1   FEDERAL TRADE COMMISSION

2   I N D E X

3

4   WITNESS: DIRECT   CROSS   REDIRECT   RECROSS

5   Heye   3614

6   3730   3752   3794   3805

7   Wagner   3820   3864

8

9

10   EXHIBITS

11

12   NUMBER   MARKED   ADMITTED   WITHDRAWN

13   CX

14   Number 798   3613

15   Number 1420   3730

16   Number 2158   3818

17   Number 2164   3818

18   Number 2828   3850

19   Number 2829   3853

20   Number 2832   3840

21   Number 2833   3827

22

23   DX

24   Number 29   3655

25   Number 30   3742

                    For The Record, Inc.
                    Waldorf, Maryland
                     (301) 870-8025

1   UNITED STATES OF AMERICA

2   FEDERAL TRADE COMMISSION

3

4   In the Matter of:)

5   Rambus, Inc.   ) Docket No. 9302

6   ----------------------------)

7

8

9   Friday, May 30, 2003

10   9:15 a.m.

11

12

13   TRIAL VOLUME 19

14   PART 1

15   PUBLIC RECORD

16

17   BEFORE THE HONORABLE STEPHEN J. McGUIRE

18   Chief Administrative Law Judge

19   Federal Trade Commission

 1   APPEARANCES:

 2

 3   ON BEHALF OF THE FEDERAL TRADE COMMISSION:

 4   M. SEAN ROYALL, Attorney

 5   GEOFFREY OLIVER, Attorney

 6   ROBERT DAVIS, Attorney

 7   Federal Trade Commission

 8   601 New Jersey Avenue, N.W.

 9   Washington, D.C. 20580-0000

10   (202) 326-3663

11

12   ON BEHALF OF THE RESPONDENT:

13   GREGORY P. STONE, Attorney

14   SEAN GATES, Attorney

15   Munger, Tolles & Olson LLP

16   355 South Grand Avenue, 35th Floor

17   Los Angeles, California 90071-1560

18   (213) 683-9255

19

20

21

22

23

24

25

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

2   - - - - - -

3   JUDGE McGUIRE: This hearing is now in order.

4   Counsel, any housekeeping tasks we need to attend to

5   this morning?

6   MR. ROYALL: I believe Mr. Oliver may have

7   something.

8   JUDGE McGUIRE: Okay, Mr. Oliver.

9   MR. OLIVER: Your Honor, there is one exhibit I

10   omitted to move into evidence yesterday afternoon that

11   is CX-798, an email to Richard Barth from Richard Crisp.

12   JUDGE McGUIRE: Any objection?

13   MR. STONE: No, Your Honor.

14   (CX Exhibit Number 798 was admitted into

15   evidence.)

16   JUDGE McGUIRE: Anything else from either side?

17   MR. ROYALL: One other thing, Your Honor, this

18   may have been discussed yesterday, because we are trying

19   to get two witnesses on and off today from the west

20   coast, we were thinking if it would be possible to have

21   a truncated lunch break.

22   JUDGE McGUIRE: Certainly. Certainly.

23   MR. ROYALL: We can decide later, 30 minutes, 45

24   minutes.

25   JUDGE McGUIRE: That's no problem with me,

1   A. Yes, sir.

2   Q. Can you briefly explain the general nature of

3   the business of AMD?

4   A. Yes, AMD's primary business is selling

5   microprocessors into what is referred to as the x86

6   market which includes desktop PCs, mobile computers,

7   which are normally laptops, and server workstations.

8   Q. Does AMD make products other than

9   microprocessors?

10   A. Yes, it does, AMD is also involved in the flash

11   memory business and it just recently acquired a company

12   called Alchemy which makes microprocessors, that's a

13   small business.

14   Q. Is the microprocessor part of AMD's business the

15   largest aspect of AMD's business?

16   A. Yes, that's the predominant business.

17   Q. How long have you been employed by AMD?

18   A. A little over five years.

19   Q. And what is your current title or position with

20   the company?

21   A. My current title is vice president and general

22   manager of the microprocessor business unit.

23   Q. How long have you held that position?

24   A. About two months.

25   Q. And generally speaking, what are your job

1   responsibilities in that position?

2   A.   The primary job responsibility is really

3   managing the business of all three segments that we had

4   mentioned earlier which were the desktop, mobile and

5   server divisions. In addition to that, I'm responsible

6   for all the platform engineering associated with

7   delivering the infrastructure to support those three

8   businesses and I'm actually responsible for the

9   engineering infrastructure for the fulfillment as well.

10   Q.   And roughly how many employees report to you in

11   your current position?

12   A.   A little over a thousand.

13   Q.   Immediately before taking this position, and did

14   you say it was only the last few months that you've had

15   the title that you described?

16   A.   Yes, sir.

17   Q.   And immediately before that, what position did

18   you hold within AMD?

19   A.   Vice president of platform engineering and

20   infrastructure.

21   Q.   And how long did you hold that position?

22   A.   Roughly two years.

23   Q.   And how did your responsibilities in that

24   position differ from your current responsibilities?

25   A.   My responsibility at that time was focusing just

1   Q.   And with what company?

2   A.   I joined Digital Equipment Corporation.

3   Q.   And how long were you employed by Digital?

4   A.   Approximately 11 years.

5   Q.   Eleven years you said?

6   A.   Eleven years, yes.

7   Q.   Digital is no longer in existence today. Is

8   that right?

9   A.   That's correct, it's no longer in existence. It

10 was acquired by Compaq, which was acquired by Hewlett

11 Packard.

12   Q.   At the time that you worked for Digital, how

13 would you describe the basic nature of the company's

14 business?

15   A.   At the time, Digital was the largest

16 manufacturer of minicomputers, in fact they developed

17 the minicomputer market. So, they were pretty much

18 number two after IBM in terms of size of computer

19 makers.

20   Q.   And generally speaking, what was the nature of

21 your work for Digital?

22   A.   When I joined Digital, they had just begun

23 getting into the semiconductor business, and that was

24 all in-house microprocessors, but I was on the original

25 design team making microprocessors for Digital

1   Equipment's internal minicomputers.

2   Q.   You said you were with Digital for 11 years?

3   A.   Yes, sir.

4   Q.   And you left in the early nineties some time?

5   A.   '91.

6   Q.   And where did you go from there?

7   A.   Apple Computer.

8   Q.   To Apple?

9   A.   Yes, sir.

10   Q.   How long were you employed by Apple?

11   A.   Six years.

12   Q.   And when you left Apple, was that '97?

13   A.   '97, correct.

14   Q.   And was it at that time that you joined AMD?

15   A.   Correct, yes.

16   Q.   In the time that you were employed by Apple

17   during those six years, how would you describe the work

18   of the company or the nature of the company's business?

19   A.   Apple had multiple business units, the one I was

20   most familiar with, and was involved with, was the

21   Macintosh computer.

22   Q.   And what type of work did you do for Apple?

23   A.   When I first joined I was hired as what was

24   called a hardware lead for developing Macintoshes. And

25   Macintosh ironically got cancelled six months after I

1   joined the company, but after that I was in charge of

2   all microdevelopment.

3   Q. Before going on to your work at AMD starting in

4   the late nineties, let's take a moment to focus on what

5   you did at Apple. You just mentioned in your last

6   answer something called Macintosh and most of us

7   probably know what that is, but just to be clear, can

8   you describe what the Macintosh product is or was?

9   A. Sure. The Macintosh was and is a PC that

10   competed with at the time it was euphemistically

11   referred to as the IBM PC market. And the Macintosh was

12   the first to have what is now known as the Windows

13   interface and it's been a relatively niche player, I

14   don't know that it ever surpassed 10 percent market

15   share, but it's always had an avid following.

16   Q. And at the time that you arrived at Apple in

17   the early 1990s, was the company already producing

18   Macintosh computers?

19   A. Yes, sir.

20   Q. I think you said that the highest market share

21   that you recall Apple having in the PC market was did

22   you say 10 percent?

23   A. I believe that to be true.

24   Q. During the six years that you spent at Apple,

25   was your work always somehow related to the Macintosh

1   product line?

2   A.   Yes.

3   Q.   And what responsibilities did you have with

4   respect to the Macintosh product line?

5   A.   When I joined the Macintosh group, they were

6   focusing on -- they were using a microprocessor called

7   the 68,000, and pretty shortly after my arrival, Apple

8   made a strategic decision to stop using the 68,000-based

9   microprocessor and begin to use what is now referred to

10   as the PC -- Power PC microprocessor. And given my

11   background at Digital being a microprocessor designer, I

12   was one of the early members of the technical team that

13   helped define the Power PC microprocessor for Apple.

14   Q.   And so, this Power PC microprocessor was at the

15   time that you arrived, it was the processor that was

16   intended to be used in future generations of the

17   Macintosh. Is that right?

18   A.   That's correct, yes.

1   processor used in a Macintosh was based off an existing

2   IBM design of a 601. Then IBM and Motorola formed a

3   joint design team which was referred to as Somerset.

4   Somerset was physically in Austin, Texas.

5   The Somerset design team was tasked to generate

6   actually three microprocessors, two for the Macintosh

7   and one for a server. And the two processors that AMD

8   was interested in were called the 603 and the 604. And

9   the products that I would -- the Macintosh that I would

10   be ultimately responsible for designing initially were

11   using the 604 microprocessor, but because of my

12   background, I was one of the initial interfacers from

13   Somerset to Apple. So when they had a question about

14   trade-offs from the 603 to the 604 initially I was one

15   of the people that they turned to for resolution of

16   these questions.

17   I should also mention parenthetically that over

18   time Apple hired eight folks to physically reside in

19   Austin, Texas, and once they built that team down there,

20   I spent less and less time dealing with Somerset.

21   Q.   You mentioned the two Power PC microprocessors

22   that you were involved in, 603 and 604.

23   A.   Correct.

24   Q.   Very generally, how did those products differ?

25   A.   Sure, the 604 was targeted for the high end of

1   the Macintosh, this would be used for what we call the

2   power users, and the 603 was targeted for the value

3   segment, and that would be more for educational market

4   and low cost Macintoshes, which at the time was $2,000,

5   which I hadn't mentioned today.

6   Q. You mentioned that you dealt with or interfaced

7   with the IBM and Motorola people at the Somerset

8   facility in Austin. Were you involved in negotiating

9   the pricing or the terms on which Apple purchased the

10 Power PC microprocessors that they manufactured?

11   A. I was not involved in the price negotiation,

12 however, there are design considerations a person makes

13 prior to the actual manufacturing of the microprocessor

14 that has direct cost ramifications. So, on the design

15 side, I was very influential. On the actual negotiating

16 the price, I was not involved in that.

17   Q. Let me ask you to elaborate on that. You said

18 that you were involved in design decisions that affected

19 cost, the cost of these microprocessors. Can you be

20 more specific about how your involvement in design

21 issues related to cost?

22   A. Sure. First off, cost for a microprocessor is

23 directly proportional to the die size, which is how

24 physically large the chip is. The bigger the chip, the

25 more expensive the chip, the smaller the chip, the

1   cheaper it is. So, what we -- discussions would always

2   be around the trade-offs of performance versus die size.

3   Because typically the more stuff you put in a

4   microprocessor, the better it performs, at the same

5   time, it would be bigger, therefore more costly. So,

6   the trade-offs involved, should I put more stuff in

7   there or should I make it cheaper and thereby take stuff

8   out. And I was involved in the stuff discussions.

9   Q. And from your standpoint representing Apple, did

10   you care about die size issues, was that important to

11   you?

12   A. Absolutely. For example, the 604, we would err

13   on the side of putting more stuff in there, at the

14   expense of cost, while on the 603 we would err on the

15   side of putting less stuff in there to make it cheaper.

16   Q. And is that because of the different market

17   segments that those two microprocessors were targeted

18   for?

19   A. Exactly.

20   Q. And the 603 was targeted more for the low end

21   market. Is that what you said?

22   A. Correct.

23   Q. From Apple's standpoint, was there any down side

24   to decreasing the die size of the Power PC

25   microprocessors?

1   A.   Well, the down side would be that the 603 did

2   not have the same performance as the 604. You know, in

3   the perfect world, you want the absolute fastest

4   microprocessor for cheaper cost, although physically

5   that's not allowed to happen. So, you're constantly

6   making business decisions to differentiate do you want a

7   low cost microprocessor with less performance or a high

8   performing microprocessor with more performance. And

9   the judgment of that is what I was involved with, so

10   that's just the standard trade-offs we make.

11   Q.   Are you familiar, Mr. Heye, with something

12   called the PCI Bus?

13   A.   Yes, I am.

14   Q.   Can you explain to us what the PCI Bus is?

15   A.   The PCI Bus is the standard bus that is used to

16   interconnect components on a motherboard and it's also a

17   bus used to plug in third party peripheral cards into

18   PCs and laptops.

19   Q.   Was the PCI Bus used in the Macintosh computers

20   that you were involved in developing while at Apple?

21   A.   Yes. The first PCI Bus used in a Macintosh was

22   the Macintosh that I was designing.

23   Q.   And were you personally involved in the decision

24   to use the PCI Bus in that version of the Macintosh?

25   A.   Yes, in fact, I drove that decision within

1   Apple.

2   Q. You drove that decision, meaning what?

3   A. Meaning that the team I worked with and myself

4   determined that the PCI Bus was the right solution for

5   the Macintosh. We then presented that to our senior

6   management and got buy-in from our management to proceed

7   down the PCI Bus. Which at the time, by the way, was a

8   rapid departure for Apple.

9   Q. Now, let's talk about that just for a moment.

10   Just to be clear, I think you made mention in your

11   earlier answer, but what precisely, not too precisely,

12   but what is the role that is played or the function of

13   the PCI Bus as it was incorporated into the Macintosh

14   computer?

15   A. So, think about a PC today. So, when you buy a

16   PC today, a lot of times you may want to add, say, to

17   the hard drive, Ethernet, a whole host of possible third

18   party devices, and the question is, well, how do you

19   plug those devices in, and a lot of times that requires

20   plugging in some extra electronics, and those

21   electronics reside in a card which then plugs into the

22   PCI Bus. And so the PCI Bus is referred to as an

23   expansion bus and also which allows a manufacturer PC to

24   put in a bunch of these what are referred to as slots or

25   connectors on the PCB, which then allows the customer to

1   plug in cards.

2   And it's really important to have that, because

3   it's impossible to design a PC that can meet the needs

4   of every individual. So, there has to be some

5   flexibility in the way you configure a PC, both in

6   production and in the after market. And the PCI Bus is

7   the one we chose for future generation Macintoshes.

8   Q. And at the time that you and your team were

9   making that choice, was there an alternative bus that

10   was available to Apple to use in lieu of PCI Bus?

11   A. At the time of the PCI Bus, there was a basic

12   transition occurring in the industry --

13   JUDGE McGUIRE: Okay, we keep talking about at

14   the time of the PCI Bus, what time was this for the

15   record, and what year, what point in time are we talking

1   A.   Correct, that's right.

2   Q.   When you arrived at Apple in the early 1990s,

3 was there already a plan in place to use this Nubus

4 technology or a new generation of it in future

5 generations of the Macintosh?

6   A.   Yes, there was a design team actually working on

7 the implementation and actually a test chip associated

8 with the future generation Nubus.

9   Q.   And once you joined Apple, did you at some point

10 in time in the early 1990s develop your own views as to

11 the quality of the next generation Nubus technology?

12   A.   From a technical point of view, it was a great

13 design. At that time, in the early nineties, it would

14 have far and away been the most superior next generation

15 PC interconnect bus on the market. It was better than

16 the existing PC Solutions, it was better than the

17 existing Apple solutions, and quite frankly, it was

18 technically better than the PCI Bus.

19   Q.   In your mind, as you were considering decisions,

20 design decisions about future Macintoshes, did you see

21 any down sides or drawbacks to Apple using the next

22 generation Nubus technology?

23   A.   The biggest drawback I saw was that, you know,

24 Apple was not a majority player in the market, and what

25 you find is that as -- if you're different from the

1   competitor and the competitor has a much, much larger

2   market share, what happens is that it is much more

3   difficult for you, the smaller share person, to get

4   the -- in this case the peripheral cards that you want

5   for your customers, because again, if I'm a card

6   manufacturer, and I have a choice in designing and the

7   manufacturing of a card, am I going to do that card for

8   90 percent of the market, or am I going to do that card

9   for the 10 percent of the market?

10   Well, business would dictate, nine times out of

11   ten you're going to do it for the 90 percent of the

12   market. And so the concern I was having that if the PCI

13   Bus was going to become the dominant industry standard

14   bus, which at that time was not clear at all, by the

15   way, but if it was going to become a dominant industry

16   standard bus, Apple would always get a competitive

17   disadvantage in our ability to get third party solutions

18   for the Macintosh.

19   Q. Now, I believe you mentioned with respect to the

20   PCI Bus that it was a standardized bus. Is that right?

21   A. Well, the PCI Bus was initially developed by

22   Intel, and then Intel formed a consortium around the PCI

23   Bus. So, Intel and nine other companies formed this

24   consortium and they specified the PCI Bus. And then

25   they made the PCI Bus open to anyone in the high-tech

1   community as long as you paid a certain fee, which I

2   don't recall what it was, and you could join the -- they

3   call it PCI SIG, which was for a special interest group.

4   Q.   Was Apple a participant in the PCI Bus

5   consortium that you just mentioned?

6   A.   Not at the time when we were doing the analysis.

7   And in fact, what had occurred was the following: The

8   PCI Bus consortium that was already founded and they

9   were pretty much closing the specification of the PCI

10   Bus. At that moment in time, that's when Apple decided

11   that we really wanted to get involved in the PCI Bus.

12   Our concern was that we wanted to be involved in the

13   inner sanctum, you know, those select eight companies

14   plus Intel. And the way the bylaws were written was

15   that you had to get voted into this inner sanctum and

16   the votes happened on an annual basisis in5 ns   nthe way the

1   thinking about, we wanted to know about. That was very

2   important to Apple that we understood every possible

3   direction or nuance that PCI Bus may have in the future.

4   Q. And let me ask you, on that point, why was it

5   important to Apple to have that role or that involvement

6   in the PCI Bus consortium?

7   A. Because at the time Apple designed all of its

8   chipsets for its Macintosh internally. So, even though

9   you don't think of Apple as a silicon -- as a chip

10   designer company, the reality was in the early nineties,

11   every piece of custom silicon in that Macintosh were

12   designed by Apple engineers. And so when you design

13   silicon, you have got to have that information fairly

14   early, as silicon has a long lead time.

15   Q. You mentioned earlier that you drove the

16   decision ultimately to go with the PCI Bus over the

17   proprietary Nubus technology in future Macintoshes.

18   A. Correct.

19   Q. Did you have to get management approval for that

20   decision?

21   A. Yes, I did.

22   Q. And were you able to get management approval for

23   that decision?

24   A. Yes, I was. It was actually contingent on me

25   getting on the PCI executive committee, which I did.

1   Q.   Was it at all a controversial decision within

2   Apple?

3   A.   Very.

4   Q.   Why is that?

5   A.   Because it was -- that was one of the first

6   times that Apple conceded being the absolute best versus

7   industry standard. Because they really did have a

8   superior solution, and the engineering people felt, you

9   know, this PCI Bus isn't as good as we're designing, so

10   why would you ever take something that's not as good and

11   bring it to market? And the counterargument is what I

12   just said, which is at the end of the day, being

13   different in a commodity market is a bad thing, and you

14   will actually lose your competitive advantage over time.

15   And so it was more important to be a standard and try to

16   influence the standard as opposed to being different and

17   better.

18   Q.   So, would it be fair to say that it was your

19   judgment at the time that it was in Apple's business

20   interest to go with the industry standard over a

21   proprietary technology, even though that proprietary

22   technology was deemed to be superior?

23   A.   Yes.

24   Q.   And you mentioned commodities.

25   A.   Yes.

1   Q.   How does the -- does the issue of commodities

2 come into play in your thinking or how did it come into

3 play in your thinking in that time period?

4   A.   Well, commodities in particular in this instance

5 might have been a misnomer, but what I'm trying to say

6 is when you look at the entire industry that develops

7 third party cards for PCI Bus, they would take offense

8 to me calling them commodities, but if you look at it

9 from a global point of view, these folks are developing

10 solutions for the mass market, and they're going to be

11 very focused on cost. And market share. And to the

12 extent that's what they're focusing on, they're always

13 going to defer to the higher volume segment before they

14 go to the low volume segment. And in which case, which

15 is a similar characteristic of the commodity market, by

16 the way. Which is why I use the word commodity in terms

17 of defining the PCI cards.

18   Q.   During your tenure at Apple, in the mid-1990s,

19 again, I think you said was it '91 to '97?

20   A.   Correct.

21   Q.   That you were there. During that time period,

22 to your knowledge, did Apple participate in any other

23 standard-setting activities besides the PCI consortium?

24   A.   Lots. You know, I couldn't even begin to

25 remember what they all were. I mean, certainly we had

1   members in the JEDEC committee, there were groups --

2   there was a whole set of committees on mobile computing,

3   which I know nothing about, but I know we were involved

4   in the standards there. You know, in the high-tech

5   world, there are standards, you can't turn around

6   without there being a standard-setting body, but I think

7   there were a number of people involved in the IEEE

8   standard body, for example. So we had people in the

9   IEEE, we had folks in JEDEC, and I'm sure there are

10   dozens, quite literally, special interest groups in

11   different subsegments of the PC mobile market that we

12   were involved with.

13   Q. With respect to JEDEC, do you know what aspects

14   of JEDEC's work Apple participated in during the time

15   frame that you were involved with the company?

16   A. Well, certainly we had a member of our -- a

17   member of Apple was involved in the memory JEDEC

18   committee.

19   Q. The memory committee?

20   A. Yeah.

21   Q. Do you have an understanding as to why Apple

22   chose to send a representative to the JEDEC memory

23   committee?

24   A. Yes. And again, a quick background. It's hard

25   to believe right now, but in the early nineties, Apple

1   was the largest consumer of semiconductors in the world

2   outside of IBM. Because at that time, Macintosh was

3   actually from an individual SKU point of view were some

4   of the highest selling individuals in the world. So,

1   reduced memory technology is going to become available.

2   It's important for us to understand when the next

3   generation of new memory is going to be available.

4   Memory comes, each one may have the same number

5   of bits, sometimes they come by form factors, by 2s, by

6   4s, by 8s, and each memory vendor would have slightly

7   different roadmaps. And again, what was important was

8   we had a -- we being Apple, this wasn't so much my job,

9   but we being Apple, from a supply-based management point

10   of view, had to make sure that whatever was needed by

11   Macintosh, that all those memory vendors could supply

12   our needs in the time frame of importance.

13   Q. To your knowledge, was Apple's -- did Apple have

warTjT*was

1   here? I'm losing track and I don't want him simply

2   testifying when I'm not sure what the question is.

3   BY MR. ROYALL:

4   Q. The question, again, was to your knowledge, did

5   Apple participate in JEDEC's memory committee with --

6   JUDGE McGUIRE: Okay, I think he's answered

7   that. Let's go on to the next question. I mean, I'm

8   not trying to cut you off, Mr. Royall, but I don't want

9   to hear, you know, five-minute answers. I want you to

10   ask him your next question and then perhaps you can

11   still go where you're trying to go.

12   MR. ROYALL: I understand, Your Honor, I just

13   interrupted him to just make clear, he referred to the

14   person who was involved in JEDEC and I wanted to get the

15   name out.

16   JUDGE McGUIRE: All right, that's fine. All

17   right, go ahead.

18   BY MR. ROYALL:

19   Q. Do you want to complete that answer now that

20   you've identified the name of Mr. Pierson?

21   A. So, Mike had two jobs. One was to work with the

22   supply-based community to make sure that they could

23   procure the parts at the best possible prices and he

24   also would feed information to the engineer so when we

25   designed the next generation chipsets, we would want to

1   know which memory technology we should design our parts

2   for.

3   Q.   Now, in your role at Apple, you personally, did

4   you become involved in issues relating to the evaluation

5   and selection of what type of computer memory to use in

6   the Macintosh?

7   A.   Yes.

8   Q.   Can you explain how you became involved in those

9   types of issues?

10   A.   So that, again, my team was responsible for

1   Q. Before designing the chipsets for the Macintosh

2   computers, was it necessary to make a decision of what

3   type of memory to use in those Macintosh computers?

4   A. Yes, you had, in other words, memory design --

5   you had to know what memory design to design those chips

6   for.

7   Q. And if you recall, what type of memory did Apple

8   select for the Macintosh computers that you were

9   involved in designing?

10   A. It was asynch DRAM, I don't remember the exact

11   frequencies.

12   Q. To your knowledge, did Apple during the time

13   period that you were with the company develop its own

14   proprietary memory products for the Macintosh?

15   A. Never.

16   Q. Do you have an understanding as to why Apple did

17   not consider that?

18   A. Even Apple, which would like to design

19   everything themselves, knew that there were certain

20   commodities you just couldn't influence or try to

21   change. So, Apple had no interest in changing the

22   memory standards. You know, our value -- the Apple

23   value-added had nothing to do with memory, so we stuck

24   to the value-added areas that we understood best, which

25   were, you know, user interfaces and hardware.

1   Q. Were you involved while at Apple in decisions of

2 which memory supplier or suppliers to do business with?

3   A. Well, Apple was so big at the time, we had to

4 have a minimum of six suppliers for any given memory

5 technology.

6   Q. And why was that?

7   A. Again, availability is very, very important and

8 when you have a commodity like memory, you know, if you

9 don't get the memory, you can't chip your Mac, you can't

10 chip your Macintosh, you're out of business. And

11 because the volume of memory is so great, Apple thought

12 it was very, very important to have multiple suppliers.

13 Again, the DRAM industry is very cyclical, so there are

14 years when we have tremendous supply glut where you

15 can't give it away and there's some years when there's a

16 supply trough, and when there's a trough, you have to

17 make sure you have enough suppliers.

18   Q. Let's return to your work at AMD, and I think

19 you said you began working for AMD in 1997. Is that

20 correct?

21   A. That's correct.

22   Q. And you also mentioned earlier that the primary

23 business of AMD is the microprocessor business. Just to

24 be clear, can you give a short explanation of what a

25 microprocessor is?

1   A.   The best way to think of a microprocessor is the

2   brains of the computer, so when you want to think about

3   how fast you can add, subtract, multiple, divide, that's

4   done by the microprocessor.   When people talk about

5   graphic images and watching things spin around and move

6   quickly, a lot of that is all done by a microprocessor.

7   It's just the brains.

8   Q.   What types of products are AMD's microprocessors

9   used in?

10   A.   Again, they're used in desktops, and in mobile

11   computers, and within the last two or three years, Apple

12   has been involved in the server market.

13   Q.   Who are AMD's principal customers?

14   A.   AMD sells to every major OEM with the exception

15   of Dell, and we have a large what's called white box

16   market, which is the -- these are guys who sell one,

17   two, three, four, five, six computers and they buy all

18   their microprocessors through distribution channels.

19   Q.   Roughly speaking, what portion of your customer

20   base is reflected by the PC, the OEM manufacturers as

21   opposed to the white box manufacturers?

22   A.   At this moment in time, about 30 percent of our

23   business is in the white box market.

24   Q.   Who does AMD compete with in the sale of

25   microprocessors?

1   A.   Intel.

2   Q.   Other than AMD and Intel, are there any other

3   firms that have a material presence or share in that

4   marketplace?

5   A.   Not a material, there are a few companies, but

6   they're less than one percent share.

7   Q.   Less than one percent?

8   A.   Yeah.

9   Q.   Do you have a rough estimate as of today of

10   Intel's and AMD's respective shares in the

11   microprocessor business?

12   A.   We're roughly 20 percent of the desktop

13   business, and about 10 percent of the mobile business.

14   So our average share of all microprocessors sold is

15   probably about 17 percent.

16   Q.   In case you didn't make it clear earlier, when

17   you refer to mobile, is that in part in reference to

18   laptop computers?

19   A.   Yes, everybody on that -- on these two tables

20   have laptops, those are considered mobile computers,

21   yes.

22   Q.   Do you know how the market share splits between

23   AMD and Intel have varied over, say, the past four or

24   five years?

25   A.   In the last -- since I've been at Apple, our

1   desktop market share has been pretty consistently

2   increasing, although it's like the stock market, we have

3   good quarters and bad quarters. For example, we're

4   about 19 percent share right now, we've been as high as

5   23, but when I started we were like 14 percent. So,

6   we've been on the desktop pretty much over time

7   increasing share on Intel. And in the mobile work,

8   pretty much flat, we go up or down plus or minus five

9   percent in any given quarter.

1   AMD microprocessors that you've been involved in in the

2   years that you've been at AMD. What was the first

3   generation microprocessor that you had some involvement

4   with?

5   A.   The K-6.

6   Q.   When you joined AMD in 1997, was the K-6 in

7   development?

8   A.   Actually it just started production.

9   Q.   So, the development was already complete?

10   A.   Yes, sir.

11   Q.   And do you know when the development on the K-6

12   started?

13   A.   The short answer is we acquired the K-6, so it

14   really wasn't developed by AMD, there was a start-up in

15   the Valley called NexGen and AMD acquired NexGen, and so

16   it was done by acquisition. And I'm not sure quite

17   frankly how long the K-6 was in development with NexGen.

18   Q.   Have you heard the term "launch" in connection

19   with microprocessors?

20   A.   Yes.

21   Q.   What does that term mean to you?

22   A.   Launch is when you first start selling your

23   microprocessors into the public.

