ELLIOT: Okay. Well, show me where you
10 think this is found in either Dr. Hart's expert report or
11 his deposition transcript.

12 MR. MCNAMARA: I'm sorry, Dr. -- I didn't hear
13 what you said at the end.

14 JUDGE ELLIOT: Oh, it can be in either the
15 expert report or the deposition transcript.

16 MR. MCNAMARA: All right.

17 So, Jim, if you could please bring up Dr. Hart's
18 expert report, Paragraph 120, which is on page 48.

19 MR. PATARIU: I think we may have to -- do you
20 have to change the --

21 MR. MCNAMARA: You're not trusted for that.

22 So, Jim, the fourth line down.

23 It talks about the vertex processing phase.
24 Fourth line from the top.

25 All right. Then further in that line, it talks

1 about the pixel processing phase.

2 All right. Then the first sentence, it talks
3 about this component that's command processing engine for
4 processing both pixel command threads and vertex command
5 threads.

6 So he's talking about the processing of both
7 pixel and vertex command threads. He's breaking up what
8 Stuttard does into a vertex processing phase and a pixel
9 processing phase.

10 Then --

11 JUDGE ELLIOT: All right. Well, let me turn
12 to -- I'm sorry, is it Mr. Patariu?

13 MR. PATARIU: Yes, Your Honor.

14 JUDGE ELLIOT: Okay.

15 The only thing I don't see in here that is on
16 that demonstrative is the binning.

17 MR. PATARIU: Well, I mean, the issue here, if
18 we go back to look at this particular slide, CDX-008C.28,
19 this lighting and shading is not in any of the listed steps
20 here. At best, even if it was one of these identified
21 steps, he has identified it as one type, and not the other.

22 What he has not done is set out the boundaries
23 of any phases in the paragraph that Mr. McNamara cited, and
24 he has not taken all of these steps collectively --
25 (Clarification requested by the Realtime Stenographer.)

1 MR. MCNAMARA: I'm sorry. I apologize. I'm
2 moving things around.

3 JUDGE ELLIOT: Hold on. Hold on.

4 Well, I'm not sure about the blue section, that
5 is the last three blocks in the block diagram, but the ones
6 in yellow, blocks 3, 4 and 5, do seem to be a vertex phase.

7 Do you dispute that Stuttard speaks of phases?

8 MR. PATARIU: No expert has identified the --
9 well, Dr. Hart has not offered any testimony on the one
10 paragraph in Stuttard that uses the word "phase." You
11 know, that's actually been removed from this slide by
12 agreement of the parties.

13 So what remains is an annotated version of
14 Figure 9 where that's outside of his expert report because,
15 again, he's never grouped or identified, for example,
16 whether the geometry processing step is part of the vertex
17 phase, or that the data transfer between neighbors is part
18 of the vertex phase, or that steps like data read to PE/MEE
19 data transfer if is part of the pixel phase.

20 That's not really in the paragraph that
21 Mr. McNamara just relied on.

22 JUDGE ELLIOT: I'll allow it.

23 So what's the other issue?

24 MR. PATARIU: So the other issue has to do -- we
25 can pull up slide 59 on CDX-8.

1 So slides 59, 72, 73, 74, and 75 use a
2 demonstrative that's even shown here that was created by an
3 AMD fact witness, Mr. Rex McCrary, who testified earlier
4 this week. This figure is not in Dr. Hart's report.

5 During our discussions with this, AMD's counsel
6 told us that the support for this slide is kind of
7 scattered across, I believe, Paragraphs 37, 51 through 59,
8 and 207, but we think that it's deficient for a few
9 reasons.

10 None of these slides reproduce the block --
11 either one of these block diagrams, describe all of the
12 components, and particularly, what is labeled traditional
13 task dispatch, or compare all of the components in
14 traditional task dispatch with the components that are
15 shown in asynchronous task dispatch.

16 For example, Paragraph 37 does not explain all
17 of the elements in this arrangement because it only refers
18 to a serialized command buffer. It doesn't describe shader
19 cores or engines.

20 Paragraphs 51 through 53 that we told support
21 this are about the '053 Patent and not the '381 Patent,
22 which this slide apparently relates to.

23 Paragraph 54 doesn't reference a scheduler,
24 doesn't describe a block diagram or refer to an engine.

25 Paragraph 55 mentions a command buffer, and none

1 of the other components that are on the left side of this
2 slide.

3 Paragraphs 56 to 58 only are describing what is
4 claim as parts of the alleged invention in '381, so they
5 don't relate to anything in traditional task dispatch.