24   Q.   Into the marketplace?

25   A.   Into the marketplace, yeah.

1   Q. Do you know when the K-6 product was launched?

2   You may have already said this already.

3   A. April '97.

4   Q. '97. And are K-6 microprocessors still being

5   sold today?

6   A. No.

7   Q. Do you know ballpark when they ceased to be in

8   the marketplace?

9   A. 2000, say 2000, 2001.

10   Q. And did the K-6, AMD's K-6 microprocessor, when

11   it was being marketed and sold, did it compete with any

12   particular counterpart products from Intel?

13   A. Yes, the Pentium II and then the Pentium III.

14   Q. Now, when you joined AMD in 1997, was there any

15   development work being done on another generation of

16   microprocessors beyond the K-6?

17   A. Yes, the K-7.

18   Q. The K-7. Is K-7 known by any other name?

19   A. Yes, in the marketplace it's known as Athlon and

20   Duron.

21   Q. Duron, is that D U R O N?

22   A. Correct.

23   Q. Do you know when the development of the K-7

24   began?

25   A. '95-'96 time frame.

1   Q.   And do you know when the development of the K-7

2   product was completed?

3   A.   '99.

4   Q.   When, if you know, was the K-7 -- AMD's K-7

5   microprocessor launched in terms of being sold in the

6   marketplace?

7   A.   It was sold in '99, in the fall.

8   Q.   And are K-7 microprocessors still being produced

9   and sold today?

10   A.   Yes, sir.

11   Q.   And in terms of competition from Intel, are

12   there any particular Intel microprocessors that the K-7

13   competes with or has competed with during its life

14   cycle?

15   A.   Pentium III and then the Pentium IV.

16   Q.   Now, you mentioned that there were three

17   different generations of AMD microprocessors that you've

18   had some involvement in. What is the third generation?

19   A.   K-8.

20   Q.   And is the K-8 microprocessor in development

21   today?

22   A.   Actually, the K-8 is shipping today. The

23   version of K-8 for the server market is referred to as

24   Opteron and that was launched in April of this year.

25   Q.   Opteron is O P T E R O N?

1   A.   Correct.

2   Q.   And you said it was shipped in?

3   A.   April of this year, 2003.

4   Q.   And do you know during what time period the K-8

5 microprocessor was under development?

6   A.   '98 to 2003.

7   Q.   And understanding that this is just beginning to

8 come onto the market, but do you have an understanding

9 as to whether there's any particular Intel-based

10 microprocessor that the K-8 will compete with?

11   A.   Yes, it competes with Xeon, X E O N.   And

12 Itanium.

13   Q.   Itanium?

14   A.   Yes.

15   Q.   I T A N I U M?

16   A.   Yes.   There's also a desktop version of K-8, but

17 that has not been announced yet.   We publicly stated

18 that it will ship in September, and that will compete

19 against Pentium IV.

20   Q.   So, the desktop version of K-8 is something that

21 will be launched some time later this year?

22   A.   Correct.

23   Q.   Does AMD, to your knowledge, have development

24 work ongoing at the present time relating to any future

25 generations of microprocessors?

1   few extra years and in all actuality they're not out of

2   the marketplace, although they may be selling a few

3   hundred thousand, which is a pretty small number.

4   Q.   Over the product life of an AMD microprocessor,

5   does the company -- well, let's take the K-7, for

6   instance.

7   A.   Um-hmm.

8   Q.   Does the company do anything to enhance

9   performance or to upgrade the product over the period of

10   years that it's out in the marketplace?

11   A.   Absolutely. The way to think about it, we have

12   actually two sort of independent efforts. The first

13   effort is we continually improve the technology of our

14   manufacturing process. And what that enables you to do

15   is with the same design, you're able to increase the

16   performance of your microprocessor. So, if you look at

17   both AMD and Intel, for example, we sell Athlon, Intel

18   sells Pentium IV, every quarter we see that they have

19   higher and higher performance. One of the ways you get

20   that is by improving your manufacturing technology.

21   The other way of doing that is we actually make

22   modifications to the design which, again, allows us to

23   tune the design to better enable higher performing

24   parts.

25   Q.   Are you familiar with the term "system" as it's

1   used in reference to microprocessors?

2   A.   Yes.

3   Q.   What does that term mean to you?

4   A.   So, again, to me a system is what the end

5   customer buys. So, for example, the PC you buy at the

6   store or the laptops that, you know, folks have on their

7   desk right now, those are end systems.

8   Q.   And does AMD during the life cycle of a given

9   microprocessor do anything to update or enhance the

10   system that goes along with the microprocessor?

11   A.   Absolutely. So, what is common practice in the

12   industry for both AMD and Intel is that we are

13   constantly working -- in AMD's case with our partners --

14   to develop new technologies that go into the system that

15   enable the overall performance of the system to improve.

16   And that can take its form in terms of different I/O

17   devices, take the form of faster memory, faster front

18   side buses. There's a whole bunch of different changes

19   that you make to assist the microprocessor to perform

20   better.

21   Q.   And what is it that drives or motivates AMD to

22   make those types of enhancements or improvements in a

23   microprocessor system over time?

24   A.   The best way to describe it is by analogy.

25   Another way to look at the microprocessor, if that's

1   your high performance of the car, and as you continue to

1   Q. Did -- well, strike that.

2   And the K-7 microprocessor, from what you've

3   told us earlier, was under development at the time you

4   joined the company.

5   A. That's correct.

6   Q. Is that right?

7   A. Yes.

8   Q. Did the K-7 microprocessor differ in any

9   material respect from the earlier generation, the K-6?

10   A. It differed in a lot of different areas. The

11 one area that was of most concern to AMD, and the reason

12 I was hired, was that the K-7 did not have the same

13 front side bus as Intel. And the implication of that is

14 as follows: When I take a K-6, I could have walked in

15 any store and had an Intel motherboard or I should

16 phrase it a motherboard that can be used by any Intel

17 processors, I can plug my K-6 into any of those boards

18 into anyplace in the world and it would just work.

19   On K-7, I couldn't do that. So, K-7 was the

20 first microprocessor that was not pin compatible with an

21 Intel-existing microprocessor. So, all that

22 infrastructure and all those companies designing stuff

23 for Intel-based motherboards, which AMD was leveraging

24 in the K-6 days, went away. And we had to generate our

25 own for K-7.

1   Q.   And do you have an understanding as to why in

2 the mid to late 1990s AMD made a decision to develop a

3 new generation of microprocessors, namely the K-7, that

4 did not have capability with the Intel infrastructure?

5   A.   Yeah. It actually came from a legal document.

6 AMD and Intel were negotiating a cross license patent

7 agreement, and the implication was that AMD was no

8 longer allowed to use Intel front side bus on its future

9 generations of microprocessors. So, we were actually

10 contractually obligated not to use an Intel bus.

11   Q.   And I believe you said that when you were hired

12 by AMD in 1997, you were hired to put in place an

13 infrastructure to support the K-7 microprocessor. Is

14 that right?

15   A.   That's correct.

16   Q.   And is that an infrastructure that did not

17 already exist?

18   A.   Did not exist.

19   Q.   Just to make sure we're very clear, what we're

1   Q.   And would it be helpful to use the easel?

2   A.   It would be great.   If I may.

3   MR. ROYALL: Your Honor?

4   JUDGE McGUIRE: All right, go ahead, Mr. Heye.

5   Do you want to mark that as DX-29, just for the record.

6   MR. ROYALL: Yes, Your Honor, that's where we

7   are?

8   JUDGE McGUIRE: All right, thank you, Mr.

9   Royall.

10   (DX Exhibit Number 29 was marked for

11   identification.)

12   THE WITNESS: Let's start with the

13   microprocessor.   So, initially we have a microprocessor

14   and a microprocessor talks in what's called the front

15   side bus.   And a bus, by the way, is just a collection

16   of wires that's used to communicate to other components

17   in the PC.   So, if the microprocessor is the brains, the

18   chipset is the central nervous system.   And there are

19   two -- and we say it's in chipsets because there are two

20   chips associated with it.   And these chips have always

21   been called euphemistically the north bridge and the

22   south bridge.

23   The north bridge has fe eao   31a   y 8ycitie

1   talks to the microprocessor on the front side bus. The

2   north bridge talks to memory. The north bridge talks to

3   graphics. And it turns out the way it talks to graphics

4   is there's also another industry standard bus called

5   AGP, it stands for advanced graphics port. And north

6   bridge also talks to the south bridge, and the way it

7   talks to the south bridge is by our friend the PCI Bus.

8   So, the PCI Bus is actually an industry standard in

9   every PC and every laptop you all have has the PCI Bus

10   in it. So, the north bridge talks to the south bridge.

11   Now, the south bridge talks to all the

12   components that everybody here is familiar with on their

13   PC today. So, it talks to the keyboard, it talks to the

14   mouse, most of you have what's called USB ports on your

15   PCs now. If you have a digital camera, you plug it into

16   you USB.

17   The other thing is it has this thing that's

18   called the IDE bus, and I can't remember what that

1   is stored on non-volatile memory. Real briefly, though,

2   all that really means is the following: Here's what

3   it's trying to solve. When the computer is turned off,

4   all the memory is empty. There's nothing there. You

5   turn on the computer, the microprocessor wakes up, and

6   the poor guy goes, what am I supposed to do, who do I

7   talk to.

8   Well, it turns out the microprocessor goes to

9   north bridge, north bridge goes to the south bridge, the

10   south bridge goes to the BIOS, the BIOS then sends

11   information to the microprocessor, it gives the

12   microprocessor enough information to now go like this to

13   the hard drive, the hard drive -- it tells the hard

14   drive, take the operating system, put it into memory and

15   then you're running.

16   It's like when you turn on your PC you see all

17   those weird sentences come up in the beginning, that's

18   the BIOS and then that flashes away and you see the OS

19   logo, and the transition is you're talking to BIOS which

20   is talking to the hard drive.

21   Q. Is all of what you have drawn on this exhibit,

22   which we will mark for identification as DX-30, does

23   that sit on something?

24   A. That sits on a piece of fiberglass, and that

25   fiberglass is called the printed circuitboard, in fact I

1   brought one with me, I can show you in a minute, if you

2   like, but it's just on a printed circuitboard and that

3   printed circuitboard is euphemistically called a

4   motherboard. So, every PC has a motherboard. And let

5   me draw out two little things to make you aware. I'll

6   just make it two little blobs, there's two things that

7   you have to feed the microprocessor with, one is

8   voltage, and it turns out there's a special set of

9   circuitry called VRMs, which are voltage regulator

10   modules, and clocks. Believe it or not, microprocessors

11   have to have a clock. And VRMs and clock chips are

12   microprocessor-specific. So, again, when I'm doing

13   Intel compatible, I can leverage these two, when I do my

14   own microprocessor, I have to develop my own clock chip

15   and VRM.

16   So, all this right here makes up the

17   motherboard. So, when you -- when AMD said, I no longer

18   can use the same front side bus, right here, as Intel,

19   the first thing you have to do is say, I better find me

20   a new chipset, because there's not a single chipset in

21   the world that can talk to my microprocessor. So, the

22   first thing you have to do is somehow get the chipsets.

23   Q. Let me, if you don't mind, just stop you there.

24   You mentioned that you brought some equipment with you.

25   A. Yes, sir.

1   Q. Do you have an actual physical motherboard that

2   corresponds with this?

3   A. Yes.

4   Q. Could you just quickly show us that?

5   A. Yes, sir.

6   MR. STONE: I thought I was supposed to get my

7   copy.

8   THE WITNESS: I beg your pardon?

9   MR. STONE: Yeah, I can take it home, put a case

10   around it and I have my computer.

11   MR. ROYALL: Well, this may be more antiquated

12   technology, I'm not sure you want to do that.

13   JUDGE McGUIRE: What's your memory at home, by

14   the way?

15   THE WITNESS: I'll tell you, I'll swap, you give

16   me your laptop, I'll give you this beautiful thing.

17   BY MR. ROYALL:

18   Q. If you can just hold that up, just so we can see

19   and you can explain to the judge how the physical

20   motherboard you have in your hand corresponds with the

21   diagram that you drew.

22   JUDGE McGUIRE: Can we come up here and Mr.

23   Stone, feel free, if you want to, so I can get a better

24   view of it.

25   THE WITNESS: Sure. So, this socket --

1   actually, could you hand me those two black boxes,

2   please.

3   MR. ROYALL: Sure.

4   THE WITNESS: Bring me the cards, too. So, the

5   first thing is, this socket right here, the

6   microprocessor socket, and this is the microprocessor.

7   So, again, in that diagram, it's where you plug in the

8   microprocessor goes there. That's the north bridge,

9   that's the south bridge. So, the north bridge has those

10   four heads. So, first, you see those little wires?

11   JUDGE McGUIRE: Yes.

12   THE WITNESS: Those wires talk to the north

13   bridge, that's the front side bus. These are memory

14   DIMMs, so again, my memory is in here. So, that's my

15   memory, so I have to plug my memory in here. This right

16   here is the graphics port, this is the graphics card

17   right here, so I plug my graphics card like so. Anyhow,

18   you plug your graphics card in there. So, that's the

19   AGP port. There's even more wires that go from here to

20   these slots, that's the PCI Bus. And then right here is

21   your south bridge and the south bridge talks all sorts

22   of stuff, so that little thing right there is the BIOS,

23   and believe it or not, there's a whole bunch of wires

24   that snake itself around and talk to these connectors.

25   Just for clarity, this is your voltage regulator

1   and I believe that's the clock chip. So, that's the

2   whole physical thing. And so, what at the end of the

3   day, I have to generate one motherboard for every

4   microprocessor we sell, but knowing that when you say a

5   motherboard, you're really talking about a whole family

6   of components that go into the motherboard.

7   JUDGE McGUIRE: All right, thank you.

8   MR. ROYALL: Now, if you can hold onto these,

9   and you can take your seat, Mr. Heye. Your Honor, we

10   can deal with this later, but Mr. Heye said that he's

11   happy to leave these, they can be marked as

12   demonstratives at a later point.

13   JUDGE McGUIRE: Okay, fine.

14   BY MR. ROYALL:

15   Q. Thank you for that explanation, Mr. Heye, and

16   going back to my earlier questions, in your initial role

17   when you joined AMD, you said it was to create an

18   infrastructure for the K-7 microprocessor.

19   A. That's correct.

20   Q. And very briefly, how does what you have drawn

21   on the easel relate to the infrastructure that you

22   described earlier?

23   A. So, again, my job is to make sure that that

24   whole easel accepts the microprocessor that's available,

25   so when we started selling microprocessors, all that

1   other stuff was the marketplace. So, if one of those

2   components wasn't in there, you can't sell the

3   motherboard; if you can't sell the motherboard, you

4   can't sell your microprocessor.

5   Q. Of these various components that you have

6   described, motherboards and various other things, how

7   much of that in terms of the physical equipment does AMD

8   itself manufacture?

9   A. Only the microprocessor, and let me -- I should

10   be a little clearer on that. AMD at times is involved

11   in the chipset business. So, we have made our own north

12   and south bridges. In fact, when we first launched

13   Athlon, we actually, AMD manufactured what is designed

14   and manufactured as north and south bridge. However,

15   today, for example, every motherboard that is sold for

16   an AMD microprocessor has a third party chipset on it.

17   We are not in the chipset business for Athlon today.

18   Q. If AMD is not, other than the microprocessor, is

19   not actually manufacturing these various components,

20   does that mean that AMD goes out and purchases these

21   things?

22   A. We don't buy any of those components. What we

23   have to do is we establish an industry-wide business

24   model with many, many partners, and those partners based

25   on the business model would go off and design north

1   bridges, BIOSes, motherboards, clock chips, VRMs, and we

2   call it the -- it's a virtual system.

3   Q. And what do you mean by the term "virtual

4   system?"

5   A. Well, for example, Intel does its own north

6   bridge, it does its own south bridge, it does its own

7   motherboards. So, Intel is not virtual, they're

8   physical.

9   Q. So, you're saying that unlike AMD, Intel not

10   only makes microprocessors, but it makes the north

11   bridge and south bridge which together make up the

12   chipset?

13   A. Um-hmm.

14   Q. And it makes the motherboard itself?

15   A. That's right.

16   Q. Okay.

17   A. And we made a strategic decision that AMD would

18   not do that. Primarily AMD's value-add in the industry,

19   where we have all the smart engineers and we have

20   tremendous, tremendous microprocessor design teams. And

21   that's our value-added. You know, our value-added is

22   not building or procuring or subcontracting out, you

23   know, motherboard manufacturing factories. We made a

24   determination that quite frankly Taiwan does a better

25   job than Intel in manufacturing motherboards. We, in

1   fact, made a determination that third party chipset guys

2   are better than AMD and in some areas better than Intel

3   in doing chipsets. So, if we can work with them as

4   partners, we believe that ultimately we have a lower

5   cost, and the original infrastructure. The risk being,

6   of course, that you really have to have good

7   partnerships with all of these folks, because any one of

8   them can cause you trouble if they don't support you.

9   Q. So, to make sure we understand, when you say

10   that you developed, referring to the K-7 for the moment,

11   the infrastructure for the K-7, by that do you mean that

12   you developed through business relationships with other

13   companies a virtual system that would allow you along

14   with your partners to deliver a motherboard with all of

15   these features to the companies that are your customers,

16   the computer manufacturers?

17   A. Yes, sir.

18   Q. Well, can you walk us through what was involved

19   in that process of putting together that virtual system

20   or that inventory for the K-7?

21   A. Sure. Well, again, like I said, the first step

22   is get the chipsets. So, AMD's chipset business was --

23   had the following strategy: AMD would develop chipsets

24   for technology that did not currently exist in the PC

25   marketplace. So, for example, the K-7 front side bus

1   did not exist.

2   Q.   That's this here?

3   A.   Yes, FSB.

4   Q.   And what you said earlier the K-7 by contrast to

5   the K-6 in earlier generations, this front side bus was

6   no longer compatible with the Intel infrastructure?

7   A.   That's correct.

8   Q.   So, you had to develop a new front side bus

9   for --

10   A.   We developed a new front side bus for our

11   microprocessor, and then we had to make sure that there

12   was a family of chipsets to work with that front side

13   bus.

14   Q.   Okay, and can I ask you before -- was there

15   anything other than developing the front-side bus that

16   AMD had to do in terms of building this infrastructure,

17   is there anything else it had to do before developing

18   the chipset?

0se ife-bd.develd

1   MADAM REPORTER: Please slow down.

2   THE WITNESS: I'm sorry, the 8X is really fast.

3   So, what happens is there are different frequencies of

4   the AGP bus, so you have to determine when you do the

5   north bridge, which of these AGP buses to develop.

6   BY MR. ROYALL:

7   Q. Other than the front side bus and the AGP bus,

8   is there any other piece of the equation that you have

9   to figure out before you are able to develop the chipset

10   portion of the infrastructure?

11   A. The next is memory.

12   Q. And can you explain why you have to develop

13   issues relating to memory before you develop the

14   chipsets?

15   A. You always want to make sure you're riding the

16   commodity curve. You don't want to be different from

17   what I call the Intel-based systems. So, for example,

18   in the time frame that we did that north bridge, there

19   was a transition going on. As I said, Apple was

20   designing for asynch memory. There was a transition

21   going that they called synchronous memory, synchronous

22   DRAM, and in the industry it's what is known as PC-100.

23   So, our original north bridge was designed to work with

24   PC-100 memory.

25   Q. Is there a period of time before a new

1   microprocessor is launched that you need to resolve

2   issues about what type of memory to use in the

3   infrastructure supporting that microprocessor?

4   A.   There are. It's what I would call second order

5   of effect, reason being the microprocessor doesn't talk

6   memory, but there are some characteristics of memory

7   that you would kind of like to know about if you're the

8   microprocessor, and at the time we designed K-7, the

9   thinking was, quite frankly, that K-7 would go from

10   asynchronous DRAM to actually DDR, and so the block size

11   of the transfers between the north bridge and the

12   microprocessor took into account what we thought the

13   actual block size would be for asynchronous DRAM and

14   DDR.

15   Q.   Once you made decisions about these features of

16   the infrastructure, or the front side bus, the graphics

17   or AGP bus, and memory, what is the next step in terms

18   of building out and completing a microprocessor

19   infrastructure or system?

20   A.   Well, so once you have the north bridge -- once

21   you have your chipset worked out, you have to work with

22   the BIOS vendors to make sure that they will -- that

23   their software will work with that chipset. You have to

24   work with the clock chip vendors and the voltage

25   regulator vendors to make sure that their chips will

1   work with the microprocessors. But the next really big

2   step is going to the motherboard vendors and saying,

3   hey, why don't you guys build a motherboard that works

4   with the AMD microprocessor, even though historically

5   you've never done that before, we think it would be a

6   great idea if you started. And so that was the next big

7   hurdle to overcome was getting motherboards.

8   Q. And when you say the next hurdle to overcome,

9   are you referring to your actual experience in

10   developing the K-7 infrastructure?

11   A. Absolutely. Again, the difficulty is you go to

12   Taiwan, these guys have been making motherboards that

13   work with both AMD and Intel microprocessors, because at

14   the time they were the same from their point of view,

15   because their motherboards were really either vendors,

16   and that represented 100 percent share of the PC market.

17   And now here comes -- here I come and saying, hey, AMD

18   has 10 percent share, or 14 percent share, some number,

19   but something a lot less than Intel's, and we say we

20   want you to design a motherboard just for that business.

21   And there's still millions and millions there, there's

22   still a business proposition there. That was my job to

23   actually go to Taiwan and convince them to do that. And

24   there was a lot of concerns in Taiwan. We've never done

25   a chipset before. We had never had our own

1   infrastructure before, and it took a lot of control and

2   work on AMD's part and actually a lot on the

3   motherboard's part, because they were encouraged by our

4   competitor not to support AMD and to make motherboards

5   for us.

6   Q. So, were the motherboard manufacturers part of

7   this group of business partners that you mentioned that

8   along with AMD built the virtual system for the K-7?

9   A. Yes, sir.

10   Q. On the memory side, were there other companies

11   that you dealt with that were business partners in

12   building that infrastructure?

13   A. Well, actually, we did a similar thing with like

14   Apple did, we talked to other memory vendors to find out

15   what their roadmaps were, and again, you know, I have a

16   person who reports to me and his job is to keep track of

17   all the memory roadmaps, and so he would -- he was

18   actually the person who told our design team, design for

19   the PC-100 because that's going to be the dominant

20   standard at the time of launch.

21   Q. How many different memory manufacturers did you

22   deal with in building the infrastructure for the K-7, if

23   you recall?

24   A. Roughly six.

25   Q. Did you deal separately with any memory module

1   manufacturers?

2   A.   Oh, yeah.   We -- I don't know how many, but

3   there's -- there are dozens of memory module guys.   If I

4   show you, what you plug into your PC isn't chips, you

5   plug in this little what's called a dim, and every

 1   motherboard, it actually goes through a box, that box

 2   changes the wall voltage into voltage that operates the

 3   electronics on the motherboard. So, you have to make

 4   sure all that stuff is available.

 5   The good news is, you know, hard drives, CDs,

 6   DVDs, we didn't work with those guys because that's an

 7   industry standard up and down the line, so we didn't

 8   talk to them because that would just work with our boxes

 9   and Intel boxes.

10   Q. In terms of the third party companies that you

11   did work with in building this infrastructure, do you

12   have a ballpark as to how many different business

13   partners AMD had in that process?

14   A. Yeah, currently right now, we have roughly about

15   100 partners that are involved in the hardware side.

16   We've got another 100 partners on the software side, but

17   that's a different discussion. But the topic that we're

1   the actual process in terms of design through completion

2   of a physical motherboard of the sort that you talked

3   about? Were there steps that were involved in designing

4   through completion of motherboards that could then be

5   used in the marketplace?

6   A. So, step one is you define your chipset. Once

7   you define your chipset, then you in parallel talk to

8   the motherboard vendors to get them to design the

9   motherboard to use your chipset, and you start

10   talking -- actually to the BIOS vendors to writing

11   software to work with that chipset.

12   So, it's a lot of parallel efforts, but the real

13   sequence of events, the critical path of events is to

14   find the chipset, get the motherboard guy, develop the

15   chipset, manufacture the chipset, put the chipset on the

16   motherboard, debug the motherboard, get the motherboard

17   to market and now you've got a product.

18   Q. And did you have a team of people working with

19   you within AMD in the course of building that

20   infrastructure in terms developing that infrastructure?

21   A. Yeah, I had a team and I had to essentially

22   build up the team.

23   Q. How large was the team?

24   A. When I started it was about 100 and now it's

25   about 500.

1   Q. And how long did it take you and your team to

2   develop the infrastructure to support the K-7

3   microprocessor?

4   A. About two years.

5   Q. You mentioned in an earlier answer the word

6   "debug."

7   A. Yes, sir.

8   Q. Can you explain what that term refers to?

9   A. It's pretty rare that the first time you design

10   and then manufacture a complicated piece of silicon,

11   like a microprocessor, like a north bridge or south

12   bridge, that it works perfectly the first time. Odds

13   are against it. So, what happens is you build your

14   motherboard, you manufacture your silicon, you put it

15   all together, you turn it on, and in all likelihood it

16   won't work the way you expect it to work. So then you

17   have to figure out what's wrong and fix it and then the

18   jargon to be used for figuring out what is wrong and

19   fixing it is called debug.

20   Q. And is the debugging process, is that the same

1   A.   Let me define two terms. There's a term called

2   validation and a term called testing. Testing typically

3   refers to ensuring that what you manufactured is

4   correct. So, typically when you manufacture silicon,

5   some of the parts will work, and some of the parts will

6   not work. And you test the manufactured material to

7   determine which parts work and do not work.

8   The term validation typically means I designed a

9   component and the question is does that design work.

10   So, validation validates the design, testing ensures

11   that the manufacturing process was done properly.

12   Q.   And do you have any incident of how long it took

13   in connection with the K-7 microprocessor to complete

14   these validation and testing steps that you've

15   described?

16   A.   So, again, from the time that the first K-7

17   showed up, to the time we shipped, was roughly a year.

18   So, it took us a year to debug the microprocessor and

19   the associated chipset and motherboards.

20   MR. ROYALL: Your Honor, I am at a convenient

21   breaking point, if it would be all right.

22   JUDGE McGUIRE: Okay, let's take a five-minute

23   break and then come back.

24   MR. ROYALL: Thank you.

25   (Whereupon, there was a recess in the

1   proceedings.)

2   JUDGE McGUIRE: Please continue, Mr. Royall.

3   BY MR. ROYALL:

4   Q. Thank you, Your Honor.

5   Mr. Heye, I asked you about your involvement in

6   memory-related issues at Apple.

7   A. Yes.

8   Q. Now I would like to ask you a little bit about

9   your involvement in memory-related issues since you've

10   been at AMD.

11   A. Okay.

12   Q. Have you, in fact, in your work at AMD been

13   involved in making decisions about which type of memory

14   to use in AMD's systems?

15   A. Yes.

16   Q. And in your role, how have you become involved

17   in those types of issues?

18   A. Given the nature of my job, I'm the focal point,

19   as an executive, for bringing decisions regarding memory

20   to our executive staff. So, and specifically in the

21   time frame we're talking about, you know, there's a lot

22   of transitions going on. They were going from PC-100,

23   that's what we ship with, and then there was an

24   evolutionary change to PC-133, then after that is when

25   we had -- we made a decision initially to use Rambus,

1   and then we made the decision not to use Rambus, and I

2   was involved both in the decision to pick Rambus and I

3   was certainly the driving force in determining not to

4   use Rambus.

5   Q. And I'll come back to a number of these things,

6   but just to make the record clear, when you said that

7   you were involved in the decision not to use Rambus,

8   were you involved in the decision at that point to use

9   something other than Rambus in the K-7 system?

10   A. Yes, using what's referred to as a DDR

11 technology.

12   Q. And you said, I think, in your earlier answer

13 that initially you shipped with PC-100, and when you say

14 shipped, you're referring to the launch of the K-7

15 microprocessor?

16   A. That's correct.

17   Q. And in the initial version of the K-7 system,

18 was it PC-100 memory that was used?

19   A. Yes.

20   Q. And to your knowledge, does the term "PC-100"

21 have any relation to synchronous DRAM?

22   A. PC-100 refers to synchronous DRAM running at 100

23 megahertz.

24   Q. And so the initial versions of the K-7 system

25 that were launched in 1999 used 100 megahertz SDRAM

1   memory. Is that correct?

2   A. Yes.

3   Q. And you said something about PC-133?

4   A. Yes.

5   Q. What is that?

6   A. That's synchronous DRAM running at 133

7   megahertz.

8   Q. So, after the initial launch of the K-7, at some

9   point, did AMD develop another infrastructure for K-7

10   that was supported by the 133 megahertz version of

11   synchronous DRAM?

12   A. Yes, but to be very clear, the chipset we used

13   to do that was not AMD, it was based off the VIA

14   chipset.

15   Q. And then at some point after that version of the

16   K-7 infrastructure was released into the marketplace,

17   was there another version of the K-7 infrastructure that

18   was developed and released that used DDR SDRAM memory?

19   A. Yes.

20   Q. And do you know roughly when that version of the

21   K-7 system was launched or released into the

22   marketplace?

23   A. Roughly October of 2000.

24   Q. Now, going back to the initial decision of what

25   type of memory to use in the K-7 system, you've told us

1   now that the choice was to go with PC-100 SDRAM memory,

2   correct?

3   A. Yes.

4   Q. And were you involved in the decision to use

5   that type of memory in the initial launch of the K-7?

6   A. Yes, again, my -- yes. The design team had to

7   know what to use and we worked with the team to

8   determine which memory would be available in the 1999

9   time frame, and that team worked for me, so yes, I was

10   involved in the decision.

11   Q. Do you recall when that decision was made?

12   A. Probably two years, roughly two years before we

13   shipped. It takes about, you know, from the time you

14   start thinking about a chipset to implementing it,

15   especially when it's brand new like the one for AMD,

16   it's about two years prior to shipping.

17   Q. So, if I'm understanding you, you're saying that

18   the decision of what type of memory to use in the

19   initial version of the K-7 system that was launched in

20   1999, that decision was made roughly two years before

21   the launch of that version of the system?

22   A. Yes.

23   Q. In making decisions about what type of memory to

24   use in support of an AMD microprocessor, do you consult

25   with people within AMD?

1   A.   Well, yes, it's a collaborative effort.

2   Q.   And what types of people do you talk with or

3   does your team consult with in making the decision --

4   within AMD -- in making decisions of what type of memory

5   to use?

6   A.   Well, it's pretty much between the engineering

7   community and again, I have a small team who is

8   responsible for tracking the memory trends, and it would

9   be those two folks, those two teams working together to

10   decide what made the most amount of sense for

11   implementing the memory, the chipset.

12   Q.   And is it important to you in your capacity in

13   making judgments about what type of memory to use to

14   have information and input from those types of people

15   within the company?

16   A.   Absolutely.

17   Q.   And why is that?

18   A.   Well, again, somebody in the company has to know

19   what's going on in the memory industry, and again, those

20   folks, it's not the engineers, so again, you have to

21   have a group of folks who track what the memory

22   community is going to be doing, and by community I mean

23   they have to be following the roadmaps of all the large

24   memory corporations, and that information has to then be

25   worked with the engineering team to determine what is

1   the best solution at the time of launch for any given

2   chipset.

3   Q. In addition to consulting with others within

4   AMD, when you and your team make decisions about memory

5   selection for AMD microprocessors, do you also consult

6   with any third parties outside of AMD?

7   A. Again, obviously the memory vendors. We talk to

8   our third party chipset partners, and quite frankly, we

9   look at Intel. You know, Intel has these things called

10   the Intel developer forums, and they also specify memory

11   roadmaps and we look at what Intel is saying as well.

12   Q. Is it important to you in making memory

13   selection decisions to consider the views or the input

14   of memory manufacturers?

15   A. Absolutely.

16   Q. And why is that important?

17   A. Again, we have to track their roadmaps. At the

18   end of the day, it's the memory manufacturers who

19   actually deliver the DRAMs to market, and it's critical

20   to understand what they believe is going to be the

21   commodity part to the marketplace, because quite

22   frankly, they're the ones delivering the parts.

23   So, you know, no matter what AMD and Intel says,

24   at the end of the day, if the DRAM guys don't want to

25   deliver it, they're not going to deliver it. So, you

1   really have to know what they're thinking.

2   Q.   And do you have to know what they're thinking in

3   regard to future production of memory?

4   A.   Absolutely.

5   Q.   And why is that?

6   A.   Same argument, it's a two-year lead time. So,

7   if I was designing a chipset today and I looked and said

8   what's shipping today, odds are two years from now it's

9   going to be different. You know it's going to be

10   different. So, the question is, if I need to design

11   something two years from now -- if I need to design

12   something today that's going to ship two years from now,

13   what type is that going to be, and you have to find that

14   out. And the answer is you have to ask, and who do you

15   ask? Memory guys.

16   Q.   And in 1997 when you made the decision to go

17   with 100 megahertz SDRAM in the initial launch of the

18   K-7, were you convinced that that would be the dominant

19   commodity product in the marketplace in 1999?

20   A.   Yes.

21   Q.   And was that based in part on input you were

22   getting from memory manufacturers?

23   A.   Yes. That was just very uncontroversial. That

24   was conventional wisdom. Everybody was pretty confident

25   that's the way it was going to go and Intel was making a

1   big push for PC-100, so it was pretty clear in the

2   industry.

3   Q.   To your knowledge, when the K-7 microprocessor

4   was developed in the time period that you described

5   earlier, 1995 to 1999, did thoughts about what memory

6   would be used with K-7 influence in any way the

7   development of that microprocessor?

8   A.   Yes.   Like I said earlier, we -- the design team

1   is within the first year, let's say, after you joined

2   AMD in 1997, did you agree with the assumption that the

3   K-7 microprocessor would start with SDRAM memory and

4   then that the system would be transitioned at some point

5   in the future to DDR memory?

6   A.   No.   In the '97 time frame, we -- and when I say

7   we, it included myself and my team which included folks

8   in engineering and the folks who tracked infrastructure,

9   the memory guys, we were thinking more and more that we

10   should go Rambus. Intel had come out and said that

11   Rambus was going to be the next generation high-speed

12   memory as opposed to DDR. The memory community was

13   saying that they were going to do Rambus.

14   At the same time, if you -- the DDR standard was

15   not coming together as quickly as people would have

16   thought. So, it was languishing in JEDEC. So, we made

17   the decision that we should go Rambus. The other thing,

18   too, I should point out, is that in dealing with Rambus,

19   one nice thing was that when you purchased -- when you

20   gave -- you had to pay Rambus a fair amount of money to

21   get the license to use the Rambus technology. One of

22   the things you got in return for all those dollars was

23   they actually gave you a design that you could plug into

24   your north bridge. So, we got -- we were able to

25   offload some of our design work from internal design to

1   external design. So, it seemed like a pretty good deal

2   at the time. And I personally negotiated the Rambus

3   contract.

4   Q. Let's step back to make sure we're clear. First

5   of all about time frame.

6   A. Okay.

7   Q. You said that you and your team made a decision

8   at some point in time, if I'm understanding you

9   correctly, that after the initial launch of the K-7 with

10   SDRAM memory, that the next step in terms of memory

11   supporting K-7 should be Rambus memory. Is that right?

12   A. That's correct.

13   Q. And what time frame was it that you and your

14   team came to that judgment?

15   A. Mid-'97. I think I'm pretty sure I signed the

16   contract -- well, I negotiated the contract, actually, I

17   think Atiq Raza signed it, our president at the time,

18   but I believe the contract was completed in December of

19   '97.

20   Q. When you and your team made the judgment that

21   starting with SDRAM that future versions of the K-7

22   system should be supported by RDRAM, was it your belief

23   that in the future RDRAM would become the predominant

24   commodity memory in the marketplace?

25   A. Correct, yes.

1   Q.   And what was that belief based on?

2   A.   Again, it gets back to the first principles,

3   which is does the end user experience or perceive

4   betterness, you know, improved quality, improved

5   performance, by going to faster memory. And the answer

6   was pretty demonstratively yes. So, it was very clear

7   that both Intel and AMD needed memory that would perform

8   better than PC-133. That was a given, and you could run

9   all sorts of simulations and performance analysis that

10   said, faster memory, better.

11   So, it was pretty clear the industry was going

12   to go that way. The question is do you pick DDR or do

13   you pick Rambus? And given that, you know, Intel, who

14   owns 80 percent of the market, really put his wood

15   behind the arrow, so to speak, on Rambus, you know, they

16   had talked about the customers, well our customers were

17   saying, hey, you ought to use Rambus, and we talked to

18   the memory vendors. And the memory vendors were saying,

19   you know what, Rambus, it's a revolutionary change, not

20   evolutionary, but, you know, that's the way the industry

21   is going, that's the way we're going to go, and Rambus

22   is it. And furthermore, here's something that's another

23   critical component --

24   JUDGE McGUIRE: I'm going to cut you off, Mr.

25   Heye, because I don't want you to just keep going on, I

1   want you to be able to respond to, you know, counsel's

2   question.

3   BY MR. ROYALL:

4   Q. Thank you, Your Honor, and I'll take this time

5   to hand Mr. Heye some water, if I may approach.

6   JUDGE McGUIRE: Go ahead.

7   THE WITNESS: That would be great.

8   BY MR. ROYALL:

9   Q. Now, going back, Mr. Heye, to what you said in

10   response to an earlier question. When you and your team

11   in '97 made the judgment that you should migrate from

12   SDRAM memory and then in the future to RDRAM memory in

13   connection with the K-7 microprocessor, was that based

14   in part on information you were getting from the memory

15   manufacturers?

16   A. Yes.

17   Q. So, the memory manufacturers were supportive of

18   the idea of moving to RDRAM memory in the future at that

19   time frame. Is that correct?

20   A. Yes.

21   Q. You mentioned in your earlier answer, you

22   mentioned, I believe the term "revolutionary" in

23   reference to Rambus memory. Can you explain what you

24   meant by that?

25   A. If you look at technology trends, let's use

1   PC -- let's use synchronous DRAM going to DDR and

2   contrast that to Rambus. To go from synchronous DRAM to

3   DDR did not require a brand new back end test

4   methodology in the memory groups, in the memory

5   companies. The basic design, the basic architecture,

6   the basic understanding of the mechanism of how memory

7   communicated to front side bus between Sync DRAM and DDR

8   was pretty straightforward. Rambus really, really had a

9   very different architecture. It was quite a rapid

10   departure from the existing Sync DRAM and DDR

11   communication conventions.

12   Q. And did that different Rambus architecture

13   create any complications with respect to designing the

14   rest of the infrastructure that would support the K-7

15   microprocessor?

16   A. Yeah, Rambus was a fairly high performing bus,

17   and the way it was designed was you really, really had

18   to be very careful how you designed both the north

19   bridge, the memory chips, the RIMMs and the motherboard,

20   and if you didn't get that all just tuned out just

21   right, you're going to have some serious electrical

22   problems. It was a really touchy design.

23   Q. Now, by comparison to Rambus memory, was DDR

24   memory more evolutionary?

25   A. It was more evolutionary, yes.

1   Q. And did that mean that it involved less

2 complication in terms of designing an infrastructure

3 that would support that type of memory?

4   A. It was less complicated. It was still, you

5 know, DDR was always faster than Sync DRAM, so that was

6 certainly going to be some investment in terms of

7 training the motherboard vendors and the dim

8 manufacturers how to support the DDR infrastructure, but

9 it was certainly less complicated than Rambus.

10   Q. But even despite the complications associated

11 with Rambus, your initial decision in the 1997 time

12 frame was that it made sense for AMD to use Rambus

13 technology in future generations of the K-7 and not to

14 use DDR. Is that right?

15   A. That's correct.

16   Q. And that was a decision that you made with input

17 from memory suppliers?

18   A. That's correct.

19   Q. Was there anything -- any drawback or particular

20 drawback that in your judgment at that time frame to

21 using DDR as opposed to Rambus?

22   A. Well, the biggest drawback at the time was the

23 standard wasn't a standard. They hadn't -- the memory

24 guys -- the memory companies could not agree on what the

25 DDR standard should be. And because of that, it was --

it was languishing in JEDEC, and furthermore, you need a
chipset to help debug the memory. Intel was doing a
Rambus-based north bridge. No one at the time that we
knew of was doing a DDR-based north bridge. So, there
was no way you're going to test DDR. So, we thought,
well, heck, if Intel is going to throw its money at the
problem, and help establish the infrastructure in Taiwan
and establish the infrastructure in the rim
manufacturers and do all that work, we'll leverage it
and go with Rambus.

Q. And once the decision was made to go with
Rambus, did you say that you were involved in
negotiating a license with Rambus?

A. Yes.

Q. And what did that license cover, if you recall?

A. It covered NRE, which is nonrecoverable
engineering costs, so basically we gave them, I think it
was $2 million, and for that $2 million, like I said,
you received a piece of technology you could literally
plug into your north bridge design that could
communicate to memory, and you also just got the right
to use the Rambus technology.

Q. The piece of technology that you're referring to
that you received from Rambus that connected with the
north bridge part of the system, what was that Rambus

1   technology called?

2   A.   I think it was a rack or a rim.   I can't keep

3   track, I can't remember right now.   What it was was, it

4   was an actual circuit and layout design in the

5   technology of our north bridge that we could literally

6   drop into our design, and that would communicate

7   directly to the Rambus memory.

8   Q.   So, when you signed the license with Rambus, you

9   paid some amount of money up front?

10   A.   Yes.

11   Q.   Is that right?

12   A.   I think it was $2 million.

13   Q. $2 million, and did you agree to pay royalties

1   JUDGE McGUIRE: Okay, then that being

2   established we'll leave it in the public record.

3   MR. STONE: I have no objection to it now.

4   JUDGE McGUIRE: I understand your objection. Go

5   ahead, Mr. Royall.

6   BY MR. ROYALL:

7   Q.   Mr. Heye, without getting into rates, if you

8   even recall what royalty rates were, I'm simply asking

9   to your recollection did the license that you signed or

10   that AMD signed with Rambus involve payment of or

11   agreement to pay royalties in the future based on

12   production or sale of items by AMD?

13   A.   Yes.

14   Q.   And do you recall what types of AMD products

15   were subject to that license provision?

16   A.   Both north bridges and microprocessors.

17   Q.   Now, once the decision was made within AMD to

18   use Rambus technology in the future, and the license was

19   signed, what did AMD do, if anything, at that point to

20   begin to implement RDRAM memory in its designs?

21   A.   Well, we mainly started a design team to do a

22   north bridge that would encompass the Rambus technology.

23   And actually the first thing we did was we wanted to

24   build a test chip that would validate the Rambus design

24rSt   rpE   19   gAsYse wases we wanted to

1   of design engineers working with a Rambus team to

2   incorporate their design into a test chip which we would

3   then manufacture and validate that the design that

4   Rambus gave us was working well, and then we would

5   continue to roll that into our north bridge and make a

6   product out of it.

7   Q. Do you know or do you have an estimate of how

8   many AMD engineers were working on the Rambus technology

9   in the period during which that was the plan of the

10   company to use Rambus in the future?

11   A. Probably around 10 to 15 engineers, and then

12   there's probably another 10 folks that support the

13   engineering community. So, 20, 25-ish.

14   Q. During that time frame, and just to be clear,

15   we're talking about is it 1998 that we're talking about?

16   Or do you recall?

17   A. Yes. Yeah, it had to be early '98.

18   Q. During that time frame, you said, I believe,

19   that you were working with Rambus, AMD engineers were

20   working with the Rambus engineers. Is that right?

21   A. That's right.

22   Q. Were you working with any other third parties in

23   connection with Rambus such as memory manufacturers?

24   A. Not from an engineering point of view, no. We

25   were talking to them, but no engineering work was being

1   done with it.

2   Q. And what was your purpose for talking to them

3   about Rambus in that time period?

4   A. Just we still -- we were -- while the industry

5   had decided that it was going to go Rambus, and by

6   industry, again, it's the memory makers, the chipset

7   guys, and certainly Intel, it was pretty clear that

8   there were some serious challenges to getting Rambus to

9   the high volume market, and so we just wanted to keep

10   track of, you know, what the heck the memory guys were

11   really doing and making sure that they were on track.

12   Because if they started slipping, then we're going to

13   have a problem.

14   Q. Were you personally involved in that time period

15   in discussions with memory manufacturers relating to

16   Rambus technology?

17   A. Yes.

18   Q. Did you make trips to visit those companies or

19   did they come to see you in that time frame?

20   A. I made trips to visit them, I go to Japan,

21   Korea, Germany.

22   MR. STONE: Your Honor, can we just clarify when

23   he says "in that time frame," what time frame we're

24   talking about here?

25   JUDGE McGUIRE: Mr. Royall?

1   MR. ROYALL: I think he just a few questions

2   earlier had said 1998.

3   THE WITNESS: Early 1998.

4   MR. ROYALL: Early 1998.

5   MR. STONE: Thank you.

6   BY MR. ROYALL:

7   Q. And in your meetings -- strike that.

8   When you met with memory manufacturers in that

9   early 1998 time period to -- and you discussed Rambus --

10   issues relating to Rambus technology, were you meeting

11   with those companies collectively or individually?

12   A. Individually.

13   Q. Was there a reason why you met with them

14   individually as opposed to collectively?

15   A. Well, they would go over their detailed

16   roadmaps, which would include their technology roadmaps,

17   and memory technology roadmaps are extremely

18   confidential. That would be the equivalent of Intel and

19   AMD in a joint session sharing confidential information

20   in front of each other. It just wouldn't happen. I

21   mean, the memory guys are incredibly competitive and

22   there's no way that they would share their technology

23   roadmaps with a competitor in the room.

24   The other thing, too, was they were very open to

25   us in terms of cost. Because the other thing that I

1   would worry about --

2   MR. STONE: Your Honor, I would object that this

3   goes well beyond the question, which is why did you meet

4   with them individually.

5   JUDGE McGUIRE: Sustained, and try to confine

6   your testimony to his questions. Let's try to stick to

7   that and I am going to admonish you as well, Mr. Royall,

8   on that point. So --

9   THE WITNESS: Yes, sir.

10   BY MR. ROYALL:

11   Q. Referring to these meetings that you recall in

12   the early '98 time period with memory manufacturers in

13   which you discussed issues relating to Rambus, do you

14   have any present recollection of input or impact that

15   you received from the memory manufacturers at that time

16   relating to Rambus?

17   A. Yeah, the memory --

18   MR. STONE: Your Honor, this is beyond the

19   answer yes, which I think is all he needed to answer the

20   question that he has a present recollection, if he's

21   going to go into what he was told by the memory

22   manufacturers, that would be hearsay.

23   MR. ROYALL: Your Honor, I have laid a

24   foundation, a very clear foundation that in decisions

25   Mr. Heye made about memory selection, it was very

1   important to him to consider input from a variety of

2   sources, including memory manufacturers. I'm not

3   getting into that for the truth of the matter, but to

4   understand his state of mind and the decisions that he

5   made for his company in that time.

6   MR. STONE: Your Honor, I am quite happy for the

7   evidence to come in, as long as we all understand it's

8   not being offered for the truth of what the

9   manufacturers said.

10   JUDGE McGUIRE: Mr. Royall, is that your

11   understanding?

12   MR. ROYALL: Yes, Your Honor, as stated.

13   JUDGE McGUIRE: All right, you may continue.

14   MR. STONE: Thank you.

15   BY MR. ROYALL:

16   Q. Do you have the question in mind, Mr. Heye?

17   A. Could you repeat it, please.

18   Q. In the early 1998 time period when you met with

19   memory manufacturers and you discussed Rambus

20   technology, do you have any present recollection of

21   input or feedback that you received from those companies

22   during those meetings relating to Rambus?

23   A. Yes. They were concerned -- the cost of Rambus

24   was starting to concern the memory vendors. This is as

25   I understood it, as told to me by them, and it was

1   becoming pretty clear to me that in talking to memory

2   vendors, that some of the initial cost projections of

3   Rambus versus DDR were not coming in line to what had

4   initially been expected, and that it was more expensive

5   than people had thought.

6   In fact, one question I had asked them, I can't

7   remember if it was early or late '98 when I was asking

8   this question, but I had always asked the question as

9   follows: If SDRAM costs one, how much does DDR cost?

10   And the answer was 1.X and X would be different per

11   memory vendor but would always be more expensive than

12   synchronous DRAM. And I would always say, okay, what is

13   Rambus, and the answer would be 1.Y, and again the Y was

14   going to be greater than synchronous DRAM, but what I

15   was also interested in seeing was that Y was always

16   greater than X. In other words, every memory vendor

17   that I spoke to would tell me that Rambus had a higher

18   cost structure on a per part basis than DDR.

19   Q. Now, putting aside input that you were getting

20   from memory manufacturers in this time period, were you

21   receiving any input internally within AMD from the

22   engineers that were working on Rambus memory?

23   A. Yeah, they were getting nervous. The --

24   MR. STONE: Again, Your Honor, this is hearsay.

25   MR. ROYALL: This is the -- it's the same issue,

1   Your Honor, I'm not offering it for the truth, it goes

2   to his state of mind.

3   JUDGE McGUIRE: Let's make that clear at the

4   onset of your inquiry, Mr. Royall, so we don't have to

5   go through this every time.

6   MR. STONE: Thank you, Your Honor.

7   BY MR. ROYALL:

8   Q. Again, the question, Mr. Heye, and again I'm

9   just asking you these questions from the standpoint of

10   what you understood and what you heard and how that

11   influenced your decisions.

12   A. Okay.

13   Q. But in the same time frame that we've been

14   focusing on, early 19 -- early 1998, or thereabouts,

15   were you and your team receiving any input internally

16   within AMD relating to efforts to implement and design

17   around or to design with the Rambus technology?

18   A. Yes, a couple of things were going on. One, the

19   actual folks working on the silicon team were starting

 1   on a -- we were doing some analysis on the motherboard,

 2   and if I may, let me just show you this motherboard.

 3   The motherboard is the piece of -- this is

 4   fiberglass, the board itself is made out of fiberglass,

 5   and this is nothing but fiberglass, a layer of copper,

 6   fiberglass, layer of copper. And in Taiwan, in the PC

 7   industry, all motherboards have four layers, that's it.

 8   You can manufacture boards with 100 layers, it's

 9   technically feasible, but in the high volume segment

10   it's four layers.

11   The other thing to look at is the back side. If

12   you look on that back side, and this is a motherboard

13   that was made probably some time in the last six to nine

14   months, there's nothing on the back side. Which means

15   it's what they call single-sided manufacturing, which

16   means the board goes on the top and they put it in a box

17   and they ship it. Again, can you manufacture the back

18   side? Absolutely. In fact, that's what Apple did. But

19   it's more expensive.

20   So, one of the standard things you're always

21   trying to do is single-sided -- single-sided four-layer

22   motherboards. The concern that we were starting to have

23   was that it looked like that you may have to go to your

24   multiple layers, your out of bunch capacitors for the

25   back side of the board, and that would add cost to

1   product, and we were concerned about that.

2   Q. And that was a concern that was raised to you

3   internally within AMD. Is that correct?

4   A. Yes.

5   Q. In this same time period, roughly early 1998,

6   did you have any interaction with memory module makers

7   relating to Rambus?

8   A. Yes. The other thing that was occurring was --

9   Q. And let me just to make clear, I am not -- I am

10   interested in understanding what, if anything, you may

11   have learned from memory module makers relating to

12   Rambus to understand your state of mind and how this may

13   have influenced your thinking in that time period.

14   A. Right. You know, first clarifying, we keep

15   saying early '98, I would like it to expand to like the

16   first six months of '98, because it was kind of a

17   continuum for this. There was a bunch of different data

18   points coming in. But the other thing we were starting

19   to hear was that the RIMMs, and again the RIMMs in

20   accord with the DIMMs that Rambus --

21   Q. Can I stop you there just to make clear what you

22   said. RIMMs is a reference to is it the memory module

23   that goes with the Rambus memory?

24   A. Correct.

25   Q. As oppose to dim, which is the memory that's the

1   name given to the memory modules with synchronous or DDR

2   memory. Is that right?

3   A. That's correct.

4   Q. Continue.

5   A. And so the RIMMs were also had some issues, one

6   of which for example, in the heat syncs. If you looked

7   at the dim that we looked at earlier on today, there are

8   no heat syncs. If the rim has heat syncs, that's more

9   expensive. The other thing again, the layout of the

10   RIMMs, how you physically hook up to Rambus on those

11   RIMMs was extremely expensive. Again, even in DDR, you

12   have to be very -- there are strict rules on how you lay

13   these things out and there are standards and all, but

14   Rambus was just more difficult. And we were starting

15   to, again, you know, hear, I admit that, that there were

16   inneroperability problems with Rambus. We didn't have a

17   Rambus design in-house, Intel was the only one who had

18   their own chipset, AMD didn't have their own chipset

19   inside.

20   JUDGE McGUIRE: Again he is going on and on

21   again, I would ask you to confine yourself only to the

22   question that's being asked, otherwise we'll be here all

23   day and we cannot afford to do that.

24   THE WITNESS: Sorry.

25   BY MR. ROYALL:

1   Q. Now, the other issues that you heard described

2   within AMD from memory makers and memory module makers

3   concerning Rambus, did you or your team make any effort

4   to work with Rambus to try to resolve or improve these

5   issues?

6   A. Yes.

7   Q. What can you tell us regarding the efforts that

8   AMD made to work with Rambus to resolve the sorts of

9   issues and concerns that you've described?

10   A. Again, I was not part of the engineering team

11 working with Rambus, but I know we had, you know --

12   MR. STONE: Your Honor, I'm going to object. If

13 the prior testimony about his concerns was not being

14 offered for the truth, then we don't have any foundation

15 that there was any basis for these concerns. They were

16 just things that were expressed to this witness. If he

17 now says I didn't have any personal involvement in the

18 engineering team, he's going to be again expressing his

19 view based on hearsay and he lacks personal knowledge or

20 foundation for this testimony and I object to that, Your

21 Honor.

22   JUDGE McGUIRE: Mr. Royall, response?

23   MR. ROYALL: I can lay a better foundation for

24 the question, Your Honor.

25   JUDGE McGUIRE: Okay, go ahead.

1   BY MR. ROYALL:

2   Q.   During the 1998 time period and focusing on the

3   first half of 1998, did you have any personal knowledge

4   of efforts relating to the work of the AMD engineers

5   that were working on Rambus, efforts on their part to

6   work with Rambus employees relating to the design and

7   implementation issues concerning Rambus?

8   A.   I knew that we had -- that there were meetings

9   taking place between the two companies on

10   non-engineering issues.

11   Q.   Now, you mentioned earlier that at some point in

12   time, a decision was made to go with DDR memory in

13   future versions of the K-7 infrastructure and not with

14   RDRAM. Is that correct?

15   A.   Yes.

16   Q.   Do you recall when that decision was made within

17   AMD?

18   A.   Probably around late summer/fall time frame.

19   Q.   Of 1998?

20   A.   '98, yes.

21   Q.   And were you involved in that decision?

22   A.   Yes.

23   Q.   And how were you involved in that decision?

1   that decision through AMD?

2   A. Through all the information I was collecting

3   throughout the industry, it was my personal belief that

4   Rambus was going to fail as a commodity part, and that

5   ultimately even Intel would have to go DDR, and that AMD

6   should be the first -- should drive the DDR standard and

7   not get tied up with the Rambus memory.

8   Q. What caused you personally to come to the

9   conclusion that AMD should substitute DDR memory in its

10   future infrastructure in place of Rambus memory?

11   A. Again, as I testified from information that I

12   was hearing from memory vendors in terms of cost, from

13   information that I was hearing from my own design team,

14   saying that they were having concerns about the

15   technology, the other thing that was happening in

16   parallel on DDR was the JEDEC committee was actually

17   getting more focused and was starting to get some

18   closure on DDR. They hadn't closed on it yet, but they

19   were getting there.

20   MR. STONE: Your Honor, I believe this witness,

21   he's gone beyond the question, I think, but if he

22   hasn't, he has no foundation to testify what JEDEC was

23   doing. I don't know that he ever attended a JEDEC

24   meeting and I don't think any foundation has been laid.

25   I object on that basis.

1   MR. ROYALL: Your Honor, I don't think it does,

2   in fact, go beyond the question, but I believe I can lay

3   a better foundation.

1   MR. STONE: As long as it's not being offered

2   for the truth. All we have is a witness who is

3   testifying just --

4   JUDGE McGUIRE: And let's try to, if that's

5   going to be the case, then let's try to put that up

6   front, Mr. Royall, so we don't have to spend time going

7   back through this same, you know, objection time and

8   time again.

9   BY MR. ROYALL:

10   Q. Yes, Your Honor, thank you.

11   Now, first of all, Mr. Heye, let me just go back

12   and ask you, and a yes or no answer would be fine, if

13   you can give such an answer, was your decision to go

14   with DDR memory in the K-7 architecture in place of

15   RDRAM memory in future versions of K-7, was that

16   decision based in any part on information or knowledge

17   that you had relating to developments with the DDR

18   standard-setad rehlodfss ?

18   A   Yes,

1   you and that you considered in that time frame.

2   A.   It was my understanding that they were -- that

3   the JEDEC community was closing in on a formal DDR

4   standard.

5   Q.   And again, in your decision-making process to

6   substitute DDR memory for RDRAM memory in future

7   versions of the K-7 infrastructure, did that information

8   have some bearing on your decision?

9   A.   Yes.

10   Q.   And in what way? How did it bear on your

11   decision?

12   A.   Per my earlier testimony, you can't design a

13   chipset to take advantage of a memory device if the

14   memory device isn't specified. So, before I was going

15   to go to our senior management and tell them to go DDR,

16   I had to have a pretty good belief that ultimately there

17   would be a DDR standard, otherwise we couldn't design a

18   DDR chip and we would have failed.

19   Q.   You mentioned going to your senior management

20   relating to the choice of DDR, did you, in fact, go to

21   senior management relating to that issue?

22   A.   Yes, sir.

23   Q.   Who within senior management did you raise that

24   issue with?

25   A.   Jerry Sanders, CEO.

1   Q. And what did you -- what did you say to him or

2   what proposal did you make to him?

3   A. I basically proposed that AMD stop doing its

4   work on the Rambus north bridge, immediately begin work

5   on a north bridge that would work with DDR, and that AMD

6   would be the first company to propose DDR as a industry

7   standard in the PC industry.

8   Q. And did you receive approval for that decision

9   at that point in time?

10   A. Yes.

11   Q. Was that decision to go to DDR from Rambus in

12   that time period in terms of your future plans for K-7,

13   was that a decision that involved any potential risk to

14   AMD?

15   A. Huge risks. If I was wrong, we would have --

16   AMD would have been at a huge, huge competitive

17   disadvantage to Intel.