6 Paragraph 207, which is the last of the ones
7 AMD's counsel mentioned to me mention some of the
8 components, but again, don't describe this block diagram,
9 and don't describe GPU components such as the engine in the
10 shader core.

11 So if there was, like, fundamental building
12 block comparing old versus new here that Dr. Hart wanted
13 to -- we don't know what his testimony is going to be here.
14 He's got this mentioned in seven or eight different slides.
15 If it is a fundamental building block in his testimony, it
16 should have been in his report, and laid out so that all of
17 the components here are fully described so that we had a
18 reasonable opportunity to understand what his anticipated
19 testimony would be.

20 MR. MCNAMARA: Your Honor, what I said was that
21 this is a demonstrative that helps elucidate Dr. Hart's
22 testimony, specifically relating to the disclosure of the
23 '381 Patent. I cited Paragraphs 37 and 57 through 59 to
24 provide that sort of support.

25 Jim, if you can bring up Paragraph 37.

1 JUDGE ELLIOT: Well, let me short-circuit this.
2 Give me a proffer of what you would intend to
3 ask Dr. Hart about with respect to that demonstrative?

4 MR. MCNAMARA: I was going to ask Dr. Hart about
5 the demonstrative to describe what the difference was
6 between, kind of, the prior art that was disparaged by the
7 '381 Patent, and then what the invention of the '381 Patent
8 is. Then go on and sort of talk to him about why that was
9 an advance, and why that was unexpected, and then move
10 forward.

11 I use that in other, sort of, slides to kind of
12 let Your Honor sort of see how things are similar to what
13 was described as sort of this traditional approach, with a
14 single command buffer, a single path through to the
15 resources of the GPU versus multiple paths into -- multiple
16 command buffers providing multiple paths into the resources
17 of the GPU.

18 JUDGE ELLIOT: Okay.

19 MR. MCNAMARA: So it's a reference.

20 JUDGE ELLIOT: So here's what I'll allow, and
21 I'm referring now to slide 59 on CDX-8C.

22 You may ask Dr. Hart: Were you here during
23 Mr. McCrary's testimony? Yes.

24 Did you see this demonstrative? Yes.

25 Do you agree that this is a very high-level

1 description of the differences between the prior art and
2 the '381 Patent.

3 Did anything Mr. McCrary say change your
4 opinion?

5 Okay? And that's it. That's all I want to hear
6 about that. This is really -- I mean, I have to say, this
7 is very high-level. I mean, this is, like, schematic --
8 really schematic. It doesn't really tell us anything about
9 the actual claim language.

10 So I'm not sure that this is really
11 prejudicial -- either keeping it in or keeping it out is
12 prejudicial to either side.

13 Let's just -- if you're having Dr. Hart comment
14 on some other witness's testimony, let's keep it to a
15 minimum.

16 MR. PATARIU: Your Honor, can we just pull up
17 one other example just for some clarity on what may be
18 going on with respect to --

19 JUDGE ELLIOT: There's another slide injure
20 complaining about?

21 MR. PATARIU: It's just an example of how this
22 is just repeated somewhere else in comparison to the prior
23 art.

24 JUDGE ELLIOT: Okay.

25 MR. PATARIU: So for example, slide number 74.

1 So here, there's color coding with respect to
2 that Mr. McCrary slide now being compared to the prior art
3 reference.

4 So I just -- for clarity and for efficiency
5 tomorrow, I would just ask what your guidance would be as
6 to what would be acceptable here so that we're not thinking
7 about needing to object or know whether or not that's
8 appropriate.

9 JUDGE ELLIOT: Okay.

10 So the idea here is that the color coding on the
11 left hand block diagram from Mr. McCrary's demonstrative is
12 supposed to match up to the color coding on the right-hand
13 side?

14 MR. PATARIU: That's our best understand, Your
15 Honor.

16 JUDGE ELLIOT: There's no OS scheduler shown on
17 the right-hand side?

18 MR. MCNAMARA: That's right, Your Honor. The
19 right-hand side is the graphics processing unit, so the OS
20 scheduler would have to be off that processor.

21 JUDGE ELLIOT: Okay.

22 So the issue is not what's on the right-hand
23 side. It's what's on the left-hand side, and the fact that
24 the colors match up.