18   Q. And why is that?

19   A. Because if I was wrong, the dominant commodity

20   part for memory would have been Rambus, which was

21   clearly higher performing than PC-133, the best AMD

22   would have had would have been PC-133, and Intel would

23   have just owned the performance space of the PC

24   industry, and that means that's where your high priced

25   processors are going, we would have been out of that

1   market and that would have absolutely killed us.

2   Q. Once the decision had been made to use DDR

3   memory in future versions of the K-7 infrastructure as

4   opposed to RDRAM, what, if anything, did you and your

5   team at AMD do to prepare the company for that step in

6   the future?

7   A. Well, there was actually multi-avenues we had to

8   attack. We had to first attack the -- first you had to

9   get the specification completed, you had to then work

10   with the memory vendors to ensure that they actually had

11   a supply of DDR parts out there. In parallel, we

12   started this effort called Team DDR, because don't

13   forget, at that time frame, Intel was spending lots and

14   lots of money and energy telling the entire world that

15   Rambus was the way to go. And we had to establish the

16   feasibility in the mind of our partners and our

17   customers and the analysts that DDR was real. And so we

18   established this notion of Team DDR to help us do that.

19   Q. Let me stop you there. You mentioned something

20   called Team DDR. What is or was Team DDR?

21   A. Team DDR was a group of partners which AMD led

22   which represented a valid infrastructure around DDR so

23   that Team DDR would consist of memory vendors, dim

24   vendors, chipset vendors, and motherboard vendors, and

25   the idea was that, again, we needed to establish the

1   feasibility of this infrastructure, because even our

2   customers were telling us that Rambus was the way to go.

3   And we had to say no, there's a viable alternative. And

4   so Team DDR was one directed at analysts and the press

5   saying, hey, DDR is real, and getting partners on board

6   and ultimately telling our customers, because we had to

7   tell our customers, hey, we have a live technology, we

8   have a live alternative and it's going to be successful

9   in the marketplace. So, that was Team DDR's function.

10   Q. In terms of your role in building a K-7

11   infrastructure, were there any complications created by

12   your decision to change from the plan of going with

13   RDRAM to the plan of going to DDR?

14   A. Well, it's just like what I just testified, I

15   mean, we had to establish a whole brand new memory

16   infrastructure, which was something that AMD had never

17   attempted, and for all those cases that I had just

18   rattled off, we had to address all that, and

19   furthermore, we had a team that was designing the Rambus

20   interface, we had invested quite a bit of dollars in

21   that team, all that work was discarded and we had to

22   start doing DDR.

23   Q. At the time that you made that judgment, were

24   the various business partners that you worked with in

25   developing an infrastructure, were they prepared to

1   develop products, their own products, in the way that

2   would be compatible with a DDR-based infrastructure?

3   A. Yes, we -- yes. We got them to agree with us.

4   Q. I'm sorry, you got them?

5   A. Yeah, they ultimately agreed to us and were

6   willing to work with us, yes.

7   Q. Did AMD need to do anything in terms of training

8   or education to help its business partners be prepared

9   to support DDR?

10   A. One thing we did is in addition to designing our

11   own chipset, we designed what we call a reference board.

12   So, actually, AMD designed and built a motherboard that

13   had DDR on it, and we went around with the feasibility

14   saying, look, this thing really works. We also went to

15   Taiwan and said, okay, Taiwan, we want you folks -- you

16   folks -- we want these large corporations to build

17   motherboards that supported DDR, and again, DDR was

18   faster than Sync DRAM, it's technically more

19   complicated, and it works --

20   JUDGE McGUIRE: Okay, you have answered the

21   question.

22   BY MR. ROYALL:

23   Q. And from the point at which you made the

24   judgment to go with DDR in future versions of the K-7

25   infrastructure, how long after that decision was made

1   did it take you and your team to put in place the

2   virtual system or infrastructure that would support DDR

3   memory with a K-7 microprocessor?

4   A.   We launched our first DDR product in October of

5   '99 -- no, October of 2000.

6   JUDGE McGUIRE: So, then, how long did it take?

7   THE WITNESS: It -- well, we changed to it about

8   a little over -- about 18 months. Yeah, that's 12 to 18

9   months, in that time frame.

10   BY MR. ROYALL:

11   Q.   Well, you said you launched the DDR version of

12   K-8 in -- did you say October 2000?

13   A.   Yes.

14   Q.   And the decision, you said earlier, the decision

15   to go with DDR as opposed to RDRAM was made in did you

16   say late '98?

17   A.   Yeah, mid to late -- I don't know exactly, but

18   I'm assuming mid to late '98, so it would be a year,

19   maybe 15 months.

20   Q.   Now, we touched very briefly earlier on the K-8

21   microprocessor.

22   A.   Yes.

23   Q.   Which you mentioned is also known in the server

24   marketplace as I believe Opteron.

25   A.   Correct.

1   Q. Were you involved in any decisions relating to

2 what memory to use in support of the K-8?

3   A. K-8 offered a radical departure --

4   JUDGE McGUIRE: Wait a minute, sir, that's not

5 the question. He asked you if you were involved.

6   THE WITNESS: Yes. I'm sorry.

7   JUDGE McGUIRE: Okay, now, next question.

8   BY MR. ROYALL:

9   Q. Thank you, Your Honor.

10   And how were you involved in decisions relating

11 to memory selection of K-8?

12   A. My team offered feedback to K-8 on what the

13 dominant -- what we thought the dominant memory would be

14 in the time frame of its launch.

15   Q. And what type of memory was selected for use in

16 the initial launch of the K-8?

17   A. DDR.

18   Q. And has there been any decision about any future

19 version of K-8, what type of memory will be used in the

20 future versions of K-8?

21   A. The expectation is we will use DDR2.

22   Q. And can you very briefly explain what reasons

23 caused AMD and your team to choose DDR and in the future

24 DDR2 memory for the K-8?

25   A. Well, if you look at that chart, I mean, we

1   started developing K-8 in the '98-'99 time frame and

2   that's just the time frame that we had made the

3   determination that DDR was the memory of choice for the

4   commodity infrastructure, so that was our decision.

5   Q.   And when you say memory of choice for the

6   commodity infrastructure, does that mean that the memory

7   that you in your judgment believed will be the dominant

8   commodity memory at the time of those versions of the

9   K-8 infrastructure was introduced into the marketplace?

10   A.   Yes.

11   Q.   Now, relating to JEDEC, you mentioned a few

12   things about JEDEC, to make it clear for the record,

13   have you, sir, ever attended a JEDEC meeting?

14   A.   No.

15   Q.   Does anyone on your team at AMD attend JEDEC

16   meetings to your knowledge?

17   A.   Yes.

18   Q.   And who is that?

19   A.   Steve Polzin, and I know Steve has some people

20   working for him who I think also attend JEDEC meetings.

21   Q.   And do you know what portion or aspect of JEDEC

22   your team members are involved in?

23   A.   Specifically, I know they're involved in the

24   memory aspect of it.

25   Q.   Do you personally, I'm asking for your personal

1   views, if you have any, do you personally have any views

2   regarding the value, if any, that AMD derives from

3   participation in JEDEC?

4   A.   AMD spends a lot of time -- AMD works

5   collaboratively with the memory vendors through JEDEC to

6   ensure that the memory standards going forward can be

7   implemented both by the chipset vendors and the memory

8   vendors.

9   Q.   You mentioned earlier the various business

10   partners that you work with in building an

11   infrastructure to support AMD's microprocessors.

12   A.   Yes.

13   Q.   Are any of those business partners involved in

14   JEDEC as well?

15   A.   Well, I know for certain that the memory vendors

16   are involved in JEDEC. I don't honestly know who all

17   the -- I don't know who all the participants are in the

18   JEDEC meetings.

19   Q.   In addition to memory-related standards, are

20   there other areas of AMD's business in which the company

21   relies on industry standards?

22   A.   Yes, when we have, again, there are IEEE

23   standards we're involved with, AMD is involved in the

24   PCI standard, similar comments when I was at Apple,

25   there are dozens of standards in the high-tech industry

1   and AMD is involved in many of those standard-setting

2   bodies.

3   Q. And are you familiar with the term "open

4   standards?"

5   A. Yes.

6   Q. What does that term mean to you?

7   A. Open standards is a term that says that there's

8   a standard that is available to be used in the industry

9   that is -- that effectively is royalty free, that if you

10   follow the standard, one, you will be able to interact

11   with other folks using that standard, and that there's

12   basically no royalties associated with it.

13   Q. And does AMD have any position or view to your

14   knowledge as to -- well, strike that.

15   Do you personally have any view about the value,

16   if any, that AMD derives from open standards relating to

17   its business?

18   MR. STONE: Objection, relevance, Your Honor. I

19   don't think this is a trial about whether open standards

20   are good or bad or proprietary standards are good or bad

21   and this witness's view on the value of open standards

22   doesn't seem relevant to any issue in this case.

23   JUDGE McGUIRE: Overruled. He can answer the

24   question.

25   MR. ROYALL: Thank you, Your Honor.

1   A.   2000, maybe 2001.

2   Q.   Do you recall how you learned of ADT? Or the

3 existence of ADT?

4   A.   We heard about it through our memory partners,

5 they told us they were doing that.

6   Q.   Do you have any understanding concerning how or

7 why the ADT consortium was formed?

8   A.   Again, my understanding was that it was formed

9 to address next generation memory interface, you know,

10 somewhat in response to the fact that JEDEC is not --

11 does not close on issues quickly, so this was supposed

12 to be a more expedient mechanism to get the standard to

13 market.

14   Q.   And when you refer to next generation memory

15 interface, are you talking about types of memory designs

16 beyond --

17   A.   Beyond DDR.

18   Q.   Beyond DDR?

19   A.   Beyond DDR, yes.

20   Q.   Do you know who formed the ADT consortium?

21   A.   I honestly don't know which initiated it.

22   Q.   Do you know whether the work of ADT had anything

23 to do with Rambus?

24   A.   I heard rumors, but I wouldn't say that it was

25 formally -- no, to answer your question, so I won't get

1   objected on it.

2   Q. And when you heard of ADT, did you on behalf of

3   AMD have a desire to participate in the ADT consortium?

4   A. Yes.

5   Q. And why is that?

6   A. It goes back to my previous testimony that, you

7   know, Intel is a formidable competitor. The fact that

8   Intel was getting information defining the next

9   generation memory interface before AMD put AMD at a

10   distinct disadvantage to Intel.

11   Q. And did you make an effort to have AMD join and

12   participate in the ADT consortium?

13   A. Yes. The ADT consortium rules were that you had

14   to get a unanimous vote with the six memory vendors plus

15   Intel to allow us to get on what I'll call the executive

16   committee. Actually, I personally called Pat Gelsinger

17   at Intel to try to elicit his vote to try to get AMD on

18   the executive committee. For the record, he was

19   noncommittal. But yeah, we tried really hard, we talked

20   to the memory vendors as well to try to get us on the

21   committee, and there were votes taken and we lost the

22   vote. And the votes were held in confidentiality, so I

23   have no idea who voted for us and who voted against us.

24   Q. So, you were not -- in your efforts, you were

25   not successful in your efforts to join ADT. Is that

1   what you're saying?

2   A.   We were not successful in our efforts to join

3   the executive committee of ADT.

4   Q.   To your knowledge, does ADT still exist today?

5   A.   No.

6   Q.   Do you have any views as to whether AMD suffered

7   any type of disadvantage as a result of not being

8   permitted to participate in the executive committee of

9   ADT?

10   A.   I don't think we suffered any damages.

11   Q.   And why not?

12   A.   The span of the technology didn't go anywhere.

13   Q.   Now, you mentioned earlier that AMD entered into

14   a license with Rambus at the time that you and your team

15   made the decision to pursue use of Rambus technology in

16   future versions of the K-7 infrastructure. Is that

17   right?

18   A.   Yes.

19   Q.   And you were personally involved, I believe you

20   said earlier that you were personally involved in

21   negotiating that license with Rambus. Is that correct?

22   A.   Yes.

23   Q.   Did you have meetings with Rambus

24   representatives relating to that license or the

25   negotiation of that license?

1   A.   Yes.

2   Q.   Do you recall how many meetings you attended

3 with Rambus representatives relating to that license

4 negotiation?

5   JUDGE McGUIRE: Mr. Royall, how is that

6 pertinent at this point?

7   MR. ROYALL: I'm just laying a foundation, I

8 think it will become clear, Your Honor.

9   JUDGE McGUIRE: Okay, proceed.

10   THE WITNESS: I have no idea exactly how many

11 meetings they had, it was certainly greater than three

12 and less than 100, I mean, we were negotiating.

13   BY MR. ROYALL:

14   Q.   Well, no, I'm sorry, the question, maybe I

15 misstated it, was not how many meetings there were, but

16 do you recall how many meetings that you participated

17 in? Or roughly speaking, I don't mean precisely. I

18 mean, was there more than one?

19   A.   Definitely more than one, yes.

20   Q.   And during those meetings, whatever the number

21 may be, but the meetings that you personally

22 participated in with Rambus, do you recall Rambus making

23 any presentations relating to its intellectual property?

24   A.   Not specifically its intellectual property, no.

25   Q.   Were there other meetings of AMD employees with

1   Rambus relating to this license negotiation that you did

2   not attend?

3   A.   Yes, many.

4   Q.   And were these other AMD employees, were they --

5   that participated in those meetings, were they part of

6   your team?

7   A.   They didn't all report to me. You said my team,

8   I'm not sure exactly what that means. There was a

9   negotiating team from AMD which included lawyers,

10   business development people and people on my staff. And

11   that was the negotiating team for the contract. I was

12   the lead executive on it.

13   Q.   And before AMD signed a license with Rambus

14   relating to RDRAM, do you recall ever hearing that

15   Rambus had or might have intellectual property relating

16   to JEDEC's SDRAM standard?

17   A.   No.

18   Q.   Did you at some point in time learn that Rambus

19   had or might have or claimed to have intellectual

20   property relating to JEDEC's SDRAM standards?

21   A.   Yes.

22   Q.   Do you recall when you first heard that?

23   A.   It was in 2000, spring, early summertime period.

24   Q.   Do you recall how you first learned that Rambus

25   claimed to have intellectual property relating to

1   JEDEC's SDRAM standards?

2   A.   Yes, they started suing memory vendors.

3   Q.   And how did you learn of that, if you recall?

4   A.   I read about it.

5   Q.   Where did you read about it, if you recall?

6   A.   On the web.

7   Q.   And was that the first -- well, strike that.

8   At some point in time, did you have a meeting

9   with or discussion with anyone from Rambus relating to

10   intellectual property, Rambus intellectual property in

11   its relation to the JEDEC standards?

12   A.   Yes.

13   Q.   Do you recall when that was?

14   A.   Again, spring or early summer-ish of 2000.

15   Q.   Do you recall one such meeting or was there more

16   than one such meeting in which you interacted with

17   Rambus representatives relating to JEDEC intellectual

18   property?

19   A.   Just one meeting.

20   Q.   And do you recall where this meeting occurred?

21   A.   At AMD.

22   Q.   Do you recall what led to that meeting being

23   scheduled?

24   A.   Yes, the Rambus representative called me and

25   said that she wanted to have a meeting with me and she

1   also said she was bringing her attorney. Which is their

2   way of saying I should bring my attorney, so I did.

3   Q. And who was the Rambus representative who called

4   you, if you recall?

5   A. Laura Fleming.

6   Q. And in the meeting that later took place, did

7   Laura Fleming attend on behalf of Rambus?

8   A. Yes, Laura attended.

9   Q. Do you recall whether anyone else from Rambus

10   attended?

11   A. Yes, there was an attorney there, and I think

12   there were a few other folks from Rambus there as well.

13   Q. At this meeting, which I believe you said you

14   recall being in the spring of 2000. Is that right?

15   A. Spring/early summer, yes.

16   Q. At this meeting with Laura Fleming and others

17   from Rambus, did anyone else other than you attend on

18   behalf of AMD?

19   A. An AMD attorney.

20   Q. And do you recall the name of that attorney?

21   A. No, I don't, I'm sorry.

22   Q. Anyone else other than the one AMD attorney and

23   yourself from AMD?

24   A. No.

25   Q. Did Rambus at this meeting make any formal

1   presentation to yourself and the AMD attorney?

2   A.   Yes.   A PowerPoint presentation.

3   Q.   Did they leave you with a copy of that

4   PowerPoint presentation, or do you recall?

5   A.   I believe they did, yes.

6   Q.   Do you recall anything, without getting into any

7   details or substance, but do you recall anything about

8   the PowerPoint presentation?

9   A.   Yes.

10   Q.   You do?

11   A.   Yes.

12   Q.   Again, without getting into details, what do you

13   recall?

14   A.   Well, there was sort of two big topics they

15   wanted to cover in that, one was our current status of

16   our contract we have with Rambus, and the second one was

17   they were -- they wanted to share with us the fact that

18   they claimed that they had IP related to synchronous

19   DRAM and DDR, they had patents in regard to those two

20   technologies.

21   MR. ROYALL: Your Honor, at this point, I would

22   like to show the witness a document, and it's a document

23   that has been marked by Rambus as in camera and I gave

24   Rambus notice that I planned to do this, but it is I

25   believe an in camera document.

 1   MR. ROYALL: Under the protective order, I'm not

 2   certain, so maybe as a caution.

 3   JUDGE McGUIRE: If you're not certain, then he

 4   is going to have to leave. So, I'm sorry, sir, but

 5   that's just the way we're going to have to do this. So,

 6   Mr. Royall, does everyone else in this courtroom at your

 7   table and behind you have access to this evidence under

 8   that order, that protective order?

 9   MR. ROYALL: One point of clarification, the

10   protective -- the reason I wasn't sure is the protective

11   order refers to outside counsel, but I believe that's

12   outside counsel of the parties. There is one provision

13   of the protective order that was just drawn to my

14   attention that says and such other persons authorized by

15   the producing party. So, if Rambus had no objection to

16   Mr. Heye's attorney being here, he could be present, but

17   that's up to them.

18   JUDGE McGUIRE: Well, it's not really their say.

19   That's fine if he has no objection, Mr. Stone, but it's

20   not his say as to whether it's okay. I'm going to ask

21   you to certify to me that everyone behind you has access

22   under the terms of that order to hear evidence. If you

23   think he is, then he can come back in, but that's up to

24   you.

25   MR. ROYALL: I understand, Your Honor, and

1 everyone in the courtroom on our side is authorized and

2 the only question is I'm just asking whether Rambus

3 would have any objection to Mr. Heye's company's

4 attorney being present, and if they don't have an

5 objection, I think under the protective order he can

6 come in. If they do have a reason to object to that,

7 then --

8   JUDGE McGUIRE: Mr. Stone, do you have an

9 objection?

10   MR. STONE: The problem, Your Honor, is Mr.

11 Heye's attorney is with a firm that represents Hynix,

12 and I'm opposed to that firm in the private Hynix

13 litigation, and so because of that, I hate to put him in

14 a position where he has ethical constraints on what he

15 and his firm can do.

16   JUDGE McGUIRE: All right, let's make it very

17 clear.

18   MR. STONE: So I can't agree to it.

19   JUDGE McGUIRE: From here on out we're treating

20 anything that's being in camera, if it's not clear, then

21 the individuals who we're not sure about, they're going

22 to be excused. Just so there's -- if we're going to

23 err, it's going to be on the side of any caution.

24   MR. ROYALL: Yes, Your Honor, I perfectly

25 understand that and I obviously have no dispute with

1   their position on this.

2   JUDGE McGUIRE: Okay, so are we ready to go

3   then?

4   MR. ROYALL: Yes, Your Honor.

5   (The in camera testimony continued in Volume 19,

6   Part 2, Pages 3883 through 3923, then resumed as

7   follows:)

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1   AFTERNOON SESSION

2   (1:27 p.m.)

3   JUDGE McGUIRE: This hearing is now in order.

4   You may proceed at this time with your inquiry, Mr.

5   Royall.

6   MR. ROYALL: Thank you, Your Honor. Actually,

7   before I go any further, I think at this time I would

8   like to offer into evidence the exhibit that we dealt

9   with in camera, CX-1420.

10   JUDGE McGUIRE: Objection?

11   MR. STONE: No objection, it just needs to

12   remain in camera, Your Honor.

13   JUDGE McGUIRE: Right, so entered on that basis.

14   MR. ROYALL: Thank you.

15   (CX Exhibit Number 1420 was admitted into

16   evidence.)

17   FURTHER DIRECT EXAMINATION

18   BY MR. ROYALL:

19   Q. Mr. Heye, did you at some point in 2000 learn

20   that Rambus had commenced asserting patents against

21   memory manufacturers that were business partners of AMD?

22   A. Yes.

23   Q. And how did you learn of that?

24   A. Initially through reading it on the web.

25   Q. When you learned that Rambus was enforcing

1   patents relating to -- and just let's be clear about

2   this, we're talking about Rambus asserting patents

3   against memory manufacturers relating to SDRAM and DDR.

4   Is that right?

5   A. Yes.

6   Q. And when you learned that Rambus was seeking to

7   enforce or was enforcing patents against those memory

8   makers relating to SDRAM and DDR SDRAM memory, did that

9   cause you any concern from the standpoint of AMD's

10   business?

11   A. Yes.

12   Q. I would like, if we could, if you could explain

13   to me or identify for me what, if any, concerns you had

14   from the standpoint of AMD's business relating to Rambus

15   asserting patents against memory manufacturers, and if

16   you could, identify whatever concerns there were, and I

17   can come back and ask you about each separate concern.

18   A. Sure. So, again, to your point there are

19   multiple concerns. The overarching concern was time to

20   market. The second concern was a possible cost

21   disadvantage we might incur in the infrastructure due to

22   the incremental royalty fees.

23   Q. I'm sorry, you say cost disadvantage, what was

24   it you said after that?

25   A. Due to incremental royalty fees.

1   Q. Okay. Any other concerns that you had?

2   A. There was some discussion of possibly changing

3   the specification to work around some of the Rambus

4   patent claims.

5   Q. And when you refer to specification, are you

6   talking about the JEDEC DRAM standards?

7   A. Yes.

8   Q. SDRAM standards?

9   A. Yes.

10   Q. Okay.

11   A. And if that were to occur, that would introduce

12 just a whole host of problems which would have been a

13 major, major concern for AMD.

14   Q. And if I can follow up on that. Other than what

15 you've mentioned, time to market, cost disadvantage,

16 potential for changing the JEDEC specifications, and I

17 understand there's some more you have to say on that,

18 but are there other concerns that you had that you

19 wanted to identify that we could come back and talk

20 about?

21   A. No, because they would be covered as you go

22 through each bullet.

23   Q. Why don't we start actually with the last of the

24 issues that you identified. And again, what I'm asking

25 you about is what concerns did you personally have, if

1   any, and you have identified some concerns, relating to

2   the assertion by Rambus of patents against memory

3   manufacturers relating to SDRAM and DDR SDRAM, and you

4   mentioned that one of those concerns had to do with

5   potential changes in the JEDEC SDRAM standards. Is that

6   right?

7   A. Yes.

8   Q. And can you explain why that was a concern to

9   you, and again, if there are multiple issues and you

10   want to lay them out and identify them, I can come back

11   and ask you about them separately.

12   A. Sure. So, the concerns around that would have

13   been first, it would have taken time to establish the

14   new standards; depending upon what they were, you would

15   have had to change the memory component, the north

16   bridge, possibly both, you would possibly have to change

17   the motherboard. You may possibly have to change the

18   dim, once you've made all those changes, you would have

19   to implement them, of course, then you would have to

20   test -- well, you have to debug them, because again, now

21   you're talking about multiple vendors with multiple

22   different components. That would take time.

23   You would have to revalidate all those modified

24   DIMMs, and again, by DIMMs, I mean both the actual PCB

25   and the memory chips against the north bridge, and by

1   the way, that is a really big deal. We spent a lot of

2   time and effort trying to get that right in the first

3   go-round. And you certainly had potential inventory

4   issues. You had opportunity cost issues.

5   Q. Okay, if I can follow up on what you've said,

6   and if you think of something else, and you identify it

7   for me, I can ask you about that.

8   A. Sure.

9   Q. Now, before we go into these separate concerns,

10   let me ask you this: Were your concerns relating to

11   Rambus asserting patents against memory manufacturers in

12   the 2000 time period?

13   A. Yes.

14   Q. Were those concerns in any way related to AMD's

15   own plans in terms of marketing or launching

16   microprocessors in that time frame?

17   A. Yes. I mean, to the extent that we -- our

18   microprocessors are going to rely on DDR-based systems.

19   Absolutely, the K-7, to take full advantage of the K-7

20   capabilities, you needed to have high performing memory,

21   which DDR was the critical component for that.

22   Q. And I think you said earlier, but the K-7

23   microprocessor which was initially launched in '99 was

24   later -- a later version of the K-7 infrastructure that

25   is the system, virtual system supporting K-7 was

1   launched in did you say some time in 2000, or with DDR

2   memory?

3   A. Yes, the first DDR-based systems came out in

1   specification, and I know that given the relationships

2   the memory vendors have with one another, it's hard to

3   get a consensus of change, and while they may all agree

4   that changes are in the works, odds are against you that

5   it's going to be the same change and you have to try to

6   figure out which change they can all accept, and all of

7   that takes time, and time is something that you don't

8   have in this market.

9   Q.   One of the things you mentioned in your answer,

10   and I don't recall your exact words, but it had

11   something to do with given how the memory manufacturers,

12   did you say relate to one another?

13   A.   That's a good word.

14   Q.   And what do you mean by that?

15   A.   Well, they're extremely competitive, and, you

16   know, were -- for example, I'm making this up as I go

17   along, but there could be a -- they could make a

18   change -- a memory vendor could actually have a change

19   that would take let's say two weeks to implement, that

20   change might take ten weeks for the other guy, and vice

21   versa. You know, they may have change B that has a

22   reciprocal problem.

23   So, neither one of them will give ground,

24   because if they give ground to the other and give them a

25   competitive advantage, that's unacceptable to them. So,

1   the memory guys are very, very competitive. Time to the

2   market is very critical to them as it is to AMD and

3   Intel. They don't want to give up any potential

4   competitive edge to one another. It's an extremely

5   competitive market.

6   Q. Now, in terms of changing the JEDEC standards in

7   response to Rambus's patent claims were to take time,

8   and without specifying how much time that might take,

9   but to the extent that were to take some period of time

10   to do.

11   A. Yes.

12   Q. Would that in any way adversely affect your

13   company AMD?

14   A. Absolutely. And again, this is all supposition,

15   so the supposition path we're going down is, again, this

16   was happening in the middle of 2000. We were planning a

1   And one thing we thought of we took all the DDR

2 memory from all the different vendors and we took all

3 sorts of mixing and matching to make sure that all

4 combinations were going to work with our north bridge,

5 and that's a lot of work and a lot of dollars and we

6 were in the process of doing that.

7   And as soon as you change that standard, and I

8 don't know what, you know, because we use the word

9 change, it has to be material, otherwise no one is going

10 to know it's a change, that would impact some level of

11 that whole inertia.

12   Q. Now, let me ask you this: You mentioned earlier

13 that one of your concerns in terms of Rambus asserting

14 patent rights against memory manufacturers had to do

15 with something that you referred to as time to market.

16   A. Yes, sir.

17   Q. What did you mean by that?

18   A. Well, again, our plan was to launch DDR in the

19 fall time frame. At that time frame, at that point,

20 Intel was coming -- I don't know the exact time, but in

21 that time frame, which would be, you know, late 2000,

22 Intel was coming out with their Rambus part, and we knew

23 that that Rambus part with an Intel processor --

24   MR. STONE: Objection, Your Honor, I think this

25 goes beyond the question of what did you mean by that

1   when you said time to market. That was the question.

2   JUDGE McGUIRE: Sustained.

3   MR. ROYALL: Well, I understand, Your Honor --

4   JUDGE McGUIRE: If you want to restate another

5   question, I might let you do that, but he is clearly

6   beyond what the inquiry was.

7   THE WITNESS: I'm sorry.

8   BY MR. ROYALL:

9   Q. Let me ask, Mr. Heye, as best as you can, can

10   you explain to us what you mean by the term "time to

11   market" and just as precisely and clearly as you can

12   explain what you mean by that term.

13   A. Time to market just simply states how long it

14   takes you to get to market with a new product or

15   feature.

16   Q. I'm sorry, how long it takes?

17   A. How long it takes you to bring to market a new

18   product.

19   Q. Okay. Now, why is it that Rambus enforcing

20   patents against memory manufacturers in the 2000 time

21   period relating to DDR and SDRAM caused you to have

22   concerns about AMD's time to market with its

23   microprocessors?

24   A. In the time frame of interest, as I just stated,

25   you know, AMD had -- and the industry had a lot of

1   momentum and were finalizing -- actually finalizing the

2   manufacturing processes to bring us to production in

3   four or five months. Anything that would cause a slip

4   in any of those components would have thereby

5   necessitated that the overall system was going to slip

6   out in time. And thereby impacting our time to market.

7   Q. Okay. And so by that, are you saying that a

8   change in the DDR standard, for instance, JEDEC's DDR

9   standard could disrupt your efforts to release a new

10   version of K-7 supported by DDR memory in October 2000

11   as actually occurred?

12   A. Yes.

13   Q. And how -- do you have any estimate of how long

14   a change in the DDR standard might have delayed the

15   release of a K-7, a new version of K-7 that was

16   supported by a DDR-based infrastructure?

17   MR. STONE: Objection, lacks foundation, calls

18   for speculation.

19   JUDGE McGUIRE: Overruled.

20   BY MR. ROYALL:

21   Q. Thank you.

22   A. A matter of months. Let me give you a quick

23   data point. We typically state that if you change one

24   transistor in let's say a chipset, it's going to take

25   you four to six weeks to get that change to the market.

1   So, it doesn't matter what you're doing, because when

2   you change just one transistor, again, not trying to

3   figure out what the heck we're talking about in terms of

4   actual content, but to change anything, not only does it

5   require the design guys to change something, then you

6   have to generate on the silicon side, you go from there,

7   you develop a what they call a mass set, which is used

1   Q.   My next question, Mr. Heye, is focusing on the

2   infrastructure that you laid out for us earlier in DX --

3   I don't know if we said this on the record, but I marked

4   it as DX-30.

5   JUDGE McGUIRE: Right, DX-30, noted.

6   (DX Exhibit Number 30 was marked for

7   identification.)

8   BY MR. ROYALL:

9   Q.   If the DDR memory standard were to change.

10   A.   Yes.

11   Q.   What other parts of the infrastructure

12   supporting the K-7 microprocessor might also have had to

13   change in response to a change in the DDR memory

14   standard?

15   A.   Again, the north bridge may have to change, the

16   physical dim may have to change.

17   Q.   And the dim, again, you're referring to the

18   module, memory modules?

19   A.   The module that plugs into the motherboard. The

20   motherboard itself may have to change.

21   Q.   Anything else?

22   A.   Let's see, memory, chipset, dim, motherboard,

23   that's it.

24   Q.   What about the BIOS?

25   A.   It may have, it depends on the change, it may

1   have to change, that's a good point.

2   Q. I assume that all of this would depend on the

3   precise change?

4   A. The precise change, correct.

5   Q. Now, once those changes were made, would there

6   need to be any debugging process of the sort that you

7   described earlier?

8   A. Absolutely. You just can't -- yes. You would

9   have to debug it.

10   Q. What about the validation process you described

11   earlier?

12   A. You would have to revalidate the whole matrix.

13   Q. Based on your experience and your work at AMD

14   since 1997, do you have any understanding of what the

15   cost of validating a new -- or a revised infrastructure

16   are?

17   A. I would get out to the millions, because you in

18   all likelihood would have to procure a bunch of new

19   silicon, and then it really, it took us months to do the

20   entire check-out of every possible combination of

21   memory, and that's a huge concern.

22   Q. Now, you mentioned earlier when you listed or

23   itemized for me the possibility of the JEDEC standards

24   changing in response to Rambus's patent claims. One of

25   the things which you mentioned was inventory.

1   A. Yes.

2   Q. Can you explain what you meant by that?

3   A. Well, again, the time frame we're talking about,

4 again, if you recall it takes about three and a half to

5 four months from the time a manufacturer starts the

6 silicon to the time it hits production. So, if you want

7 to ship in October, that means you have to start

8 production wafers four months back, and four months from

9 October is June. So, starting eo7Bcs-D

1   Q. Can you explain what you meant in saying that

2   opportunity cost was one of the types of concerns that

3   you had?

4   A. Sure. As I discussed earlier, the change would

5   require a lot of engineers to get involved, and involved

6   in the changing of the JEDEC standard, and that would

7   bring no real value to the industry. They're changing

8   the standard not to make it better, they're changing the

9   standard to avoid litigation with Rambus. Those

10   engineers would actually do what I would consider

11   value-added work to actually improve performance and

12   provide features to the customers.

13   Q. Are you familiar with the term "backward

14   capability?"

15   A. Yes.

16   Q. Does the concept of backward capability, did

17   that have anything to do with the concerns that you had

18   about Rambus enforcing patents against DDR and SDRAM

19   memory?

20   A. Well, absolutely, yes.

21   Q. And can you explain the nature of that concern?

22   A. Well, in terms of SDRAM, there are literally

23   hundreds of millions of systems in the industry. I

24   mean, I -- Intel and AMD-based platforms, over 100

25   million were sold per year for multiple years had

1   synchronous DRAM in there. The expectation of the user

2   who buys that BC is that at some time in the future they

3   want to upgrade their memory, they can go buy some

4   PC-100 memory and plug it in. If you change that

5   standard, and that memory no longer works for your

6   existing PC, that's a problem.

7   Q. Now, are you finished?

8   A. I'm done, yes.

9   JUDGE McGUIRE: Yes.

10   BY MR. ROYALL:

11   Q. Now, one other thing that I wrote down that you

12   said earlier, in terms of concerns that you had in how

13   AMD could be impacted by a change in the DDR memory

14   standard in 2000 had to do with cost disadvantage. And

15   then you mentioned something about increased royalty

16   fees. Do you recall that?

17   A. Yes.

18   Q. Can you explain what you meant by that?

19   A. Well, again, it's just you're adding incremental

20   cost to your base -- to the commodity part. And

21   typically system vendors have a certain cost they're

22   going to pay for the hardware and if one component

23   commodity starts going up, they try to take the cost of

24   other components, like microprocessor pricing. So, you

25   know, the goal is to always maintain the lowest possible

1   cost structure of the system.

2   Q.   Are you saying that you had the concern with the

3   potential for Rambus to charge royalties and thereby

4   raise the cost of memory manufacturers?

5   A.   Memory manufacturers and also the chipset

6   manufacturers, because they were -- there's a double

7   taxation.

8   Q.   What do you mean by double taxation?

9   A.   It means you had to pay for the rights to the

10   Rambus on both ends of the bus, which means that the

11   chipset vendors had to pay more, had to pay the royalty,

12   and the microprocessor -- and the memory manufacturers

13   had to pay royalty. So, you had to pay royalties on

14   both sides.

15   Q.   And did your concerns about Rambus asserting

16   patents against DDR and SDRAM have anything to do with

17   AMD's competitive position compared to Intel?

18   A.   Yes.

19   Q.   And in what way was that a factor in your

20   thinking relating to this issue?

21   A.   Well, it gets back to time to market, anything

22   that impacts time to market would put it -- would mean

23   that Intel would come out before we did with a

24   competitive platform, which again would put us at a

25   competitive disadvantage vis-a-vis Intel and its

1   platforms.

2   Q.   Now, after you learned that Rambus was asserting

3   patents against memory manufacturers relating to SDRAM

4   and DDR SDRAM.

5   A.   Yes.

6   Q.   Did you at any point express the sorts of

7   concerns that you've testified about this afternoon

8   directly to the memory manufacturers that AMD worked

9   with?

10   A.   Yes.

11   Q.   When was that?

12   A.   Summer or fall time frame.

13   Q.   Of 2000?

14   A.   2000, I don't remember the exact time.

15   Q.   And did you meet collectively with memory

16   manufacturers to talk about this issue?

17   A.   No.

18   Q.   You met individually with memory manufacturers?

19   A.   Yes.

20   Q.   Which ones?

21   A.   Elpida, Samsung, Infineon, those were the three

22   that I personally talked to.

23   Q.   And you expressed concerns about the way in

24   which changes to the DDR or SDRAM standards could impact

25   AMD. Is that your testimony?

1   A. Yes.

2   Q. Did you ask these memory manufacturers to do

3 anything or did you encourage them to do anything

4 relating to this issue?

5   A. Well, my number one concern was to make sure

6 that they maintained -- I'm trying to form it -- I

7 wanted to make sure that in October of 2000 there would

8 be a supply of memories in the market, and I went around

9 to find out from an AMD perspective that we were going

10 to do the AMD chipset that worked with DDR, we were

11 still working with motherboard vendors to do DDR-based

12 motherboards and it was my expectation that there would

13 be a viable infrastructure for DDR in the fall of 2000.

14 And I wanted them to participate in that infrastructure.

15   Q. Now, as we've been discussing these various

16 concerns, we've been primarily focused on DDR, what

17 about SDRAM, I don't mean to go back over the whole

18 territory, but did you have concerns also about the

19 potential for Rambus's patent claims to result in

20 changes to the SDRAM standard as opposed to DDR?

21   A. Yes.

22   Q. And did those concerns differ in any way from

23 the concerns you had about potential changes in the DDR

24 standard?

25   A. Yes.

1   Q.   How did they differ?

2   A.   PC-100 was in existence, it was -- it was a huge

3   installed base. There was a huge -- the infrastructure

4   was alive, well, and established. The DDR

5   infrastructure was in its infancy, it was just

6   beginning, it hadn't been established in the

7   marketplace, and the concern I had was that this could

8   be a defocusing activity to actually establish DDR in

9   the marketplace.

10   Q.   How many microprocessors does AMD, in terms of

11   current numbers, manufacture and sell today, if you

12   know?

13   A.   Roughly seven and a half to eight million

14   microprocessors per quarter.

15   Q.   Seven and a half to eight million per quarter?

16   A.   Yes.

17   Q.   Do you know what percentage of those seven and a

18   half to eight million AMD microprocessors today use the

19   DDR standard established by JEDEC?

20   A.   100 percent.

21   Q.   If the JEDEC standard for DDR were to change

22   today, would that have any impact on AMD, or do you have

23   any concerns that it might have an impact on AMD?

24   A.   It would have a very big impact on the whole PC

25   industry, including AMD, yes.

1   Q.   And how would that compare, if you have any

2   views on this, to the nature of the impact that there

3   would have been on AMD had the DDR standard been changed

4   in 2000?

5   A.   Now it's more the conversation of the PC-100

6   spec, because Intel right now has also adopted DDR as

7   its preferable memory choice, so again, you have the

8   vast majority of all PCs sold in the world today use DDR

9   as its memory, and now you do have a huge installed

10   base, now discussions of backwards capability come into

1   rigorous and test the whole microprocessor in case you

2   made a mistake. So, it would take a lot of time and

3   effort. It would cause a disruption for K-8.

4   MR. ROYALL: Your Honor, I don't have any

5   further questions at this time.

6   JUDGE McGUIRE: All right, thank you, Mr.

7   Royall. You may cross examine, Mr. Stone.

8   MR. STONE: Thank you, Your Honor.

9   CROSS EXAMINATION

10   BY MR. STONE:

11   Q. Good afternoon, Mr. Heye.

12   A. Good afternoon.

13   Q. Earlier when we were in the in camera session, I

14   asked a couple of foundation questions that I said that

15   I would come back to and put on the record when we

16   weren't in camera.

17   A. Yes, sir.

18   Q. The first one was the license agreement between

19   Rambus and AMD, you signed that document, didn't you?

20   A. Yes, sir.

21   Q. And you had a meeting, I think you testified

22   before we went into the in camera session, with Rambus

23   representatives in April of 2000?

24   A. Yes.

25   Q. And it was shortly prior to that meeting that

1   you notified Rambus that AMD had made the decision to

2   use DDR, correct?

3   A. It was --

4   MR. ROYALL: Your Honor, I don't know that

5   there's foundation for that question.

6   MR. STONE: Your Honor, I --

7   JUDGE McGUIRE: Overruled. Go ahead.

8   BY MR. STONE:

9   Q. Do you have the question in mind, Mr. Heye?

10   A. Yeah. I'm not sure about the word shortly, but

11 we had informed Rambus, I don't know exactly the time

12 frame relative to when.

13   Q. Within a few months prior to that meeting?

14   A. Months, yes.

15   Q. And as soon as you -- within a few months, then,

16 after you told Rambus that you were going to use DDR

17 instead of RDRAM, Rambus came to you and said, well, we

18 think that would infringe on some of our patents, didn't

19 they?

20   A. Yes.

21   Q. When you made the decision to go to DDR, that

22 was some time in the fall or summer of 1998, correct?

23   A. Yes.

24   Q. And you met with Mr. Sanders at that time?

25   A. Yes.

1   Q.   And he was the CEO?

2   A.   Yes.

3   Q.   And the two of you made a decision in the summer

4   or fall of 1998 to go to DDR and not use RDRAM, correct?

5   A.   Correct.

6   Q.   And you waited a year and a half or so to tell

7   Rambus of that decision, correct?

8   A.   I -- I'm not sure of the question, I did say

9   months, but here's what I do not remember. I do not

10   remember precisely when I told Rambus of our decision to

11   go to DDR. It had to be -- they would have known about

12   that decision as soon as we transitioned from doing the

13   north bridge for supporting Rambus to DDR, so they would

14   have to know within months of me making that decision

15   that we were changing our minds, because we would

16   have -- so, after going through the time line with you

17   right now, you're correct, I told Rambus within a couple

18   of months, it had to be within a couple of months of

19   that decision that we were going DDR, because of the

20   engineer effort.

21   Q.   I'm not sure that now I understand. I want to

22   make sure we're clear on this.

23   A.   Yeah.

24   Q.   You told me earlier that it was some time within

25   a few months of your meeting in April of 2000 that you

1   told Rambus that you were going to go to DDR and Rambus

2   then came to you and said that the use of DDR infringes

3   on our patents.

4   A. I misspoke.

5   Q. So, you're now telling me that you told Rambus

6   much earlier than that?

7   A. I'm telling you that -- and I'm hesitant to give

8   you months, because I'm not clear. I can tell you in

9   terms of sequence of events. Upon making the decision

10   to go to DDR, we transitioned the team from doing a

11   Rambus-based north bridge to a DDR-based north bridge.

12   That event would have triggered us telling Rambus of

13   that decision, because at that point, you know, they're

14   meeting with the engineering team quite a bit. Those

15   meetings terminated.

16   Q. Well, didn't you have two separate teams?

17   Didn't you have one team working on the DDR north bridge

18   and one team working on the Rambus north bridge?

19   A. We had -- we had one team working on -- we

20   had -- we kept on going with the test chip for Rambus to

21   keep on -- we kept on going on the technology thing just

22   quite frankly the test chip -- I'm hesitant -- what I'm

23   hesitating on is the term "design team." We had a

24   full-fledged design team for the north bridge for DDR.

25   We had some design engineers working -- if you recall I

1   said the first thing we were doing was a test chip for

2   Rambus. That test chip team didn't disappear when we

3   started focusing on the north bridge activity on DDR.

4   We spent some time on that test chip. Now, I have to be

5   honest with you, I don't remember exactly what we

6   terminated that test chip activity.

7   Q. But it was not until after you terminated the

8   test chip activity that you told Rambus of your

9   decision, right?

10   A. I don't remember. I honestly don't. I'm sorry,

11   I don't remember.

12   Q. Let me make sure if I can get one date accurate.

13   A. Sure.

14   Q. You did make the decision to go from Rambus to

15   DDR in the summer of 1998?

16   A. Yes.

17   Q. And Rambus came to you some of time after you

18   notifying them of your decision in April of 2000 and

19htmFron in Aprithat you tol-pT   t,t onnfrur ur , c   ec   10

17   Q. 2ou did make the dc uour tobackf ti1998 you somhat, c

1   Q. You could negotiate a license with Rambus,

2 correct?

3   A. Yes.

4   Q. And you could go to the memory manufacturers and

5 see if they thought it was going to be a problem?

6 Right?

7   A. I could go and see if what was a problem, I'm

8 sorry?

9   Q. To see if the fact of the use of DDR might

10 infringe on Rambus patents was going to be a problem.

11   A. Yes.

12   Q. And so the first thing you did was you went and

13 met with three memory manufacturers yourself, correct?

14   A. The first thing I did, as opposed to the other

15 two?

16   Q. Yeah, you didn't try to negotiate a license

17 agreement with Rambus, did you?

18   A. For DDR, no, I did not.

19   Q. And you didn't switch back to the RDRAM.

20   A. So then we did a -- right, so we -- correct, I

21 went around to the memory vendors, that's right.

22   Q. And you went and met with Elpida.

23   A. Yes.

24   Q. And Samsung?

25   A. Yes.

1   Q. And Infineon?

2   A. Yes.

3   Q. And in the course of those meetings, did Elpida

4   tell you that they had a license from Rambus for DDR so

5   there weren't any problems, they would manufacture DDR

6   as long as you wanted it?

7   A. No, my -- my recollection of the timing of that

8   meeting was that Elpida was considering, although had

9   not decided, at that moment in time, if they were going

10 to sign a license agreement for getting the DDR IP.

11   Q. And they later did, correct?

12   A. They later did, yes.

13   Q. And you were pleased when they signed the

14 license agreement?

15   A. I was ambivalent.

16   Q. Okay. And what did Samsung tell you? Did they

17 tell you that they had signed a license agreement?

18   A. No, at the time, they hadn't signed it either.

19   Q. But they told you they expected to?

20   A. They didn't tell me that either. They said they

21 were considering it.

22   Q. And they ultimately did sign?

23   A. Correct.

24   Q. And Infineon, to your knowledge, did not sign,

25 correct?

1   A. At the time we talked to Infineon, they said

2 they disagreed with some of the IP claims and they were

3 going to challenge them in court.

4   Q. And Infineon told you that they thought the

5 patents were invalid, didn't they?

6   A. I'm not sure they used those words. Again, I

7 don't recall the specifics of the conversation. The

8 specifics I take away was they haa4(r   n't

4   Q10 And Infineon to nAa9jfs1 wi court.

1   MR. ROYALL: Do you have a copy?

2   MR. STONE: I do not, because it was not scanned

3   by complaint counsel when they gave it to us, so all I

4   can do is show it on the ELMO.

5   MR. ROYALL: This is, I take it, not on the

6   exhibit list?

7   MR. STONE: It's on complaint counsel's exhibit

8   list, CX-2164.

9   BY MR. STONE:

10   Q. Do you recognize the cover of this as the AMD

11   annual report for 2001?

12   A. Actually, the picture I'm seeing it looks like

13   an annual report cover, I can't see, you're on it, so I

14   can't really say that it's on 2001.

15   Q. Let me zoom down on the year and show you.

16   JUDGE McGUIRE: Be careful there, Mr. Stone.

17   THE WITNESS: Yes, it says Annual Report 2000,

18   so I'm sure that's it, yes.

19   BY MR. STONE:

20   Q. Let me go back, I want to turn you to one

21   provision of this, the one I've labeled with patents,

22   and you'll see, I'm going to give you my hard copy.

23   A. Thank you.

24   Q. But I just want to show you where it is on this,

25   so we all have it, it's page 23 of the document.

1   A.   Right.

2   Q.   And it starts in the lower, left-hand column,

3   "We may not be able to adequately protect our technology

4   or other intellectual property in the United States and

5   abroad through patents, copyrights, trade secrets,

6   trademarks and other measures." Do you see that?

7   A.   Yes, sir.

8   Q.   And then on the carry-on up here, it says, what

9   I want to direct your attention to, is the paragraph

10   that begins, "From tims   amrrneitci inreadns, "From

1   tims   amrr we havet bhen noified thatwWe may be

2   infrinegigr intellectual propertyyright ofd othesQ. Ife

3   any such claimks rbe sspered agagint uys, We may seks

4   btagi a license undher thethirde paty'sr intellectual

5   propertyyrightQ. Whe cn not sssuro you thatalal

6   necessary licensese cny be btagied ionsatisfactorgy

1 7   termys,if hatalaQ. Whe ould deciade in thealternatives

8   ureornt tolitigantion t chalaenge such claimkQ. Such

9   chalaengese ould beextremtelyexpensives andamrr

210   consumgig, hand culd havetae mteriualadvhesbeefftect n

2 1   utQ. Whe cn not sssuro you thatlitigantionrelared   ahr

2 2   inntellectual propertyyright ofduks and othes wilal

2 3   alwsayt be voiadd orsuccessfulelyconcluaddnei
                    F owThloRf,coMrad,ylamed
24   Do you see tha languaget?

257   A.   Yer.

```
1          Q.  Now, did you in 2000 --

2               JUDGE McGUIRE:  You may approach, Mr. Stone.

3               MR. STONE:  I'm sorry, Your Honor.

4               I just wanted to let you see in case you wanted

5      to see the language.

6               THE WITNESS:  Thank you.

7               BY MR. STONE:

8          Q.  If it helps you.  Did you in April of 2000 or

9      thereafter seek to obtain a license from Rambus for any

10     of its intellectual property in the event that anything

11     AMD was doing might infringe on Rambus's patents?

12              MR. ROYALL:  Could I ask for clarification

13     whether this is a question as to what AMD did as opposed

14     to what Mr. Heye individually did?

15              MR. STONE:  Yes, it is about what AMD did.
```

1 against AMD, AMD was going to litigate?

2   A. I don't know.

3   Q. Did you make a decision one way or the other to

4 either seek a license or choose to litigate?

5   A. No.

6   Q. What decision, if any, did you make after Rambus

7 notified you about their patents?

8   A. I mean, our counsel, you know, our lawyers were

9 given those patent numbers and were looking into it, and

10 then after that, that was on the part of our general

11 counsel office.

12   MR. ROYALL: Your Honor, I would just caution

13 the witness to be careful about privileged issues.

14   MR. STONE: I am glad that he is represented by

15 his own lawyer and Mr. Royall to caution him.

16   MR. ROYALL: Your Honor, I would ask that that

17 statement be stricken from the record, and I do not

18 appreciate those type of statements.

19   MR. STONE: Your Honor, I am not seeking

20 anything that's attorney/client from this witness.

1   AMD might be infringing on Rambus's patents.

2   A.   Yes, sir.

3   Q.   Did AMD suffer any adverse economic

4   consequences?

5   MR. ROYALL: I object as vague and ambiguous as

6   to whether these are consequences relating to that or

7   something else.

1   Q. When the K-7 was introduced, it was introducing

2   SDRAM, am I right?

3   A. The initial chipset that supported Athlon was

4   SDRAM-based, yes, sir.

5   Q. And it was a PC-100?

6   A. PC-100, that's correct.

7   Q. And then later you switched from the use of a

8   PC-100 to DDR, correct?

9   A. That's correct.

10   MR. ROYALL: Your Honor, I believe that

11   misstates the record, I believe the witness testified

12   earlier today that there was PC-133.

13   MR. STONE: Whatever the witness thinks is the

14   truth is what I would like.

15   MR. ROYALL: Well, I object, it misstates the

16   record.

17   JUDGE McGUIRE: Well, if it misstates the

18   record, restate.

19   MR. STONE: I don't know whether it does.

20   JUDGE McGUIRE: Well, we can ask Mr. Heye

21   whether he can so indicate and whether that was your

22   true and accurate testimony on that point.

23   BY MR. STONE:

24   Q. Let me do it this way, Mr. Heye.

25   A. Sure.

1   Q.   When the K-7 was introduced, it used SDRAM?

2   A.   Let me refresh my memory, when you're referring

3   to it as opposed to the K-7, that's a misnomer, if you

4   go back to the chart, the very first systems that

5   supported K-7 were based off PC-100 memory, yes, that's

6   correct.

7   Q.   And who designed the memory system that was used

8   with the K-7?

9   A.   The first north bridge for K-7 was by AMD and

10   that was PC-100 based, that's correct.

11   Q.   And who designed the second north bridge?

12   A.   The second north bridge came from a company

13   called VIA and that supported both PC-100 and PC-133.

14   Q.   And who designed the third north bridge?

15   A.   Either ALI or SiS, I don't know which one.

16   Capital S, smrte randnietal 3.

7   Q.   m, I correcd that theonlyd north bridge that was

8   designed by AMD for us with the K-t was designed or us

9   PC-10e?

205   A. Noat theonlyt, the firs3.

211   Q. Okayt, the firs,A and then yo lather designed

212   anoither one?

235   A. Yes3.

214   Q.   And when was thae?

252   A.   That was the--7 w launchend thatptroduts i 6

1   October of 2000 and that was the north bridge that

2   supported DDR memory.

3   Q. Okay. So, the first north bridge designed by

Atoberatjcoveay y.croingberrst nortingbupj   3.033767

1   through the time it's introduced into the market?

2   A.   Yes, through the design, yes.

3   Q.   And the next one that was designed by AMD for

4   use on the K-7 with the DDR north bridge was started

5   when?

6   A.   In the '98 time frame.

7   Q.   Oknf'

1   A.   That is correct.

2   Q.   And when you switched from the design for a

3   PC-100 compatible north bridge to the design for a

4   DDR-compatible north bridge, you had to switch some

5   things other than just the north bridge, didn't you?

6   A.   From a system point of view?

7   Q.   Yes.

8   A.   Oh, absolutely, yes.

9   Q.   So, you undertook to change the motherboard?

10   A.   Yes.

11   Q.   And what else did you change?

12   A.   Again, I just want to caution, when you say you

13   changed, I would like to say, the changes that were

14   required to implement the infrastructure, which is

15   different than Rich Heye or AMD changing, but the

16   memory, obviously the DDR memory is different from

17   PC-100 memory, so the memory vendors had to have

18   different memory. The dim standard is different for

19   synchronous DRAM versus DDR, the motherboard is

20   different and the north bridge is different. So, those

21   all had to change and we facilitated that as opposed to

22   actually doing.

23   Q.   Now, when the change was made in the north

24   bridge used with the K-7 to go from a PC-100 compatible

25   product to a PC-133 compatible product, which you said

1   was done by VIA.

2   A.   Yes.

3   Q.   What changes were necessitated by that?

4   A.   The VIA chipset required a different

5   motherboard. That is the same -- the dim structure and

6   the sockets were the same for PC-100 and PC-133.

7   Q.   So, a new north bridge and a new motherboard?

8   A.   Correct.

9   Q.   One of the things you told us -- may I approach,

10   Your Honor?

11   JUDGE McGUIRE: Yes.

12   BY MR. STONE:

13   Q.   One of the things you talked about with Mr.

14   Royall was whether the BIOS had to change. Do you

15   recall that?

16   A.   Yes, I did.

17   Q.   Did the BIOS change when VIA designed the

18   PC-133-compatible north bridge?

19   A.   The BIOS had to change with the VIA chipset,

20   that's correct.

21   Q.   And did the BIOS change again when AMD designed

22   the DDR-compatible north bridge?

23   A.   Yes.

24   Q.   And you told us earlier today, I think, that

25   BIOS stands for binary input output software, correct?

1   you. It's to enable these connectors, that's right.

2   Q. And the PCI Bus that you persuaded Apple to use,

3   you told us you had to get management approval at Apple

4   to do that.

5   A. Yes, sir.

6   Q. Because Apple was in the process of making a big

7   change while you were there from doing everything on an

8   Apple proprietary system to trying to become more PC

9   compatible, correct?

10   A. No. No, what I said was, I didn't say that at

11   all.

12   Q. No, I didn't say you said that, I said while you

13   were at Apple, Apple was in the process of making the

14   change from relying on Apple proprietary systems to more

15   PC compatible systems.

16   A. No, I didn't say PC compatible, what I would say

17   is that Apple was on its peripheral card strategy, was

18   adopting the same interconnect as the PC industry so it

19   could leverage the PC -- the PC infrastructure for its

20   I/O cards. The Mac is not very PC-centric.

21   Q. And it was trying to make the peripherals a part

22   of that product more PC compatible. Is that a fair

23   statement with which you could agree?

24   A. Yeah, the way I would phrase it is that, like I

25   said before, the way I would phrase it, I guess we can

1   A. It was important to me at the time that the PCI

2   Bus was part of an open standards body.

3   Q. And it was important to you at the time that you

4   would also have inneroperability for a lot of products

5   with that bus, correct?

6   A. That's correct.

7   Q. And when you went to get management approval at

8   Apple, who did you go?

9   A. A gentleman by the name of Eric Haslem

10   [phonetic].

11   Q. And was that as high as you had to go? Did you

12   have to go to -- was Mr. Skully in charge of Apple at

13   the time?

14   A. Yes, Mr. Skully was in charge of the company,

15   and I never personally talked to Skully about that

16   decision. Whether Eric Haslem did or not, I have no

17   knowledge.

18   Q. You described earlier the PCI consortium as

19   something that you wanted to be part of the inner

20   sanctum. Do you recall that?

21   A. Yes, sir.

22   Q. And your concern during the time you were at

23   Apple was that if you weren't part of that consortium

24   that the group might do things that were contrary to

25   your competitive interests, correct?

1   A. Yes.

2   Q. One of the things that you were afraid was that

3   they would know things about the design or specification

4   before you would?

5   A. Yes.

6   Q. And when you agreed with Rambus to license the

7   Rambus technology, did you get access to all of that

8   technology?

9   A. Define "all that technology," please.

10   Q. If I can approach.

11   JUDGE McGUIRE: Yes.

12   BY MR. STONE:

13   Q. You told us earlier that Rambus gave you what

14   you needed to plug into the north bridge design so that

15   the interface with the Rambus DRAM would work, correct?

16   A. Yes.

17   Q. And they provided you with that technology,

18   correct?

19   A. Yes.

20   Q. In the form of essentially drawings or a

21   computer data that could be used in the design, right?

22   A. Yes.

23   Q. And you also understood that that information

24   had been made available to Intel, correct?

25   A. Yes.

1   Q.   And between AMD and Intel, that accounts for,

2   what, 90 percent of the microprocessor market?

3   A.   Yes.

4   Q.   So, did you understand at the time that the two

5   players in the microprocessor market both had access to

6   the Rambus technology that they needed to design north

7   bridge portions of the chipset to work with the RDRAM

8   product?

9   A.   I understood that Intel -- actually, I didn't

10 know that Intel had, I made that -- Rambus would not

11 tell me precisely what was given to Intel, so it's hard

12 for me to tell you what Intel had, and the concern that

13 I had was always that Intel had more than I did.

14   Q.   You were concerned that Intel might have more

15 than you and you were concerned that Intel might somehow

16 be paying less for it than you were?

17   A.   Yes, sir.

18   Q.   And the concern that Intel might be getting a

19 competitive advantage over you was a big worry?

20   A.   It was a worry, yes.

21   Q.   And one of the reasons you wanted to go out and

22 support what you called Team DDR was that you wanted to

23 have a product where you were part of the inner sanctum?