25 MR. PATARIU: That's right, Your Honor.

1 JUDGE ELLIOT: All right.

2 I think I'll let this go. You can use this one.

3 MR. PATARIU: I think those are our only two
4 issues, so thank you, Your Honor.

5 JUDGE ELLIOT: Very good.

6 All right. Mr. McNamara, you have six minutes.

7 MR. MCNAMARA: All right, Your Honor.

8 Sorry.

9 Your Honor, at this time, AMD is going to call
10 Dr. John Hart. We can start that questioning. At this
11 time, AMD calls Dr. Hart to the stand.
12 Whereupon--

13 JOHN HART, PhD,
14 having been first duly sworn, was examined and testified as
15 follows:

16 DIRECT EXAMINATION

17 BY MR. MCNAMARA:

18 Q. Sir, can you please introduce yourself to the
19 Court.

20 A. Sure. My name is John Hart.

21 Q. Let's talk a little bit -- go to the next slide.
22 This is just an overview of what we're going to kind of go
23 through with Dr. Hart, but let's just skip to slide 4.

24 Sir, can you tell us where you currently work?

25 A. I'm a tenured full Professor at the Department

1 of Computer Science at the University of Illinois at
2 Urbana-Champaign. That computer science department is
3 ranked one of the top five programs nationwide.

4 Q. What courses do you teach at the University?

5 A. I've taught computer graphics for over 30 years,
6 or related areas. Right now I'm teaching data
7 visualization.

8 Q. What's your research area?

9 A. My research area has been computer graphics
10 since 1987. That research has been funded by the US
11 government, including the Department of Defense, but also
12 various companies, including Adobe, Intel, Nokia, NVIDIA,
13 and Microsoft.

14 Q. In your professional life, what have you done
15 besides teaching and research?

16 A. For example, in 1999, I was the executive
17 producer of a documentary, The Story of Computer Graphics.

18 I have been a past editor-in-chief of the top
19 journal in computer graphics, that's the ACM Transactions
20 on Graphics.

21 And I've provided computer graphics expertise in
22 a number of cases, including several before the ITC.

23 Q. What was the technology that was at issue in the
24 cases where you were an expert at the ITC?

25 A. Computer graphics hardware.

1 Q. Now, what work did you do with the Xbox 360
2 around 2003?

3 A. Sure, the, so the Xbox 360, used the Xenos
4 unified shader technology, and I worked on getting this
5 advanced rendering technique called precomputed radiance
6 transfer into a form that could be implemented in realtime
7 on the Xbox 360. I did that work with Microsoft in 2003.

8 Q. What other GPU programming work have you done in
9 your career?

10 A. So later we'll be talking about things like
11 asynchronous task dispatch, and that uses a technique
12 called synchronous compute. Those are compute shaders, and
13 they use the computer graphics process for things that
14 other than the real-time, raster-based computer graphics
15 used in video games.

16 I started working on this even before the
17 graphics processor was actually user programmable. I got
18 the first National Science Foundation Information
19 Technology Research Grant on this for doing what was called
20 general purpose, GPU, programming, and continued on working
21 on this. It became -- this became known as compute
22 shaders.

23 For example, in 2016, I used these, in the upper
24 right image, to help doctors map out blood flow when their
25 analyzing an aortic aneurysm.

1 Q. Are you familiar with the definitions His Honor
2 has put forth for one of ordinary skill in the art?

3 A. Yes, I am.

4 Q. Are you one of ordinary skill in the art?

5 A. Yes, I have been, and I would be considered at
6 least a person of ordinary skill in the art.

7 Q. All right. Let's shift our focus to the
8 '053 Patent. What's the '053 Patent about?

9 A. The '053 Patent is about unified shaders.

10 Q. What is a unified shader, in the context of the
11 '053?

12 A. A unified shader is a -- it's a GPU,
13 programmable GPU, where the shader core can run both vertex
14 shader programs and pixel shader programs.

15 Q. Why is it important for something to be able to
16 run both vertex and pixel instructions?

17 A. The main reason is utilization. You've got a
18 very fast processor. You don't want it to be idle too
19 much. You want to use every cycle available to it.

20 As you'll see when we're processing vertices,
21 and we're processing pixels, there's usually hundreds of
22 times more pixels to process than vertices to process.

23 If you have a separate vertex processor. That's
24 going to remain idle while you're trying to do all this
25 pixel processing.

1 If you have a single processor capable of doing
2 both, that has the combined resources of both, then you can
3 keep it busy because you can use it for the vertex
4 processing for just the vertex command threads, but then
5 you can spend all the rest of the time finishing out all of
6 those pixels.

7 Q. Let's shift to talking just a little bit about
8 the background technology.

9 What's shown in slide 10?

10 A. This is an example of a computer graphics image
11 displayed on a computer display.

12 Q. What's a piece of this that might be a rendered
13 image?

14 A. In this example, the vehicle is the rendered
15 part using computer graphics.

16 Q. How much data is needed to represent this kind
17 of photo realistic image?

18 A. Done tons of data. Tons of computation.

19 That car -- computer graphics would be
20 represented by a triangle mesh connecting a bunch of
21 vertices. And there might be tens of thousands of
22 triangles to represent an object in a video game.