24 Correct?

25   A.   No, the real reason I went with DDR, quite

1   manufacturers would show the level of detail and

2   specificity of their roadmaps that they shared with me

3   to the general public. All had roadmaps on the web pages

4   so of course the roadmap is out there in the public

5   domain, but the level of detail that they were sharing

6   with AMD was greater than the public statements.

7   Q.   And you didn't think that the DRAM manufacturers

8   would get together and share cost information either,

9   did you?

10   A.   Again, it's all the level and degree. I knew

11   that there were manufacturers -- it's all degree. First

12   of all, I have no idea what DRAM manufacturers' state of

13   mind are, so that's the short answer, I just don't know.

14   Q.   And earlier when you told us that you understood

15   that the memory manufacturers were competing with each

16   other, you don't know whether or not the memory

17   manufacturers, in fact, have agreed on certain things,

18   do you?

19   MR. ROYALL: Your Honor, I object to this on

20   relevance grounds. The witness had mentioned something

21   about why he chose to meet with memory manufacturers on

22   an individual basis, he did not get into the sorts of

23   issues that Mr. Stone is now attempting to probe in his

24   cross examination.

25   JUDGE McGUIRE: Mr. Stone, response?

1   MR. STONE: Yes, Your Honor. The witness has

2   said that he views the market as competitive. He has no

3   foundation or basis for saying that. I want to bring

4   out that he doesn't know whether they're competing or

5   whether they're conspiring. I don't expect that he

6   knows either way, but his testimony shouldn't stand that

7   he uses them --

8   JUDGE McGUIRE: Overruled, Mr. Royall, I will

9   hear the question.

10   THE WITNESS: I'm sorry.

11   BY MR. STONE:

12   Q. Do you have the question in mind?

13   A. Please rephrase it, please.

14   Q. Let me see if I can ask it this way: You don't

15   know, do you, Mr. Heye, whether memory manufacturers

16   have gotten together and agreed on anything that might

17   impact the sale of memory products one way or the other?

18   A. That's correct, I don't know first hand that to

19   be true.

20   Q.   Was there a K-7 product or an Athlon product

21   known as the XP?

22   A. Yes.

23   Q. And what was distinguished that from other

24   Athlon products?

25   A. Let's see, the XP had -- I believe that's when

1   we first came out with 333 megahertz front side bus, I

2   think that's the most distinguishing factor. It had a

3   333 front side bus -- I mean, one of the biggest

4   differences on the XP was that it is a first-time we

5   changed our nomenclature from megahertz to model

6   numbers, so that was the way we -- that was the way we

7   measured our performance change in the XP.

8   Q.   And what memory would the Athlon Xp port with?

9   A.   DDR.

10   Q.   And was that a chipset designed by AMD?

11   A.   When XP came out, there were chipsets from AMD,

12   VIA, I think SiS and I believe nVidia at that time, all

13   had DDR memory. I'm not sure about nVidia, they have

14   memory today, I'm not sure when that came out.

15   Q.   The RDRAM product that you signed the license

16   agreement with Rambus to license their technology, you

17   knew at the time that that was not standardized by

18   JEDEC, ceprtRolobggensXp port co thaupway we -- thss2hnosTi chip

1   A. Yes, sir.

2   Q. And you knew at the time that you were at Apple

3 that much of the Apple system was proprietary to Apple

4 and not standardized by JEDEC, right?

5   A. Absolutely.

6   Q. And the microprocessor that is designed by AMD

7 today, it's proprietary to AMD, isn't it?

8   A. Yes.

9   Q. It's not standardized by anyone?

10   A. It's proprietary.

11   Q. And it's covered by AMD patents?

12   A. And a cross patent license, yes, and a cross

13 patent license.

14   Q. And if Intel, for example, tried to come out

15 with an identical version of the microprocessor that AMD

16 is selling today, that is something that you would think

17 they are not entitled to?

18   A. That gets down to the fact that we have a cross

19 patent license with Intel and I am not an expert on that

20 license, so I am the wrong person to have on the stand

21 with respect to that question.

22   Q. I'm not going to push that if you don't know the

23 answer. You told us earlier that the reason why you

24 switched from producing Intel compatible

25 microprocessors, correct?

1   A.   We have to be real clear on the English on that

2   one.

3   Q.   If I can go back and if I can approach and just

4   point you to this.

5   JUDGE McGUIRE: Yes.

6   BY MR. STONE:

7   Q.   I think when we were talking on Mr. Royall's

8   examination of you about the K-6 as a product that was

9   or was not one that could be just put into a motherboard

10   in place of an Intel microprocessor.

11   A.   That's correct.

12   Q.   It could be?

13   A.   The K-6 could be.

14   Q.   Okay. And so what I'm saying, I'm probably

15   using the words compatible the wrong way.

16   A.   Yes, you're making that -- again, the K-7 front

17   side bus was not compatible with the Intel front side

18   bus at the time, whereas the K-6 was, correct.

19   Q.   And the reason AMD moved to the use of a front

20   side bus that was not compatible at Intel, was because

21   of patent litigation and other intellectual property

22   litigation with Intel, correct?

23   MR. ROYALL: Objection, Your Honor, I believe

24   this misstates the witness' prior testimony and there's

25   no foundation for it.

```
 1            BY MR. STONE:

 2       Q.  Sure, let me -- I don't mean to misstate, let me

 3   just ask.  Why was it, to your knowledge, if you know,

 4   that when AMD went from the K-6 to the K-7, they went to

 5   a front side bus which was not compatible with Intel's?

 6       A.  It had to do with our cross patent license.  I'm

 7   not sure there was any litigation involved.  I mean, we

 8   had a -- it was a license negotiation and part of that

 9   negotiation was that the requirement was that we could

10 was aD0wsn2o  aDudsenN  9    negotit   10 nh our

 1  mi crN  9    negotit  Grmt8te  7    not   not   not   notthadrcOk
```

1   A.   Chipset, no.

2   Q.   Motherboard?

3   A.   The motherboard, that's true.

4   Q.   Let me show you, if I can, a couple of documents

5   on the ADT issue that you were asked about earlier.

6   May I approach, Your Honor?

7   JUDGE McGUIRE: Yes.

8   BY MR. STONE:

9   Q.   Let me show you RX-1879.

10   A.   Thank you.

11   Q.   And if you can bring up whatever you can of the

12   header part of this. Do you see at the top that this is

13   a email that bears the date of August 17th, 2001 and

14   it's addressed to Levi Murray and Richard Heye?

15   A.   Yes, sir.

16   Q.   And Levi Murray is someone who works with you,

17   correct?

18   A.   Yes, sir.

19   Q.   And who is it from?

20   A.   Quddus Mian.

21   Q.   I was hoping that you could pronounce it and I

22   could avoid it.

23   A.   No.

24   Q.   Mian Quddus?

25   A.   I'll take your word for it.

                    For The Record, Inc.
                     Waldorf, Maryland
                      (301) 870-8025

1   Q.   What I want to direct your attention to is it

2   refers down below, if we can go back to the document,

3   there's a heading, Attendees.

4   A.   Yes.

5   Q.   And it shows, Attendees, AMD, Richard Heye, Levi

6   Murray and Samsung, that's what SSI stands for, right,

7   Samsung?

8   A.   Yes.

9   Q.   Dieter Mackiewicz and Mian Quddus.   Anyway, we

10   see the names.

11   A.   Sure, I see the names.

12   Q.   And right under the summary, if you could go to

13   the summary and just pull up that first paragraph under

14   summary.   It reports in this email that "Richard Heye

15   stated that AMD has about 25 percent of the CPU market

16   and their target is to be approximately 30 percent

17   soon."   Is that a correct statement of what you would

18   have said or did say about AMD's market share in August

19   of 2001?

20   A.   Yes.

21   Q.   And then help me just reconcile that with the

22   numbers you gave us earlier that AMD's market share I

23   think you told us earlier was over desktops and mobile

24   about 17 percent.

25   A.   Right.   So, my comments would have been in

1   reference to desktop, although they didn't capture the

2   desktop in their summary. And the only thing, too, was

3   I was being a bit bullish, AMD can get about as high as

4   20 percent desktop and it has gotten down to about 15

5   percent now. So, I was being somewhat rounded to 25

6   percent. I wasn't sworn to -- I was being a bit

1   A.   Absolutely.

2   Q.   And that's why you made a strong effort to get

3   into ADT as a developer, right?

4   A.   Yes.

5   Q.   And you wanted to -- they finally let you on the

6   board, did they, or not?

7   A.   No. Never did.

8   Q.   Never let you in?

9   A.   No.

10   Q.   One other document I want to show you with

11   respect to ADT, if I can, and this is RX-2106.

12   May I approach, Your Honor?

13   JUDGE McGUIRE: You may.

14   BY MR. STONE:

15   Q.   And you'll notice this document talks about an

16   ADT meeting with Intel, and it shows certain attendees

17   and not you. Do you see that?

18   A.   Yes.

19   MR. ROYALL: Well, Your Honor, if I can

20   interject, I would ask that Mr. Stone, before he asks

21   any questions about this, establish a foundation that

22   this witness has seen this document before. Otherwise,

23   I don't think it's appropriate to be asked about it

24   along the lines of what I understand the questions have

25   been recently.

1   JUDGE McGUIRE: Lay a foundation, Mr. Stone.

2   BY MR. STONE:

3   Q. I will, Your Honor.

4   And you'll notice that it's addressed to

5 distribution.

6   A. Yes.

7   Q. But there's no distribution list attached to

8 this document.

9   A. Yes.

10   Q. At least I couldn't find one. Is this a

11 document that in the ordinary course at AMD you would

12 have seen?

13   A. Well, I've got to read it a little more. I

14 mean, in general, Levi had gone to dozens and dozens of

15 meetings that I didn't always get the minutes.

16 Depending upon the comment and what they wanted me to

17 see, they could have sent it to me. Let's put it this

18 way: I don't have a recollection of reading this

19 document. I'm not saying I never got it, I just don't

20 remember reading it. So, I would have to make a

1   thing.

2   Q.   Sure, whatever time you need.

3   A.   Can I ask who sent this memo? There's no from

4   either.

5   Q.   I don't know. It was produced to us by AMD.

6   You'll notice the AMD-0137 number.

7   A.   Yes.

8   Q.   But I can't tell you beyond that.

9   A.   Okay.

10   Q.   Is that jogging your recollection at all, Mr.

11   Heye?

12   A.   Well, let me get back, to answer your question

13   is this something that they would have sent me, this is

14   a -- I'll give it a 50/50, something they could have

15   sent me. Something out of the -- it's not so mundane

16   where if they sent it to me -- it's not something so

17   mundane that would be sent to a vice president. At this

18   level ADT stuff, they may have sent it to me,

19   absolutely.

20   Q.   But you don't have any recollection one way or

21   the other?

22   A.   I certainly have read documents about ADT, so it

23   certainly may be a document that I have seen.

24   Q.   Independent of this document, let me ask you a

25   couple of questions.

1   A.   Sure.

2   Q.   Was it your understanding that if -- that if AMD

3 was not permitted to join ADT.

1   my knowledge, and in fact he mentions here, that, you

2   know, royalties was not part of ADT, that ADT was

3   explicitly trying to get around the royalty of the

4   Rambus patent. So, I can read that if you give me just

5   one second. It said, i.e. did not like the Rambus

6   model.

7   Q. Right.

8   A. So, royalty wasn't an issue, it was time to

9   market.

10   Q. Let me ask you if you would to just look to see

11   if it jogs your recollection, at the bottom of page 3,

12   question number 10, and the top of page 4, answer number

13   10. You'll see where it says, "Royalty bearing, license

14   to AMD versus non-royalty bearing (AMD's license) uneven

15   treatment of IP." And then the answer, on the top of

16   page 4, "Participants agree to license their technology,

17   blocking IP at no charge. Developers won't pay

18   royalties, participants could pay royalties if not

19   cross-licensed with other developers (DRAM vendors)."

20   Does that at all refresh your recollection or

21   your understanding that one of the things that you were

22   trying to avoid that just being a participant in ADT

23   could pay royalties?

24   A. Yes, they wanted us to be a developer is my

25   recollection, so participants, you know, for those who

1   don't have the document in front of them, board of

2   directors is the highest level, developers is the second

3   ring down and participants was the third ring down. You

4   know, we had actually been asked to join the developer

5   level, so my expectation was that in the absolute worst

6   case scenario, should ADT take place, and we couldn't

7   get into the -- I forget what it's called, excuse me a

8   moment, if we couldn't get into the board of directors,

9   we would probably have joined the developers to not

10   participate in any royalty arrangements, gotten actually

11   the IP, done the -- you know, done the ADT development

12   on our own.

13   Q. And when you said you voted on the membership,

14   you didn't know what it was, and it had to be unanimous

1   A. Yes.

2   Q. And that press release announcing to the world

3 that you had chosen Rambus came after or at the same

4 time that you had already decided to go with DDR, didn't

5 it?

6   A. I'm sure it was before, because we would have

7 said -- we would have done the press release when we

8 signed the contract, which was in December of '97, so

9 I'm guessing, although I don't have the press release in

10 front of me, although you may, but I'm guessing that the

11 press release would have come out within weeks of us

12 signing the agreement. You're shaking your head.

13   Q. October of 1998 is when it came out, Mr. Heye,

14 isn't it?

15   A. If you say so. You may have the documents to

16 back it up, I'm just explaining to you that I don't

17 recall.

18   Q. This is a document that I pulled off the website

19 last night from AMD. Do you have it up on the screen?

20 Do you see the date on this press release, Mr. Heye?

21   A. Yes, I do.

22   Q. October 8, 1998.

23   A. Yes, I see it.

24   Q. You announced to the world in October of '98

25 that you had chosen Rambus, correct?

1   A.   That's what the press announcement says, yes.

2   Q.   And you have told us time and time again today

3   under oath that in the summer or fall of '98 you had

4   already decided to go with DDR, haven't you?

5   A.   Yes, I did.

6   MR. STONE: I have no further questions of this

7   witness, Your Honor, thank you.

8   JUDGE McGUIRE: Mr. Royall, redirect?

9   MR. ROYALL: If I could just have a moment, I

10   need to locate an exhibit.

11   JUDGE McGUIRE: Go ahead.

12   MR. ROYALL: I'm sorry, Your Honor, something

13   that his very last question raised prompted the need for

14   an exhibit.

15   JUDGE McGUIRE: Go ahead.

16   MR. ROYALL: That I had a hard time finding.

17   REDIRECT EXAMINATION

18   BY MR. ROYALL:

19   Q.   Mr. Heye, in his questions of you just this

20   moment, Mr. Stone drew attention to the fact that you

21   have said today that from your recollection, your fact that you

1   analysts or the public of our intentions. So, to the

2   extent this press release came out in October of '98,

3   and I am sure that at this time frame we did not -- we

4   did not make the DDR decision, I must be incorrect in my

5   time reference in terms of when we made the DDR

6   decision.

7   Q. Now, I would like to approach, Your Honor. I

8   don't have multiple copies of this exhibit, because it

9   just came up, but we'll flash it up on the screen.

10   Could I approach?

11   JUDGE McGUIRE: Go ahead.

12   BY MR. ROYALL:

13   Q. Mr. Heye, I have just handed you what's been

14   marked for identification as CX-2158. I'll give you a

15   moment, but I guess my first question is do you

16   recognize this document?

17   A. I remember seeing this document in the

18   documentation prior to coming here, but I didn't

19   remember this document prior to this other than looking

20   at it a few days ago.

21   Q. Now, let me ask you if it refreshes your

22   recollection, do you see the subject line of this email,

23   CX-2158, which was written by Steve Polzin, or it's from

24   Steve Polzin, the subject line is "DDR and Rambus

25   HistorycsrS ehyou see the a

1   A.   Yes.

2   Q.   And do you see, then, the discussion below on

3   the first page of CX-2158, where it says, about roughly

4   halfway down, "decided to stick with SDRAM PC-100." Do

5   you see that language?

6   A.   Yes.

7   Q.   And do you see, then, that there's a reference

8   below that to Rambus license signed and then question

9   mark.

10   A.   Right.

11   Q.   And then below that, do you see IGR4 started in

12   earnest in September 98. Do you see that?

13   A.   Yes.

14   Q.   And do you have an understanding of what IGR4

15   refers to?

16   MR. STONE: Your Honor, if I can object. Mr.

17   Royall objected earlier to my questions on the grounds

18   that I hadn't laid a foundation that the witness had

19   seen the document before. Now, the witness just said I

20   never saw this document at the time, that it was shown

21   to me this past weekend before I came here. That's his

22   testimony just now. That's not a foundation for showing

23   him the document, if the rules are going to be applied

24   the way Mr. Royall asked they be applied to me.

25   Now, I know we've used documents that witnesses

1   haven't seen before in efforts to refresh their

2   recollection, but Mr. Royall is asking what words in the

3   document mean, and that's not to refresh the witness'

4   recollection, that's to get him to testify about a

5   document for which he has not laid a proper foundation.

6   JUDGE McGUIRE: Mr. Royall, response?

7   MR. ROYALL: Your Honor, I am happy to move on,

8   I am seeking simply to refresh his recollection with the

9   document and I will focus him now on specific language.

10   JUDGE McGUIRE: Don't ask him what that word

11   means.

12   MR. ROYALL: I will withdraw that question.

13   JUDGE McGUIRE: Noted.

14   BY MR. ROYALL:

15   Q. Now, going further down in the document it says,

16   "Between summer '97 and fall '98 JEDEC-DDR turned

17   around.

18   A. Yes.

19   Q. And then there's more language and below that it

20   says, "In late 1998 AMD traveled to Micron, PC in Minn

21   to see their DDR chipset." Do you see that?

22   A. Yes.

23   Q. Now, let me ask you, does that language refresh

24   your recollection at all as to when it was that AMD made

25   the final decision to go with DDR as opposed to Rambus?

1   A. Yeah, yes, it does. I just -- I misspoke. I'm

2   frustrated with my memory right now. The reality is as

3   I'm looking at this, again, the sequence of events which

4   I remember but I got the dates wrong was we started

5   working on the -- so, we started working on the

6   Rambus-based chipset in October of '98, which was

7   exactly when that press announcement was in October, so

8   that presence announcement is consistent with what AMD

9   did, which is inconsistent with my memory. So, I

10   apologize for my bad memory and I apologize to the

11   court.

12   Q. So, once you started on that work in October of

13   '98, how long did you continue down the path on

14   developing an infrastructure for RDRAM before you made

15   the decision to go with DDR instead?

16   A. It was months, but I don't know how many months.

17   Q. So, you mean months after October '98?

18   A. Yes.

19   Q. Okay. Thanks. Now, when you first started

20   dealing with Rambus, with the possibility in mind of

21   licensing Rambus's technology for use in conjunction

22   with AMD microprocessors.

23   A. Yes.

24   Q. Do you know whether it was known to Rambus

1   was stated to Rambus that AMD had considered or even was

2   considering the possibility of using DDR memory as

3   opposed to Rambus?

4   A. I honestly don't know who told me that or not.

5   Q. You don't know?

6   A. I don't know.

7   Q. Now, Mr. Stone asked you whether the -- if I

8   recall this correctly, whether the assertion of patent

9   rights by Rambus over the JEDEC standards DDR and SDRAM

10   standards had had any actual adverse consequences to

11   AMD. Do you recall that?

12   A. Yes.

13   Q. In his questioning. And I believe you said that

14   it did not have any actual adverse consequences. Is

15   that right?

16   A. Yes.

17   Q. Would it have had adverse consequences on AMD if

18   in response to Rambus's patent claims the JEDEC

19   standards had been changed?

20   A. Yes.

21   MR. STONE: Objection. Calls for speculation.

22   Lacks foundation.

23   JUDGE McGUIRE: Sustained.

24   BY MR. ROYALL:

25   Q. Were you concerned, sir, in terms of your own

1   concerns about AMD's business and the aspects of the

2   business that you are responsible for that changes in

3   the JEDEC standards might adversely impact your company?

4   A.   Yes, I was concerned.

5   Q.   Now, Mr. Stone also asked you about changes that

6   had been made in various chipsets supporting the K-7

7   microprocessor. Do you recall that?

8   A.   Yes.

9   Q.   And he asked you about the change going from

10   PC-100 to PC -- was it 133?

11   A.   Yes.

12   Q.   And he asked you about potential changes to the

13   BIOS as well as the chipset. Do you recall that?

14   A.   Yes.

15   Q.   Now, in any of these changes that have actually

16   been made in the life cycle of the K-7 infrastructure,

17   from one chipset to another or one memory to another,

18   have any of those changes been detrimental to AMD in

19   terms of time to market?

20   A.   Could I ask you to restate that question

21   slightly different to make sure I understand the

22   question that you're asking me.

23   Q.   Let me withdraw the question, it was a little

24   unclear. In the changes that have been made to the

25   chipsets that have supported K-7 infrastructure.

1   A. Yes.

2   Q. During its product life cycle, has AMD been

3 forced to make any changes that were outside of what it

4 was planning to do in terms of its own roadmaps for the

5 development of that chipset program or, I'm sorry, that

6 microprocessor program?

7   A. No, I mean, we weren't forced to make any

8 changes. I mean, we continuously made improvements to

9 the platform which would cause us to change the

10 platforms, but --

11   Q. And was that consistent with your preplanning

12 for future versions of the infrastructure?

13   A. Yes.

14   Q. And had you ever had to make changes to the K-7

15 infrastructure in a way that was at odds with what you

16 were planning to do in a material way?

17   A. Give me a moment to think. No, we never had any

18 changes that were at odds. The reason I'm hesitating is

19 at times we would have goals of having infrastructure

20 available at a certain time and for engineering reasons

21 it would slip out. So, we would sometimes not be able

22 to accomplish our goals, so to the extent we would have

23 technologies in the market longer than we had liked,

24 that did occur, so it wasn't like we executed falsely to

25 our roadmap, but to the extent that we had a roadmap and

1   be caused by having to redesign chipsets and delays in

2   validation and time to market and competitive

3   disadvantages and other things. Do you recall that?

4   A.   That's correct.

5   Q.   Now, when the actual changes were made in the

6   chipset supporting K-7 to go from PC-100 to PC-133 and

7   to DDR.

8   A.   Yes.

9   Q.   Did any of those adverse consequences that you

10   talked about in your earlier testimony, did they --

11   did -- was AMD forced to suffer any of those adverse

12   consequences when it made the change, the evolutionary

13   change from PC-100 to 133 to DDR?

14   A.   No, we never had a -- we did not suffer any

15   consequences. If I may, the key here is that there's no

16   question that you have to change things when you go from

17   let's say PC-100, PC-133 to DDR. The thing is you want

18   to manage it, in other words you want to work with all

19   your partners because, you know, they're right, you

20   know, DDR is different from synchronous DRAM, you did

21   need a different chipset, you did need a different

22   memory solution. The trick is to work with all of your

23   partners in lining it all up such that you put a lot of

24   engineering effort and validation effort such that when

25   you do make that transition, it is not a major

1   disruption to the supply chains to your customer, i.e.

2   the ones manufacturing PCs. That's your goal. And if

3   you manage it and properly communicate with all your

4   partners, the plans, you can manage change, because

5   change does occur. The trick is all of the sudden when

6   you're almost ready to launch and then you change

7   something unexpectedly, then you have to go back and

8   redo those plans and that's the adversity that I was

9   referring to would occur.

10   Q. And that is a major disruption to the supply

11   chains in response to an unexpected change, is that the

12   type of concern that you had with respect to the

13   potential of the DDR and SDRAM standards being changed

14   in response to Rambus patent claims?

15   A. Yes.

16   MR. ROYALL: No further questions, Your Honor.

17   JUDGE McGUIRE: Mr. Stone, recross?

18   MR. STONE: Yes, thank you.

19   RECROSS EXAMINATION

20   BY MR. STONE:

21   Q. You still have Exhibit 2158 in front of you?

22   The one that Mr. Royall showed you just a moment ago.

23   A. From --

24   Q. The Steve Polzin email.

25   A. Yes, I do.

1   Q. And that's addressed to Dirk Meyer as well as

2 Levi Murray, correct?

3   A. Levi, yes.

4   Q. Levi Murray. Who is Dirk Meyer?

5   A. Dirk Meyer is my boss.

6   Q. If we can use this now, if we have a new set of

7 dates to work with, I just want to go back.

8   A. Sure.

9   Q. And see if we can get this down once and for

10 all.

11   A. Okay.

12   Q. You made the decision to switch from Rambus to

13 DDR after you made the visit to Micron, correct?

14   A. Yes.

15   Q. After you visited the PC -- the other DRAM

16 manufacturers, correct?

17   A. Yes. Well, say that again once more, I'm sorry.

18   Q. After you visited the other DRAM manufacturers.

19   A. Yes.

20   Q. And after a complete design team freed up in

21 early '99. That reference is on the second page of the

22 document.

23   A. Unfortunately I don't --

24   Q. Mr. Royall only gave you the first page?

25   A. Yes, sir, I apologize, I only have the first

1   page.

2   Q. Let me give you the second page, if I can

3   approach.

4   A. Thank you, sir.

5   Q. Take a look at the second page of the document.

6   A. Yes.

7   Q. Can we bring it up? Yeah. Do you see where it

8   says, "A complete design team freed up in AUS (EPD) in

9   early '99?"

10   A. Yes.

11   Q. And so you didn't make the decision, then, to

12   switch to DDR based on this document, at least, and let

13   me ask if that refreshes your recollection, until some

14   time in '99?

15   A. Early '99, yes.

16   Q. Okay. And you were able to design a new

17   chipset, a new set of DIMMs, a new memory controller,

18   and a new motherboard after you made the switch

19   beginning in early '99 in order to power up by December

20   '99, correct?

21   A. Your question had a lot of -- just take it back

22   a step.

23   Q. Let me back up. One of the things that you had

24   to do when you switched from the Rambus plan to the DDR

25   plan was you had to design DIMMs to replace the RIMMs.

1   A.   Again, this is where we have to be real clear.

2   It depends who we is.   We would include me, which is not

3   me.   In other words, the we in the context you're

4   talking about are the memory vendors and the dim

5   manufacturers.   So, when you ask the question did -- AMD

6   doesn't design DIMMs, and there was clearly work,

7   according to Steve's memo, that Micron had DDR DIMMs up

8   and running in late '98.   So, that doesn't surprise me

9   that any modifications that they would have had to make

10   those DIMMs between late '98 and late '99 could occur,

11   yes.

12   Q.   Okay, so let me --

13   A.   So, on the dim side.

14   Q.   I understand the problem with my question, and

15   let me ask it this way: Certain changes needed to be

16   made by someone.

17   A.   Yes.

18   Q.   When AMD made the decision to switch from RDRAM

19   to DDR?

20   A.   Yes, sir.

21   Q.   One of those changes was to make sure that you

22   had DIMMs to replace the RIMMs?

23   A.   Yes.

24   Q.   One change was to redesign north bridge.

25   A.   Yes.

1   Q. One change was to redesign the motherboard.

2   A. Yes.

3   Q. And one change was to possibly modify the BIOS.

4   A. Yes.

5   Q. And Mr. Royall asked you about all those changes

6 earlier.

7   A. Yes.

8   Q. And those changes were accomplished so that you

9 could power up a K-7 DDR design by December of '99,

1   MR. ROYALL: Objection, vague and ambiguous.

2   BY MR. STONE:

3   Q. Let me rephrase. When you made the decision to

4 go from RDRAM to DDR, you did it voluntarily?

5   A. Yes.

6   Q. Nobody said, we're going to sue you if you use

7 RDRAM?

8   A. That is correct, no one said those words.

9   Q. And it cost you money to make the change.

10   A. Yes, sir, it did.

11   Q. And you would have spent less money if you had

12 continued to use RDRAM?

13   A. No. I don't believe that.

14   Q. Okay, because you believe in the long-term, you

15 would have had issues?

16   A. That's correct.

17   Q. And when you made the change to go from RDRAM to

18 DDR, you started it some time in early '99, correct?

19   A. Yes.

20   Q. And you were powered up by December of '99,

21 correct?

22   A. Yes.

23   Q. And you were shipping product in 2000, late

24 2000?

25   A. Late 2000, yes.

1   Q. And if there were any of the issues about

2 opportunity costs and inventory and the other issues

3 that Mr. Royall asked you about, those costs weren't

4 ones that AMD incurred as the result of switching from

5 RDRAM to DDR, correct?

6   A. The context of that question versus the context

7 of his question was different.

8   Q. Okay.

9   A. So, that's not a yes/no question, from my

10 perspective.

11   Q. Explain it, please.

12   A. So, again, you know, we kept on saying, if you

13 look at from the time we were talking about it, which

14 was early '99, to the time we ship, which was late 2000,

15 again, that's about an 18-month window from let's do

16 this to the time we're actually doing it. So, that's

17 the 18-month cycle. And it's also consistent that it

18 takes about, in this case, December to October, so about

19 ten months from the power-on to actually getting the

20 system out there.

21   And, you know, there's no lost opportunity cost

22 here because this is real -- this is bringing real value

23 to the customer. You know, no one's -- I don't think

1   question in that time frame was, with Rambus versus DDR

2   and for the last five hours my testimony has been that

3   DDR was better. So, when we spent all those 18 months,

4   that wasn't to me lost opportunity cost, that was good

5   old-fashioned business acumen and engineering.

6   Opportunity costs would have said, we've done

7   this for let's say 15 months and then three months

8   before you ship, now I have to -- again, we're going

9   down this whole supposition path, three months before I

10   ship now you've made a change which has no real end user

11   benefits but to get around these patents we had to make

12   these changes and that slips everything out. Now I'm

13   using the engineers not to finalize and get all this

14   stuff to market, I'm spending it and moving on to next

15   generation projects.

16   The opportunity cost now is that any time after

17   October these engineers are working on the problem,

18   that's the opportunity cost question which is different.

19   So, that's why opportunity cost versus doing the actual

20   business doesn't make sense.

21   The same with inventory, again, when you're

22   three months prior to shipping a product and you're a

23   semiconductor manufacturer, not a motherboard, but a

24   semiconductor manufacturer, you have already started

25   wafers, production wafers. So, again, like I said

1   earlier, the whole thing with doing infrastructure

2   change, it's hard, I'm not going to deny it was a change

3   to the industry, it was a change, it was gosh darn hard,

4   quite frankly, a lot easier than Rambus, but it was hard

5   and you have to plan it and manage it and it takes 18

6   months for everything from Team DDR to engineering stuff

7   to make that happen.

8   When you do all that work and then you change

9   last minute, that's where all the problems are and

10   that's where your inventory hits. And so that's why we

11   asked for the context, pre-18 month loss is a very

12   different discussion of just engineering 101 and getting

13   everything ready for planning versus now I'm about to

14   ship and changing everything on you. I'm sorry.

15   Q. I appreciate that. And for a DRAM manufacturer

16   before they go to silicon to avoid inventory costs,

17   they're going to need at least three months lead time,

18   right?

19   A. Three months prior to shipping they must start

20   production of wafers.

21   Q. Just one more set of questions. Did you make

22   the trip to Micron in Minnesota that's referred to in

23   this document?

24   A. No.

25   Q. Do you know if the people who visited Micron

1   that's referred to in this document were told by Micron,

2   well, you know, one issue is, Rambus has told us that

3   there may be some patents that Rambus has that relate to

4   SDRAM DDR?

5   A. I don't know if they were told that my Micron

6   and if they were, they certainly didn't tell me.

7   Q. And did your JEDEC representative at any time

8   after you joined AMD tell you that he learned at JEDEC

9   meetings about Rambus patents?

10   A. Not to my recollection, no.

11   Q. When you looked at this document earlier today

12 when Mr. Royall showed it to you and it allows you to

13 conclude right away that you had not told Rambus -- you

14 had not made the decision to go to DDR in the summer or

15 fall of '98, correct?

16   A. Yes.

17   Q. All you had to do was pick up this document and

18 say I can see now that summer and fall of '98 is not the

19 right date.

20   A. Yes.

21   Q. And you saw this document most recently when?

22   A. A couple of days ago, which I probably didn't

23 read it that carefully because I had figured out the

24 dates already.

25   Q. And who did you see it with?

1   A.   As is common practice, you get a set of

2   documents that might be shown, so you look at them.

3   Q.   Who put the set of documents together for you?

4   MR. ROYALL: Your Honor, I would caution the

5   witness if there are any attorney client issues, his

6   lawyer can speak if there are, but I just would do that.

7   JUDGE McGUIRE: Well, his attorney is here, he

8   can speak for his client.

9   MR. BEDDO: Well, I can make the same caution

10   not to disclose attorney/client privilege.

11   JUDGE McGUIRE: Sir, what is your name again for

12   the record?

13   MR. BEDDO: B E D D O, David Beddo.

14   JUDGE McGUIRE: Okay, thank you.

15   BY MR. STONE:

16   Q.   Let me ask it this way, Mr. Heye, let me

17   withdraw that.

18   JUDGE McGUIRE: He is going to withdraw the

19   question.

20   BY MR. STONE:

21   Q.   Let me ask you, was it your understanding that

22   you were given a set of documents to review over the

23   weekend that you understand might be shown to you by

24   complaint counsel when they examined you during the

25   course of this proceeding?

1   A. Those words were never said. I mean, I think --

2   Q. I don't want to know the words, I don't want to

3 know the words that were said, I just want to know your

4 understanding. Wasn't it your understanding that these

5 were documents that complaint counsel might show you

6 during their examination of you?

7   A. Actually, it was more --

8   MR. BEDDO: Your Honor, I would like to caution

9 the witness again not to disclose attorney/client

10 communications.

11   JUDGE McGUIRE: All right, he has been

12 cautioned. So, we don't need to stand up and say I want

13 to caution him again. He's been cautioned. So --

14   THE WITNESS: I've been cautioned. I don't know

15 who I ask this question to, but when you have a

16 conversation with your lawyer, that's attorney/client

17 privileged issues and I'm not supposed to --

18   BY MR. STONE:

19   Q. I am not asking you what was said to you by your

20 lawyers at all. I just want to know was it your

21 understanding that the set of documents that you were

22 given to look at were documents that you understood

23 complaint counsel might show you and ask you about in

24 this proceeding?

25   A. Actually, to be quite honest with you, it was

1   doable. I am going to urge both sides for the sake of

2   everyone concerned that we attempt to expedite each

1   JUDGE McGUIRE: Oh, are you still looking for

2   the RX?

3   MR. OLIVER: I was going to try to pull it up

4   while the proceedings are going on.

5   JUDGE McGUIRE: Then you may proceed at this

6   time, Mr. Davis.

7   MR. STONE: I should clarify, that was the press

8   release, Your Honor, that we showed him. RX-2302 would

9   be the hard copy press release that I used.

10   MR. OLIVER: Perhaps if we could look at that.

11   JUDGE McGUIRE: Let's go off the record for a

12   moment so all this chatter doesn't get on.

13   (Discussion off the record.)

14   JUDGE McGUIRE: On the record, you may call your

15   next witness, Mr. Davis.

16   MR. DAVIS: Thank you, Your Honor. Complaint

17   counsel calls Mr. Barry Wagner.

18   JUDGE McGUIRE: Mr. Wagner, would you approach

19   and you will be sworn in by the court reporter.

20   Whereupon--

21   BARRY WAGNER

22   a witness, called for examination, having been first

23   duly sworn, was examined and testified as follows:

24   JUDGE McGUIRE: If you could have a seat over

25   there, Mr. Wagner.

1   All right, Mr. Davis, proceed.

2   DIRECT EXAMINATION

3   BY MR. DAVIS:

4   Q.   Thank you, Your Honor.

5   Please state your name for the record.

6   A.   Barry Wagner.

7   Q.   And where are you currently employed?

8   A.   NVidia.

9   Q.   And what is your current position?

10   A.   Manager of technical marketing.

11   Q.   And how long have you been at nVidia?

12   A.   About six years.

13   Q.   Could you describe your educational background,

14   please.

15   A.   Bachelor of science in electrical engineering

16   and a minor in computer science.

17   Q.   Thank you. We are going to talk a little bit

18   about nVidia's background now, for the next set of

19   questions. What is nVidia's line of business?

20   A.   We make reference processors and chipsets for

21   the PC workstation in game console markets.

22   Q.   What is a graphics processor?

23   A.   A graphics processor is the piece of silicon

24   that's generally put on a graphics card and it's what

25   ultimately you see on the displays of the computer.

1   Q.   Does nVidia fabricate the graphics processors

2   they design?

3   A.   No, we do not.

4   Q.   And who fabricates those?

5   A.   We have a source of graphics, TMPC and we have

6   relationships with IBM.

7   Q.   And who validates the graphics?

8   A.   A graphics card, primarily.

9   Q.   What is a graphics card?

10   A.   A graphics card is it's a PC board, it plugs

11   typically into a graphics slot in the motherboard, and

12   then ultWha 36.0001 734.3999 TmiF1 1 T   processors)TjT hr

manufactureintsA. A graphics card is it's a PC bTMPC and we havemanufactureis

will buildT the   0001 sell itnd   . A graphicss from(mgraphics card?)Tj

1   for identification as CX-2833.

2   Your Honor, that's a document that's not in the

3   database, it's a glossy brochure. May I approach?

4   JUDGE McGUIRE: You may.

5   BY MR. DAVIS:

6   Q. Do you recognize this document?

7   A. Yes.

8   Q. And what is CX-2833?

1   the column with the title Memory, what does that refer

2   to?

3   A.   That's the memory that is on the graphics card.

4   Q.   And what kind of memory is used in these

5   graphics cards?

6   A.   Most of them are DDR, one of them says SDR.

7   Q.   And who buys these products?

8   A.   Typically customers for our workstation graphics

9   cards are engineers that need to produce some sort of

10   hardware to model it on a computer. That's the kind of

11   market that we sell the workstation products to.

12   Q.   And what is a workstation?

13   A.   A workstation is basically a PC, it's usually a

14   higher performing PC. It often times will have multiple

15   processors in it, things to improve its performance, and

16   other than that it's very much like a PC.

17   Q.   If you can turn three pages later to the page

18   with the table titled nVidia Consumer Graphic Solutions?

19   JUDGE McGUIRE: What page is that, Mr. Davis?

20   MR. DAVIS: Unfortunately, the document doesn't

21   have any page numbers, that's why I'm sort of flashing

22   it. It's about six pages into the document.

23   JUDGE McGUIRE: I've got it.

24   BY MR. DAVIS:

25   Q.   What's being described in this table?

1   one of these segments for how much memory should go onto

2   the graphics card, and that's typically what the user in

3   that market segment would expect to find if they bought

4   a graphics card in that class of product.

5   Q.   Well, in the lower right-hand corner of the

6   document is a -- there's a picture in the lower

7   right-hand corner of the page, can you describe what

8   that is?

9   A.   That's a picture of a graphics card.

10   Q.   And I think everyone has probably seen a number

11   of graphics cards and other cards, we'll speed up.

12   Could you describe what some of the blocks on those --

13   on that video card are?

14   A.   The chip in the middle of the card with our logo

15   on it, that's our graphics processor. To the right

16   there's four memory devices that are all on the graphics

17   card.

18   Q.   Is there a memory controller on the video card?

19   A.   Part of our graphics processor has the

20   integrated memory controller, that hooks up to the

21   memory interface.

22   Q.   Could you turn three more pages to the table

23   entitled nVidia Platform Processor solutions.

24   A.   Okay.

25   Q.   What's being described on this table?

1   A.   It's another list of products that are

2   available, in this case this is for our chipset

3   business. We have essentially a north bridge/south

4   bridge kind of function, and again, it's some features

5   and functionality for each of those platforms.

6   Q.   Do you need me to indicate what north bridge and

7   south bridge are?

8   JUDGE McGUIRE: No, I'm sorry, I've had enough.

9   BY MR. DAVIS:

10   Q.   In the second to the last column of the table is

11   a column titled Memory Controller. Do you see that?

12   A.   Yes.

13   Q.   In the first two rows of that column are entries

14   that include the parenthetical, "Dual 64 bit DDR." Do

15   you see that?

16   A.   Yes.

17   Q.   Could you describe what that means?

18   A.   These product lines have 128 bit memory bus, and

19   the data bus with it. We've architected it as two

20   64-bit memory controllers, each one of those 64 bits

21   hooks up to a JEDEC standard DDR dim module.

22   Q.   And who would buy the products described in this

23   table?

24   A.   One of our customers today is HP, they buy this

25   product and put it into a motherboard. These particular

1 chipsets work with AMD processor base.

2   Q. Now, if you could -- Your Honor, I would like

3 to -- I'm sorry, could you turn to the page entitled

4 nVidia Mobile Graphics Solutions.

5   A. Okay.

6   Q. What's being described in that table?

7   A. It's a list of graphics products that we sell

8 into the notebook market. Again, it's broken out by

9 segment and lists a variety of features for each of

10 those, the segments.

11   Q. And how are these processors different from the

12 processors that you described earlier?

13   A. The primary difference is they're focused on

14 lower power. We try to reduce power to maintain battery

15 life in the notebook, it's a little different from a

16 desktop in that sense.

17   Q. And who would buy the products described in this

18 table?

19   A. Our biggest customers in mobile today are I

20 believe Toshiba and Dell.

21   MR. DAVIS: Your Honor, I would like to move

22 CX-2833 into evidence.

23   JUDGE McGUIRE: Any objection?

24   MR. STONE: No objection.

25   JUDGE McGUIRE: So entered.

1   (CX Exhibit Number 2833 was admitted into

2   evidence.)

3   BY MR. DAVIS:

4   Q. I would like to return to your personal

5   background and your work at nVidia. What do you do as

6   the manager of technical marketing?

7   A. I have a group that works with various

8   technology segments of our business to try to get the

9   technology advances that we want to see into our

10   products sooner. So, we will work with in my case the

11   memory industry a lot to drive our requirements for

12   future products into their roadmaps and hopefully keep

13   our companies aligned with each other in terms of when

14   products come on the market.

15   Q. And why do you work with the memory

16   manufacturers?

17   A. The memory industry is -- it puts most of its

18   emphasis into the activities in JEDEC to drive the dim

s?

1   JUDGE McGUIRE: All right, go ahead.

2   BY MR. DAVIS:

3   Q. Why was it important to you that you have an

4   understanding of what memory technologies were in

5   that -- in the JEDEC standard?

6   A. At this time we got involved more directly with

7   JEDEC is when we started working on the chipset side of

8   our business. The PC main memory platforms, ultimately

9   if we're going to have to produce a chipset, we need to

10   be using what that standard is, otherwise we're just not

11   cost effective in the market. So, as the main memory

12   standards were evolving, we wanted to be sure that we

13   knew exactly what they were going to bee main D3tswthis t(r

1   vendors were offering 150 and 153 megahertz kind of die

2   bins. We were actually buying say 166 megahertz. The

3   166 megahertz standard wasn't in JEDEC as something that

4   they were working on at the time, but it was a speed bit

5   of the memory that we could buy from our point-to-point

6   application.

7   Q. When you use the term bin twice in your answer,

8   what does that mean in your answer?

9   A. So, when the memory is built, there's a natural

10   distribution that happens, some parts are faster than

11   others. They will bin out these faster parts, cull them

12   at faster speed grades and sell them for typically for

13   more money. So, the faster are typically at a premium

14   versus the slower parts.

15   Q. Prior to being the manager at nVidia, what was

16   your position?

17   A. I was manager of systems engineering.

18   Q. And what did you do in that position?

19   A. I also worked with the memory vendors. I spent

20   the majority of my time, however, on the board design

21   and chip bring-up and debug kinds of activities. I had

22   less time to spend on memory in that role.

23   Q. And did you have any positions within nVidia

24   prior to being manager of systems engineering?

25   A. Prior to that I was a group member just to the

1   systems engineering team and prior to that I was a

2   technical marketing engineer. During all these times I

3   worked with memory industries and worked on more

4   bring-up and chip debug activities.

5   Q. What do you mean by chip debug?

6   A. When the silicon comes back from fab it's not

7   useful to put down on the graphics board. The teams

8   that I have been involved with do the board design and

9   then when the chip arrives we go through the process of

10   getting the board working into something that you can

11   actually sell and make a product out of.

12   Q. Just so I understand when you say the word

13   "board," what are you referring to?

14   A. The PCB, the graphics board that the chip sits

15   on.

16   Q. Is that the video card?

17   A. The video card.

18   Q. And you said the board bring-up, what does that

19   mean?

20   A. I said what?

21   Q. I think you used the term board bring-up?

22   A. Board bring-up, yeah. The process that we go

23   through in the lab to get something up and running in a

24   PC is what we refer to as bring-up, it's the development

25   process.

1   Q. Now, what DRAM manufacturers have you worked

2 with while with nVidia?

3   A. It's changed a lot over the years. There's a

4 lot less suppliers now than there used to be. Most of

5 our time is spent with Samsung and Micron, Infineon,

6 Hynix, a little bit with Elpida. There's ESMT, out of

7 Taiwan, Nanya and Winbond. There are others.

8   Q. And Nanya is N A N Y A and Winbond is W I N B O

9 N D?

10   A. Yes.

11   Q. And what work do you do with these DRAM

12 manufacturers?

13   A. We do a variety of things, we talk to them about

14 roadmaps, when we're going to have new products coming

15 out, we get a sense of when their products are going to

16 be coming out and we go through and have meetings with

17 their engineers about future sets that we want, and

18 ultimately work to define what a particular memory is

19 going to have in the future, and then work towards

20 getting that into the market.

21   Q. Does nVidia use internal code names to identify

22 its individual graphics chips?

23   A. Yeah. The graphics products are all NV

24 something and the something is usually a number,

25 typically one or two digits.

1   Q.   Does nVidia buy DRAM?

1   used with nVidia's graphics processors are always JEDEC

2   compliant?

3   A.   The graphics processors are not necessarily

4   compliant in a true JEDEC sense. He many times we're

5   using the same device that JEDEC would have defined, but

6   because it's a different speed bin, there isn't a JEDEC

7   standard for it per se. Generally what we try to do is

8   use devices that are compatible with whatever that JEDEC

9   standard was, so that we can leverage off that inventory

10   that's in the market.

11   Q.   Does nVidia ever attempt to get DRAM

12   manufacturers to design DRAMs specifically for nVidia?

13   A.   Yes, we frequently work with them on the high

14   end of our product line to try to get a faster memory in

15   the market than something that's what JEDEC might be

16   working on.

17   Q.   And how would these DRAMs differ from the JEDEC

18   standard DRAMs that are being produced at the time?

19   A.   We try to make them as close as possible to

20   whatever the next standard in JEDEC is going to be, or

21   we predict it's going to be. The main differences

22   relate to in our applications it's a point-to-point

23   application, there's usually only one or two memory

24   loads on the data bus. It's a little bit different than

25   a dim and we can typically run at a higher speed. So,

1   the differences usually relate to something about being

2   a point-to-point graphics system or needing to run at a

3   higher frequency.

4   Q.   And why is it important that you make a similar

5   to JEDEC standard DRAMs?

6   A.   As we've talked about in several different

7   product segments before, the very high end segments that

8   we can sell for a higher price we can afford sometimes

9   the premiums associated with the high speed memory. The

10   low end of the market, you can't afford that premium and

11   most of the low end products use a very JEDEC compatible

12   device. So, we intermix those kinds of technologies

13   depending on the price points in the market and the

14   volume requirements.

15   Q.   Is there a current DRAM being produced, a

16   specialized DRAM being produced for nVidia?

17   A.   The most recent one that went into production

18   was what's now being called a GDDR2 DRAM, it was first

19   sold with our NV-30 product and it's in one of our

20   workstations products right now.

21   Q.   And how does that differ from DDR2 SDRAM?

22   A.   It's pretty similar, the DDR2 SDRAM standard

23   focuses its definition on clock speeds that were

24   basically 200 megahertz or 266 megahertz. We were

25   focused on a 500 megahertz memory standard. So, the

1   main things that are part of a DDR2 standard in JEDEC

2   are essentially a burst length 4 functionality, on-die

3   termination and some differential clock strobes for the

4   data bus. Those three things are in this GDDR2 part,

5   which kind of separate from the DDR parts that are out

6   there.

7   Q. I would like you to look at what's been marked

8   for identification as CX-2832. Your Honor, this is

9   another one.

10   JUDGE McGUIRE: You may approach.

11   BY MR. DAVIS:

12   Q. Do you recognize this document?

13   A. Yes.

14   Q. And what is CX-2832?

15   A. It's a product guide, it's for our Quadro Fx

16   product. This marketing mainly is what was used for the

17   workstation version of our NV-30 product line.

18   Q. And how long has nVidia been selling the Quadro

19   Fx?

20   A. Since early this year.

21   Q. Do you know when work began on that nVidia

22   Quadro Fx?

23   A. I don't know exactly when it began. The NV-30

24   product line was a major new architecture for us. It's

25   fairly typical for a new architecture to take on the

1   order of two years to produce. So, it's somewhere

2   around two years ago probably.

3   Q. Did nVidia have an internal code name for the

4   Quadro Fx while it was being developed?

5   A. Yes, that was NV-30.

6   Q. And did you work on that product?

7   A. Yes.

8   Q. And what did you do on that project?

9   A. I was involved in the memory definition working

10   with the memory suppliers to get the 500 megahertz

11   memory defined, and ultimately when it came back in

12   silicon form, I was in the lab working on it, getting it

13   up to speed.

14   Q. Could you turn to the second page of CX-2832.

15   A. Yes.

16   Q. There's a table on that page, the lower portion

17   of the page. Do you see that?

18   A. Yes.

19   Q. Can you describe what that table is.

20   A. It shows several graphics cards that are part of

21   our workstation product family.

22   Q. Could I focus your attention on the row

23   involving the Quadro Fx, I believe that's the top row.

24   A. Um-hmm.

25   Q. The fourth bullet down, and also, I'm sorry, the

1   second column of that table, the fourth bullet down

2   states "128 megabytes DDR2 SDRAM." Could you describe

3   what that means in this table?

4   A. So, that column is architecture, it talks a

5   little bit about the basic architecture of the graphics

6   board. The 128 megabytes DDR2 SDRAM is the memory that

7   is on the graphics card, it's actually since this was

8   produced, the name has effectively changed to GDDR2

9   SGRAM.

10   MR. DAVIS: Your Honor, I move CX-2832 into

11   evidence.

12   MR. STONE: No objection.

13   JUDGE McGUIRE: Entered.

14   (CX Exhibit Number 2832 was admitted into

15   evidence.)

16   BY MR. DAVIS:

17   Q. Earlier you described some of your graphics

18   chips as being able to operate with both SDRAM and DDR

19   SDRAM, does nVidia produce processor chips that are

20   capable of operating with both types of DRAMs?

21   A. That was our NV-10 product line.

22   Q. And when did the NV-10 -- I'm sorry, when did

23   nVidia video cards using DDR SDRAM begin to ship?

24   A. I'm sorry, could you say the question again?

25   Q. I'll restate it. When did the nVidia video

1   cards using DDR SDRAM begin to ship?

2   A.   In the fall of 1999.

3   Q.   And when did nVidia begin working on a graphics

4   processors that was used to support those cards?

5   A.   NV-10 was also a major new architecture, so

6   roughly two years earlier is a reasonable estimate.

7   Q.   Is this amount of time to ship a graphics card

8   typical in your experience at nVidia?

9   A.   It's typical for a major new architecture. It's

10   typically not that long for minor changes to

11   architecture for each generation of a product family.

12   Q.   And how long does a minor change usually take?

13   A.   Very minor things that are maybe almost kind of

14   like bug fixes can be a few months. A more typical

15   product is probably like a year, somewhere around that

16   range.

17   Q.   Do you know why the NV-10 was designed to

18   support both SDRAM and DDR SDRAM?

19   A.   Because DDR was new in that time, we had

20   concerns whether or not it would be available in time

21   for when we wanted to ship. So, the decision was made

22   to support both SDR SDRAM and DDR SDRAM so that if DDR

23   didn't show up, we still had a fallback plan and could

24   still ship our product on the market, but at a slower

25   speed.

1   Q.   Were you involved in that decision?

2   A.   Yes.

3   Q.   Now, were there any other DRAMs considered for

4   use with the NV-10 chip?

5   A.   There are a number of technologies that were

6   considered. In the end, it basically came down to DDR

7   or the direct RDRAM. We also looked at I think

8   Mitsubishi at the time had a -- something they called a

9   3DRAM and Fujitsu I think was doing an FC RAM back then.

10   Q.   And why was DDR chosen instead of these other

11   DRAMs?

12   A.   The Mitsubishi and Fujitsu technologies were

13   basically sole sourced kind of technologies. They were

14   viewed as being kind of risky for us to produce, or

15   risky to go with because we didn't know if there would

16   be a wide supply base if there were manufacturing

17   issues.

18   Q.   I'm sorry, did you mention RDRAM as well?

19   A.   RDRAM was -- I guess our decision came down to

20   basically do we do direct RDRAM or do we do DDR. We

21   came close to using direct RDRAM, but ultimately decided

22   the alignment of our schedule in the market, it looked

23   very risky to go with RDRAM. We wanted to come out in

24   the fall of '99, at that same time period is when Intel

25   was supposed to launch their chipset that was going to

1   use RDRAM, and we had a lot of concerns that supply was

2   going to be limited, and if there was a supply problem,

3   we probably weren't going to be the company to be able

4   to get the product or we would have to pay a substantial

5   premium to get the product. So, we chose to go a more

6   evolutionary approach and go with DDR and maintain the

7   backward capability of SDR in case there was a supply

8   problem.

9   Q. And what was your understanding of what the

10   effect would have been had there been a supply problem?

11   A. Well, for us it would have -- if we had chosen a

12   direct RDRAM, we would have had no fallback plan, unless

13   we had -- and technically Rambus also had a previous

14   generation of technology, we could have designed support

15   for that. It wasn't particularly compelling to our

16   application, so it wasn't a good fallback plan, it was

17   also a very high premium fallback plan.

18   The way things kind of worked out for us was

19   although we chose direct RDRAM, ultimately to even -- we

20   ultimately chose DDR SDRAM. We actually shipped first

21   with SDR, we did end up having trouble getting the DDR

22   as well.

23   Q. Do you know what other nVidia graphics chips are

24   capable of operating with both SDRAM and DDR SDRAM?

25   A. Everything that we've built since NV-10 has had

1   support for both.

2   Q.   And why are the more recent nVidia graphics

3   chips capable of operating with both SDRAM and DDR

4   SDRAM?

5   A.   Because we serve a lot of different markets with

6   these products, the cost associated with DDR versus SDR

7   throughout much of the life of our -- of these products,

8   it was still cheaper in many cases to buy an SDR SDRAM,

9   so for the low end of the market that didn't really care

10   about the performance, car manufacturers would buy and

11   use the SDR SDRAM, and only recently has the cost of DDR

12   essentially crossed over and it's now typically cheaper

13   or more cost effective or a better performance trade-off

14   to build with the DDR SDRAM than SDR, so almost all

15   products now are shipping with DDR SDRAM.

16   Q.   I would like to show you what's been marked for

17   identification as CX-2828. You should have that in

18   front of you.

19   A.   Okay.

20   Q.   Do you recognize this document?

21   A.   Yes.

22   Q.   Now, there's handwriting on the front page of

23   the document, do you recognize that handwriting?

24   A.   Yes. That's a highlighter.

25   Q.   Could you tell me what this document is?

1   A.   This first page looks like a photocopy of a file

2   folder that I would have used to keep track of in this

3   case next generation memory development efforts that we

4   were working on.

5   Q.   And what is the document itself?

6   A.   The document is sort of a combination of an

7   email thread and a report of the meeting minutes that we

8   were having with Infineon to discuss a 500 megahertz DDR

9   style device. Ultimately, this was the product that

10 became the GDR2 SDRAM, or the SDRAM that we shipped with

11 NV-30.

12   Q.   And were you involved in these discussions?

13   A.   Yes.

14   Q.   What was your role in these discussions?

15   A.   For nVidia's side, I was the primary technical

16 contributor to this effort to get the 500 megahertz spec

17 defined within Infineon. There were a number of other

18 members of our team that depending on the meeting may or

19 may not have been present.

20   Q.   Now, were there any differences between this

21 DRAM and the existing DDR SDRAM?

22   A.   I'm sorry, say that again.

23   Q.   Were there any technical differences between

24 this DRAM and the existing DDR SDRAM?

25   A.   So, this DRAM was targeting 500 megahertz. The

1   DDR standards that we were using is for other graphics

2   memory solutions, at the time I don't recall exactly how

3   fast they were, but up until recently, we had only

4   gotten to about 325 megahertz. We just launched a

5   product that's gotten up to 450 with a DDR kind of

6   technology. This was targeting 500 megahertz and at the

7   time was roughly twice the frequency that the JEDEC

8   kinds of DDR devices were.

9   Q. Were there any other differences between this

10   DRAM and the JEDEC SDRAM?

11   A. The feature sets that we settled on ended up

12   being more in line with what was being developed for

13   DDR2, we went with the burst 4 architecture, we wanted

14   on-die termination and we wanted the differential clock

15   strobes.

16   Q. If you turn to page 7, which is CX-2828-7.

17   A. Okay.

18   Q. And I refer you to the top entitled Technical

19   Features. Do you see that?

20   A. Yes.

21   Q. Do you see the second paragraph in this section

22   where the document states, "Infineon proposed to take

23   into the definition some of the JEDEC DDR2 features."

24   A. Yes.

25   Q. And I think you just mentioned some of the DDR2

1   Q. And what is that?

2   A. For example, in our Enforce product line which

3   is our chipset business, we integrate the graphics core

4   into the north bridge product, in that case, we have a

5   unified memory architecture. We use the same memory

6   subsystem as the processor in that case, which in the

7   platform it's in the DIMMs from JEDEC rather than have a

8   separate memory, say either on a motherboard or on a

9   graphics card, if we do the stand-alone cards.

10   Q. And what is your understanding of the term "main

11   memory?"

12   A. Main memory is the -- whatever the JEDEC

13   standard is at any given time being used by the PC

14   market.

15   Q. Was it your understanding of nVidia's strategy

16   here that nVidia was trying to drive the new standard

17   for high speed memory?

18   A. Yes.

19   Q. And why was it necessary for nVidia to drive

20   that type of a standard?

21   A. In the graphics space, one of the big

22   differentiators for everybody's product is how fast is

23   the memory subsystem, how much memory bandwidth do we

24   have available to us. So, we put a lot of effort into

25   making the memory subsystem faster, and as a company if

1   we can get access to faster memories ahead of our

2   competitors, it gives us an advantage in the market.

3   So, we work with the memory companies to try to ensure

4   that we're defining what that standard is and that we're

5   first to market with it.

6   Q.   In the next paragraph under general -- I'm

7   sorry, in that same paragraph, under general targets, is

8   the statement that "JEDEC is a nice-to-have, but more

9   important is to have a second source which provides

10   compatible products." And I believe I misstated, it's

11   in the next paragraph. Do you see that?