23 Then -- so all of those vertices need to be
24 processed to figure out where they appear on your
25 particular view of the scene from the three-dimensional

1 position to the two-dimensional position.

2 Then you've got -- those triangles on the
3 screen, you fill them with pixels through a scan conversion
4 process, and you know, if you're filling the screen with
5 computer graphics, HD resolution, you've got millions of
6 pixels on the screen.

7 Then you need to do that a hundred times a
8 second just to keep up with the refresh rate that one would
9 expect from a video game. You multiply that all out, and
10 that becomes many trillions of computations that need to
11 happen in a second.

12 JUDGE ELLIOT: Mr. McNamara, whenever a good
13 stopping point is, let's take our break for the day.

14 MR. MCNAMARA: I have a couple more questions to
15 close out the technology piece, and so we can do that and
16 then break?

17 JUDGE ELLIOT: Very good.

18 MR. MCNAMARA: All right.

19 BY MR. MCNAMARA:

20 Q. How did the industry solve that kind of
21 computational challenge?

22 A. We don't have a single processor that can
23 compute many trillions of computations in a second.

24 Computer graphics is embarrassingly parallel, so
25 we have arrays of SIMD processors that are designed to be

1 able to apply the same instruction, because you're doing
2 the same thing to all of the vertices. You're applying the
3 same transformations to them to get them to the screen.

4 Then shading all of them in the pixel process,
5 so you can do the same operations to all of the vertices,
6 same operations to all of the pixels, and so it maps really
7 well to these parallel arrays of SIMD processors.

8 Q. Now, how did the approach to GPUs change over
9 time leading up to the unified shader?

10 A. Well, originally, as I mentioned before, we had
11 programmable shaders, which was great, but there was a
12 separate vertex shader, and then separate pixel shader,
13 which I'm showing in red that would process the vertices in
14 blue, that would process the pixels.

15 That red unit, the vertex shader, there aren't
16 as many vertices as there are pixels. It would remain
17 idle, and those are wasted cycles while you're completing
18 all of the pixels. The unified shader pulls all of the
19 resources of both into a single unit.

20 And then, you can keep that unit occupied more
21 often by just using it to process what vertices you have,
22 and then using the remaining cycles to process all of
23 the pixels, because you've got like a hundred times as many
24 pixels.

25 Q. What was the first company to implement a

1 unified shader in a consumer product?

2 A. AMD.

3 Q. How do you know that?

4 A. Here's an example. There's an article -- it was
5 CX-1883. One of the authors was David Luebke from NVIDIA
6 research, and he cites ATI, the ATI Xenos chip, as being
7 the first to realize unified shaders.

8 Q. How did Mr. Luebke characterize the unified
9 shader technology?

10 A. He said it was a flexible parallel architecture
11 that improved GPU utilization.

12 Q. Is NVIDIA AMD's biggest competitor in the GPU
13 space?

14 A. They have been from my personal knowledge of the
15 computer graphics industry over the past few decades.

16 MR. MCNAMARA: All right. We're about to
17 transition into the patent technology, so I think this is a
18 good time to break.

19 JUDGE ELLIOT: Very well.

20 All right. Dr. Hart, please don't discuss your
21 testimony with anyone overnight.

22 Again, if anything happens, please let me know
23 in the morning.

24 (A recess was taken at 5:18 p.m., to resume the
25 following day, Friday, March 17, 2023, at 9:00 a.m.)

1 C O N T E N T S

2

3 WITNESS DIRECT CROSS REDIRECT RECROSS

4 Massoud Pedram, PhD 963 980 1015

5 (Continued)

6 Dinesh Manocha, PhD 1048 1120 1139

7 Thomas Olson PhD 1158 1198 1121 1217

8

9

10 AFTERNOON SESSION: 1082

11

12 CONFIDENTIAL SESSIONS:

13 1147-1157

14 1171-1220

15

16 E X H I B I T S

17 EXHIBIT NO: RECEIVED

18 (No exhibits were entered)

19

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25

1 CERTIFICATE OF REPORTER

2 TITLE: CERTAIN GRAPHICS SYSTEMS, COMPONENTS THEREOF, and
3 DIGITAL TELEVISIONS CONTAINING THE SAME

4 INVESTIGATION NO: 337-TA-1318

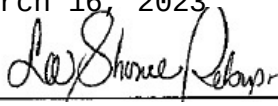
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7 NATURE OF HEARING: Evidentiary Hearing, Volume IV

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