12   A.   Yes.

13   Q.   Does this passage accurately state your

14   understanding of nVidia's interests in the importance of

15   JEDEC for this particular DRAM chip?

16   A.   For this particular DRAM chip, yes. We

17   participate in JEDEC to try to drive our requirements

18   in, but in the graphics space, for the highest

19   performance devices, we know JEDEC is not going to be

20   the one defining that requirement, they focus on the

21   DIMMs at a much lower speed, therefore if we can get it

22   out of JEDEC, that would be great, but the reality is we

23   have to do it ourself.

24   MR. DAVIS: I would like to move CX-2828 into

25   evidence.

1   JUDGE McGUIRE: Objection?

2   MR. STONE: No, I'm sorry, Your Honor, no

3   objection.

4   JUDGE McGUIRE: Entered.

5   (CX Exhibit Number 2828 was admitted into

6   evidence.)

7   JUDGE McGUIRE: It's getting late in the

8   afternoon, Mr. Stone.

9   MR. STONE: I'm just trying to be easy.

10   JUDGE McGUIRE: That's fine.

11   BY MR. DAVIS:

12   Q.   I'm going to show you what has been marked for

13   identification as CX-2828.

14   Your Honor, this is a document that there is

15   some information on it that was apparently confidential

16   information, but it hadn't been marked in camera

17   previously. I have spoken with Mr. Detra and we just

18   blocked out the -- it's really just a number.

19   JUDGE McGUIRE: All right, as long as it's

20   been --

21   MR. STONE: Yeah, I don't think it's 2828,

22   though.

23   JUDGE McGUIRE: All right, as long as it's

24   been -- as the issue has been addressed and there's no

25   concern about it being disclosed proper improperly.

1   MR. STONE: No, they redacted the information.

2   It was a third party's concern, I have no problem with

3   that.

4   JUDGE McGUIRE: All right, proceed.

5   MADAM REPORTER: What was that CX number?

6   MR. DAVIS: CX-2829.

7   THE WITNESS: I have the document.

8   BY MR. DAVIS:

9   Q.   Do you recognize this document?

10   A.   Yes.

11   Q.   And what is this document?

12   A.   It's an email thread, it started from one of our

13   architects asking some questions about the burst length

14   that we expected to see for future memories and whether

15   or not we expected any changes coming soon.

16   Q.   If you turn to the third page of this document,

17   the bottom email I suppose is the email you were just

18   referring to?

19   A.   Yes, it started with Matthew Pappakippos.

20   Q.   And do you have an understanding of why Mr.

21   Robinson forwarded that question to you?

22   A.   John Robinson is one of the engineering managers

23   for one of our chips, he's responsible for NV-35. He

24   knows that I'm the primary person in the company that

25   works with the memory vendors about the technology

 1   direction. So, if he's got any questions, he forwards

 2   them on to me.

 3   Q.   That Robinson email on that page refers to a

 4   GS1000 and a Micron part. Do you have any idea what

 5   those terms refer to?

 6   A.   The GF-1000 I believe is Samsung's code name for

 7   the GDR DDR2 DRAM that we sold with NV-30.

 8   Q.   And the Micron part?

 9   A.   The Micron part is the product that is not yet

10   on the market.

11   Q.   Now, what was nVidia's interest in these two

12   DRAM chips, the Micron chip and the GF-1000?

13   A.   Those two products were the leading candidates

14   for high-speed memory in a time frame that we wanted to

15   bring out NV-30. They're the two technologies we were

16   watching very closely.

17   Q.   And if you could go to the first page of

18   CX-2829, in the bottom email, which is an email from

19   Matthew Pappakippos. Do you see that?

20   A.   Yes.

21   Q.   There's a sentence there that reads, "These

22   changes are hard for us to work around in arch, and our

23   lead time to fix them is 1.8 years." Do you see that?

24   A.   Yes.

1   "arch" means there?

2   A.   Arch is short for architecture.

3   Q.   And what changes is he referring to?

4   A.   This discussion thread was about the burst

5   length. Our products at the time were being architected

6   for a burst length 4, and if the next high speed device

7   that we wanted was going to be a burst length 8, we

8   needed about 1.8 years to change the architecture design

9   to be efficient for burst length of 8 implementation.

10   MR. DAVIS: Your Honor, I would like to move

11   CX-2829 into evidence.

12   MR. STONE: No objection.

13   JUDGE McGUIRE: Entered.

14   (CX Exhibit Number 2829 was admitted into

15   evidence.)

16   BY MR. DAVIS:

17   Q.   I think earlier you stated that nVidia is a

18   member of JEDEC?

19   A.   Correct.

20   Q.   And why did nVidia join JEDEC?

21   A.   For a variety of reasons, but in part to keep up

22   with what technology was coming into the main side of

23   our business with the chipsets, and also because we were

24   requesting things from memory vendors that was different

25   from the direction that JEDEC was going, and they had

1   asked us to get involved in JEDEC to drive our

2   requirements. There weren't many members in JEDEC that

3   were from the graphics industry, so most of the feedback

4   that the JEDEC team was driving towards was based on

5   system memory, and with what the server applications

6   wanted.

7smnOQentAy, aho is nVidia's the JErepresireplive?ted.

1   around '98, '99 we probably joined or at least got

2   involved at some of them.

1   burst length 2, burst length 4, burst length 8 are

2   common values. Burst length represents how many bits of

3   data come out of the memory every time you make a

4   request. In the case of a read or a write you are going

5   to send them that many bits of data.

6   Q. Do you know what the current SDRAM and DDR SDRAM

7   standards specify programmable burst length?

8   A. Yes, they do.

9   Q. Do you understand what the term "dual edge

10   clocking" means with respect to JEDEC compliant DRAM?

11   A. Yes.

12   Q. Could you define that for me?

13   A. The dual edge clock refers to the data

14   interface, so the data bus for every time you set a

15   clock there's a data strobe being used where every edge

16   of the data strobe clocks out the data. So, a burst of

17   4 you have two clocks, there's four edges to that clock,

18   those four edges, the data come out.

19   Q. Are you aware of Rambus's lawsuits against the

20   DRAM manufacturers?

21   A. Yes.

22   Q. And when did you learn of those lawsuits?

23   A. When it became very public in the Internet

24   forums for technology sites that DRAM companies were

25   being sued, I was aware of it.

1   Q.   And did you have an understanding of what those

2   lawsuits are about?

3   A.   I understand it relates to the burst length/CAS

4   latency kinds of patents.

5   Q.   At the time you learned of the Rambus lawsuits

6   against the DRAM manufacturers, do you recall whether

7   nVidia had any graphics processors then in the market

8   that were designed to work with DRAMs that used JEDEC

9   standard programmable CAS latency?

10   A.   All of the devices that we have on market use

11   either SDR or DDR. I believe that the time DDR wasn't

12   quite available in the market yet, so we were using SDR,

13   which does have programmable functionality for burst

14   lengths and CAS latency.

15   Q.   At the time you learned of the Rambus lawsuits

16   against the DRAM manufacturers, do you recall whether

17   any of the nVidia graphics processors then on the market

18   were designed to work with a DRAM that used JEDEC

19   standard dual edge clocking?

20   A.   At some point we began using DDR with maybe ten.

21   We ended up shipping in the fall of '99, so somewhere

22   around the year of '99 we were working on that memory

23   controller and so we would have had the dual edge clock

24   in that device.

25   Q.   Now, between the time you learned of the Rambus

1   lawsuits against the DRAM manufacturers and today, did

2   you have any understanding of whether any of the

3   features of SDRAM and DDR SDRAM that you've described,

4   that's programmable CAS latency, programmable burst

5   length and dual edge clock, as those technologies are

6   specified by JEDEC, could have been replaced in the

7   JEDEC standard by alternatives?

8   MR. STONE: Objection, Your Honor, lacks

9   foundation, calls for opinion testimony or speculation

1   expert testimony or at least a designer.

2   MR. DAVIS: He designs and works with the

3   graphics processor which has the memory controller on

4   it, his job is to work with DRAM and make it work with

5   that memory controller.

6   JUDGE McGUIRE: It's a close call. I'm going to

7   hear the question. Overruled.

8   THE WITNESS: Yeah, I believe there are

9   solutions to those issues. You have to treat them on a

10   case-by-case basis, to which what solution is right for

11   each of those options.

12   BY MR. DAVIS:

13   Q. And what have you understood to be the

14   alternatives to JEDEC standard programmable CAS latency

15   in the mode register?

16   MR. STONE: Your Honor, same objection, if I can

17   just have a standing objection. There's no foundation

18   that he knows the alternatives, he is not an expert.

19   JUDGE McGUIRE: Okay, I said it was a close

20   call. So, that doesn't mean that you are going to get

21   it in on the same line of questioning on this, Mr.

22   Davis. Now, I allowed you, you know, the one episode to

23   allow that question, I'm not going to allow this same

24   inquiry when I don't think there's a whole lot of

25   foundation here that's going to give him the opportunity

1   to state what he's stated. So, you either have to

2   change your inquiry or I'm going to uphold every

3   objection on this issue. So --

4   BY MR. DAVIS:

5   Q. Okay, Your Honor.

6   Did you ever propose to change the JEDEC SDRAM

7   standard at any time after you learned of the Rambus

8   lawsuits against the DRAM manufacturers to eliminate

9   programmable CAS latency or burst length?

10   A. No, I didn't propose for them to go off and

11   change the technology. It's painful for us as a company

12   to go and change our direction.

13   MR. STONE: Objection, Your Honor, the question

14   was did you do something, he said, no, I didn't do it,

15   and that should be the end of his answer and we should

16   now have another question so that I have an opportunity

17   to object. So, I move to strike everything after the

18   words "and change the technology -- no, I didn't propose

19   for them to go off and change the technology." I move

20   to strike everything beyond that as beyond the grounds

21   of the question.

22   JUDGE McGUIRE: Well, you didn't ask the

23   question and you don't have any standing on that ground

24   to propose that objection.

25   MR. STONE: Well, Your Honor, if I didn't have

1   standing to raise that objection, then you could put a

2   witness on the stand and say, what's your name, and the

3   witness could talk for four hours, even if he was no

4   longer being responsive, if I don't have the right to

5   object when he stops being responsive. I think I do

6   have a right to object when he goes beyond the scope of

7   the question. If not --

8   JUDGE McGUIRE: Well, beyond the scope is one

9   thing, on that grounds, you know, I will sustain that

10   objection as beyond the scope. But, you know,

11   un I think I don w96 on5ething else all together.

12   MR. STONE: FinI dYour Honor, I don't mean to

13   phrase it incorrectly, I appreciate that.

14   JUDGE McGUIRE: We'll sustain in terms of scope.

15   BY MR. DAVIS:

16   Q. And why didn't you propose to change the SDRAM

17   or DDR SDRAM standards to eliminate programmable CAS

18   latency and programmable burst length?

19   A. We were trying to launch products into the

20   market and if the standard was going to change, that

21   meant we had to change our development plan and go

22   change to on5ething new that was yet undefinId. For us

23   iw96 a painful process to go through and not be able to

24   release a productdon w96 basically ready to be released

25   and have to go start over again. So, we weren't trying

1   to get the industry to promote a change when we were

2   working within the standard in the industry that was

3   proposed by JEDEC and was perfectly viable.

4   Q.   Did you ever propose to change the JEDEC DDR

5   SDRAM standard at any time after you learned about the

6   Rambus lawsuits against the DRAM manufacturers?

7   A.   No, I did not.

8   Q.   And why didn't you?

9   A.   For the same reason, that we felt that it was a

10   lot of work for the industry to have to go through and

11   make those changes. As a graphics company, we try to

12   create demand for our products primarily through the

13   game industry. So, we have feature sets that are new to

14   each architecture generation that enable a very new set

15   of type of game technologies to come out. The time

16   lines of those games get aligned to the time lines of

17   our chips. If we can't release the chip because we have

18   to go redesign for some new technology, then, you know,

19   we miss the opportunity to align with this new game or

20   whatever is coming out. So, we try not to change things

21   late in the design cycles.

22   MR. DAVIS: Thank you. No more questions, Your

23   Honor.

24   JUDGE McGUIRE: Thank you, Mr. Davis. You may

25   cross examine.

1   MR. STONE: Thank you, Your Honor.

2   CROSS EXAMINATION

3   BY MR. STONE:

4   Q. Mr. Wagner, how are you?

5   A. Good.

6   Q. Are you a gamer?

7   A. I'm not.

8   Q. Cool games featured in your catalog 2833, aren't

9   there?

10   A. There's a lot of neat stuff coming out.

11   Q. Are the gamers sort of the high-end group

12   concerning what they're willing to pay for performance?

13   A. Yeah, the real enthusiast gamers, they'll save

14   up their money and go out and buy the latest and

15   greatest things every few months if they can afford to.

16   Q. And so one of the things that you find is true

17   is that the highest speed, the fastest chip will sell

18   for more money?

19   A. Yes.

20   Q. And in order to achieve that one of the things

21   you look for is memory that runs at the fastest speed?

22   A. Yes.

23   Q. And to do that, you've pushed manufacturers to

24   supply you with memory which goes faster than anything

25   JEDEC has specified?

1   A. Yes.

2   Q. And you've pushed Infineon to do that, you've

3   pushed Micron to do that, you've pushed Hynix to do

4   that, you've pushed other companies as well, right?

5   A. I wouldn't say I push. We tell them what we

6   want and if they want to serve our market, they go off

7   and produce high speed memories.

8   Q. You encourage them to do it?

9   A. Absolutely, and our selling factor on it quite

10   frankly is that they get to be the leading edge

11   performance guy, by serving our market they can go out

12   and say they're the fastest in the world as well.

13   Q. And often times what they provide you is

14   something that is not JEDEC -- is not within the JEDEC

15   specifications?

16   A. Correct.

17   Q. Okay. And you talked to us earlier today about

18   DDR2.

19   A. Yes.

20   Q. The DDR2 specification has not been published by

21   JEDEC, has it?

22   A. I actually think there is a version of it that's

23   been published now.

24   Q. You think it's been published as opposed to just

25   circulated within JEDEC?

1   A. I believe it is on the JEDEC website now, but

2   I'm not positive.

3   Q. And you started, in any event, you started

4   making use of something that you thought would meet the

5   JEDEC specification before that specification was

6   finalized?

7   A. Correct.

8   Q. And the first product, am I right that the first

9   product you started to work on that made use of what you

10   thought would ultimately be a DDR2 product was the one

11   featured in 2832, the nVidia Quadro Fx?

12   A. Not exactly. It wasn't a -- it was the first

13   device that we targeted to be compatible with hopefully

14   what would become a JEDEC DDR2 standard. The device

15   that we were developing was not being developed in the

16   context of JEDEC, so we knew that it was not true JEDEC

17   DDR2, we hoped they would be compatible so that we could

18   ultimately have a lower cost version of it also further

19   down the product line.

20   Q. Let me try and just make sure. Was the first --

21   let me just ask you, what was the first product that you

22   designed that you thought would make use of something

23   which might become DDR2?

24   A. That was our NV-30 product.

25   Q. That was your which one?

1   A.   NV-30.

2   Q.   And the NV-30, was that then released with a

3   product name?

4   A.   Yes, that bulletin that you are holding, Quadro

5   Fx is one of the product names associated with the NV-30

6   product.

7   Q.   And the NV-30 product, when did you start work

8   on that?

9   A.   I had said previously it was on the order of a

10 two-year development cycle. I don't know exactly when

11 it started.

12   Q.   And when was it first released?

13   A.   We released that product into the market early

14 this year, maybe February time frame, something like

15 that.

16   Q.   So, you would have started on it some time in

17 2001? Late 2000, early 2001?

18   A.   Yeah, something like that.

19   Q.   And in any event, you started work on that

20 product after you knew about the Rambus lawsuits,

21 correct?

22   A.   Yes.

23   Q.   You started work on the product after you knew

24 that the use of what might become DDR2 might infringe on

25 the Rambus patents?

1   A. The development of that technology, there really

2   wasn't any discussion whether it did or didn't infringe

3   on patents. I don't know whether I knew much about the

4   patents at that point in time. I knew there was

5   lawsuits going on, I don't think I knew the specifics.

6   Q. Well, I thought you -- maybe I misheard earlier,

7   I thought you told us that the lawsuits involved

8   programmable CAS latency.

9   A. I do understand that now, in 2000, I don't know

10   if I knew specifically it was a CAS latency they were

11   concerned about or something else.

12   Q. When did you first learn it involved dual edge

13   clocking?

14   A. I don't know exactly when I learned the

15   specifics of the patents in question, it was probably

16   some time around getting asked to participate in this

17   trial what were the specific items involved.

18   Q. So, when Mr. Davis asked you if you ever went to

19   JEDEC and proposed that they changed the standard with

20   respect to programmable CAS latency or programmable

21   burst length or dual edge clock, when is the first time

22   that you even knew those issues might be involved in the

23   lawsuit?

24   A. At some point, I don't recall exactly what year,

25   memory vendors came to us and said would you like to

1   change this, we're finding some IP issues over it, and

2   our feedback was, well, if the industry is going to

3   change, we need to change with it and we basically left

4   it up to them to go off and decide to change or not.

5   Q.   And when was that that the memory vendors came

6   to you and said should we change to avoid these IP

7   problems?

8   A.   It was probably some time in the 2000 time

9   frame. I don't recall exactly.

10   Q.   Okay. And so, and you gave your feedback to the

11   memory vendors when they asked you if they should

12   change?

13   A.   The way discussions would have happened, they

14   wouldn't have asked me should 7nd w1d c

echnologywith it ssions woulou a chanalreadyouldn't to the

stithara chanme. I de baswantudecide to, cha this,on't to the

developmentucycleas thacanngeudelerato ack scheduleahie or not.

19   5   Qd 6   re 11bsuew thamanufcalurey vendor going to

20wemoryece tin thith n they askw tha askthoughtmaboully left

2   1 y is gonge to th 7   problems?

22   8   nme. Iknowkw gon't oft up tssions woulbeen, nblems?

2   believe Micron'ssions woulcbab chanIt was prssions woulblems?

2   talk, we nSamsu ise timthat 200 9   n ck was, nme. Iblems?

1   Q. And do you recall that one of the changes

2 proposed was to simply go to fixed burst length?

3   A. Yes, and fixed burst length we've never had an

4 issue with. Any one of our products has only ever been

5 fixed burst length.

1   clock, the data portion of the bus is at the gigabit

2   frequency, so a thousand megahertz kind of a clock.

3   Q.   Have you run tests to see how fast you could run

4   an SDRAM, which was not using any dual edge clocking?

5   A.   We have, and at the time of the standard SDRAMs,

6   I think they stopped making them at about the 250

7   megahertz for a standard SDRAM.

8   Q.   But you've pushed those past the 250 megahertz,

9   right?

10   A.   No, we didn't really have any need to spend the

11   energy in that time frame. It was a -- the devices that

12   could go to 250 megahertz were in a density that wasn't

13   interesting to the new crop of devices we were coming

14   out with, so we just didn't put the engineering effort

15   into it.

16   Q.   And do you put your memory in a module or does

17   it fit directly next to the memory -- I'm sorry, the --

18   what's it called, the graphics controller?

19   A.   It depends on the market segment and what you

20   refer to as a module. We sell a graphics card, so the

21   graphics card is not a module in most people's sense,

22   but in many ways the bulk of a graphics card is a

23   graphics chip and memory plus power supply components.

24   So, that's kind of an example for a graphics card. We

25   have in a mobile market, we have a device we call MAP

1   which is literally just a little tiny package that we

2   kind of refer to as a little memory graphics module.

3   It's for the mobile market, takes up a small amount of

4   space. But we don't do DIMMs that are those kind of

5   memory modules.

6   Q. Let me ask you just about the picture that you

7   were shown earlier by Mr. Davis, which is in exhibit

8   CX-2833, on the page entitled nVidia Coeptoui5htaphics mTjT

10   idntitfid nhe psqure tboxin ehe pcntii5hwithehe pVidia CTjT

12   A LYs.

1   sfourmemory mchip.

15   A LCorrect

16   Q. LAn nre those knd ividual DRAMs?

17   A LYs.

18   Q. LOkay LNotin ea dimin ehes iconfiguratiep?

19   A LCorrect

1   had designed the controller to use either one. Do you

2   recall that?

3   A. Correct.

4   Q. And am I correct that that's the NV-10?

5   A. Correct.

6   Q. Is that what you would call a bimodal

7   controller?

8   A. I don't generally use the term bimodal in my

9   talk of it. It's a memory controller that's compatible

10   for either SDR or DDR SDRAM.

11   Q. And does it detect what type of DRAM you've put

12   in?

13   A. It doesn't detect, the BIOS we have on our card

14   gets programmed to tell the chip what type of memory is

15   on the card. Because we aren't using a dim, we don't

16   have to detect, we know what we do manufacturing time,

17   so we just program the BIOS to represent what is

18   manufactured.

19   Q. And so there's different circuitry that comes

20   into operation depending whether it's an SDRAM or DDR?

21   A. Yeah, there are some differences.

22   Q. And in your operations, the use of SDRAM and DDR

23   are not something you would say are backward compatible,

24   are they?

25   A. The use of which?

1   Q. SDRAM and DDR, the DDR is not backward

2   compatible to your products which were designed for

3   SDRAM?

4   A. I disagree with that, it is backward compatible.

5   Q. Backward compatible beginning with the NV-10?

6   A. So --

7   Q. Am I right, beginning with the NV-10?

8   A. As we design a memory controller, NV-10 is the

9   first one we did both DDR and SDR, the memory controller

10   is backward compatible in supporting SDR, as well as

11   DDR. So, we developed for the new technology, we

12   maintained backward capability to the old.

13   Q. Beginning with the NV-10?

14   A. Yes.

15   Q. And that's because you designed the controller

16   specifically to do that?

17   A. Yes.

18   Q. And could you plug in a DDR2 product into the

19   NV-10?

20   A. Not into the NV-10. Actually --

21   Q. You have to go up to -- go ahead.

22   A. Actually, NV-10 could have worked with the GDR-2

23   SGRAM. If I could elaborate on that, if you like, it is

24   possible. The reason I know this is the first chip that

25   we actually tested the GDR SGRAM was actually an NV-20

1 chip even though we shipped it with NV-30, actually

2 NV-25. In order to support -- well, the way we

3 specified the GDR-2 device is we knew it would come out

4 before our chip that supported DDR2, so we built in

5 capability into the memory to be -- to kind of act like

6 a DDR-1 device in the sense that as long as the

7 controller could operate in burst 4 mode, you could

8 still operate the memory because you could turn off the

9 offline termination and you could tie the differential

10 strobe one way to be directional. So, because it was a

11 fixed burst 4 DDR in essence, so NV-10 had support for

12 burst 4 and probably could have used it.

13   Q. The number of different product launches you've

14 worked on since you joined nVidia, if I counted them

15 correctly, would be 14?

16   A. If you counted them, I haven't tried to count

17 them. I can walk through them all in my mind again if

18 you like.

19   Q. You did 3, 4, 5, 10, 11, 15, 17, 20, 25, 28, 30,

20 31 and 34 and 35?

21   A. There was an 18 in there also.

22   Q. And I thought earlier when you gave the list, I

23 thought you left 18 out of the list. You worked on that

24 one as well, right?

25   A. I didn't do as much on that one, but yes.

1   Q. And you've been with the company how long?

2   A. About six years.

3   Q. Since you've -- and your first JEDEC meeting

4   that you attended was March of 2000, correct?

5   A. I don't believe that's the first, but that's at

6   least kind of in that time frame.

7   Q. Well, I could be wrong. Because I certainly

8   wasn't there, but let me show you your deposition

9   transcript for one second, if I may.

10   May I, Your Honor?

11   JUDGE McGUIRE: Yes.

12   BY MR. STONE:

13   Q. Mr. Wagner, you recall giving a deposition in

14   this case?

15   A. Yes.

16   Q. And you were deposed I believe it was January of

17   this year. Is that right?

18   A. Sounds correct. The document says that, so yes.

19   Q. I hand you the transcription of that deposition,

20   I would ask you if you could to turn to page 44 of this

21   transcript and look at the testimony that starts at the

22   bottom of page 44, line 24, and continue on to page 45,

23   line 9.

24   A. I'm sorry, how far down?

25   Q. Just line 9. Did you have a chance to read?

1   A. Yes, I did.

2   Q. I'm just trying to jog your recollection. If

3 you remember a meeting before March 4 of 2000, could you

4 tell us when it was and where it was?

5   A. Like I said, the very first meeting that I ever

6 went was to when I was invited to attend, at the time we

7 weren't members and we were talking about a data mass

8 function. I know that's before Atlanta. I don't know

9 exactly when that was. It was in the Bay Area, though,

10 so it was in California somewhere.

11   Q. And that was the first one that you can remember

12 attending as a member, March 2000 in Atlanta?

13   A. I think it is.

14   MR. STONE: That's all. Thank you, no further

15 questions.

16   JUDGE McGUIRE: Mr. Davis, any further redirect?

17   MR. DAVIS: No, Your Honor.

18   JUDGE McGUIRE: Then thank you, sir, for your

19 testimony. You are excused from this proceeding. Let

20 me ask complaint counsel again, get me up to date for

21 what's on tap again for Monday.

22   MR. OLIVER: Actually, if I could have just a

23 moment, please, Your Honor.

24   JUDGE McGUIRE: Okay.

25   MR. OLIVER: Your Honor, we were expecting to

1   call Mr. Steve Polzin of AMD, but he will not be

2   available until 1:00 in the afternoon. We had actually

3   been hoping to resolve the deposition issue with Mr.

4   Reese Brown, but --

5   JUDGE McGUIRE: I can do that on Monday. I can

6   do that Monday morning if you want.

7   MR. OLIVER: We have -- we have filed a response

8   to --

9   JUDGE McGUIRE: Right, I just got it today and I

10   haven't really had a chance to go through it, but if we

11   wanted to go -- I mean, it's only -- your opposition

12   only pertains to pages, what, 89 through 115, something

13   like that?

14   MR. STONE: Yeah, I don't have the exact page

15   numbers in mind but it's a limited number of pages that

16   we had objected to.

17   JUDGE McGUIRE: That's what I'm asking. Is it

18   complaint counsel's intent to go ahead and put that on

19   and then at the time we get to the area that's in

20   dispute then I'll rule? I mean is that what you plan on

21   doing?

22   MR. OLIVER: With three caveats, Your Honor,

23   first I haven't had a chance to consult with the other

24   side to see if they are willing to agree to that. The

25   second, I agree that there are some additional

1   objections that may have to be ruled on after we go that

2   I think could be handled as we go. The third is that to

3   my understanding that we still have a few technical

4   issues to work out with the video, which I think we can

1   however there's other objections.

2   MR. OLIVER: That was my understanding, again,

3   Mr. Swindell has been coming up on our behalf and he is

4   not here. My understanding is that there were a few

5   additional specific objections that would have to be

6   ruled on.

7   JUDGE McGUIRE: Well, I'll tell you right now

8   having just gone through your response today, I tend to

9   agree with the respondent that there was no -- there's

10   certainly an improper foundation, if any, you know,

11   foundation laid for the proposed testimony on pages 89

12   through 115. So, that's how I intend to hold, you know,

13   on that issue. So, I'll just advise you at this time of

14   that. Now, if there's other objections, we could

15   perhaps consider them as we go on Monday, if that's

16   agreeable. But, you know, I don't know what you have in

17   store at this point.

18   MR. STONE: That's fine with us, Your Honor, if

19   you rule on them as we go. We have no problem with

20   that. I don't think the other ones are large in volume

21   and I think you can rule on them. That's fine with us.

22   JUDGE McGUIRE: Now, I've had time to go through

23   each of the pleadings, and like I say, I don't see where

24   there's a proper foundation, at least on the pages in

25   question.

1   MR. OLIVER: Okay, thank you, Your Honor. I

2   will try to find out as quickly as I can whether we can

3   resolve the technical issues with the video over the

4   weekend.

5   JUDGE McGUIRE: So then you want to plan on I

6   guess convening on Monday in the morning at the same

7   time, 9:30, or do you want to advise me, you know, on

8   Monday morning and then we'll play it by ear on Monday

9   morning?

10   MR. OLIVER: I would recommend, Your Honor, that

11   we advise you first thing Monday morning and play it by

12   ear.

13   MR. STONE: We probably need to have the

14   reporter here, though.

15   JUDGE McGUIRE: Let's plan on having a court

16   reporter here in the morning, early on Monday morning at

17   9:30. So, with the anticipation that we might well

18   start at 9:30.

19   MR. STONE: And we'll work, if we can help

20   resolve the technical issues, we will.

21   JUDGE McGUIRE: Okay. Anything else?

22   MR. STONE: Nothing else, Your Honor, thank you.

23   JUDGE McGUIRE: This hearing is now in recess.

24   See you Monday.

25   (Whereupon, at 4:47 p.m., hearing adjourned.)

1   C E R T I F I C A T E   O F   R E P O R T E R

2

3   DOCKET/FILE NUMBER: 9302

4   CASE TITLE: RAMBUS, INC.

5   HEARING DATE: MAY 30, 2003

6

7   I HEREBY CERTIFY that the transcript contained

8   herein is a full and accurate transcript of the notes

9   taken by me at the hearing on the above cause before the

10   FEDERAL TRADE COMMISSION to the best of my knowledge and

11   belief.

12

13   DATED:

14

15

16   Sally Jo Bowling

17

18   C E R T I F I C A T E   O F   P R O O F R E A D E R

19

20   I HEREBY CERTIFY that I proofread the transcript

21   for accuracy in spelling, hyphenation, punctuation and

22   format.

23

24

25   Sara J. Vance

For The Record, Inc.
Waldorf, Maryland
(301) 870-8025