FEDERAL TRADE COMMISSION

I N D E X (PUBLIC RECORD)

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UNITED STATES OF AMERICA

FEDERAL TRADE COMMISSION

In the Matter of:)

Rambus, Inc.) Docket No. 9302

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Wednesday, July 16, 2003

9:31 a.m.

TRIAL VOLUME 43

PART 1

PUBLIC RECORD

BEFORE THE HONORABLE STEPHEN J. McGUIRE

Chief Administrative Law Judge

Federal Trade Commission

600 Pennsylvania Avenue, N.W.

Washington, D.C.

Reported by: Josett F. Hall, RMR-CRR

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P R O C E E D I N G S

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JUDGE McGUIRE: This hearing is now in order.

Before we start this morning, any housekeeping chores?

MR. STONE: We have none, Your Honor.

JUDGE McGUIRE: If not, then, Mr. Stone, at this time you may call your next witness.

MR. STONE: Thank you, Your Honor.

At this time we call Dr. Betty Prince.

JUDGE McGUIRE: And Dr. Prince, would you please come toward the bench and the court reporter will swear you in.

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Whereupon --

BETTY PRINCE

a witness, called for examination, having been first duly sworn, was examined and testified as follows:

MR. BURT: My name is Scott Burt with Jones Day. I'm here both representing Dr. Prince and MOSAID Technologies on which she is a board member.

Both Dr. Prince and MOSAID have filed in camera motions. I understand you have now just ruled on those?

JUDGE McGUIRE: Oh, yeah. That was done, you

know, six weeks ago probably.

MR. BURT: Okay.

JUDGE McGUIRE: I assume you got a copy.

MR. BURT: I did not, which is why I asked.

JUDGE McGUIRE: I don't know if at the time you were the acting attorney. Perhaps -- I assume you got a copy.

Did counsel get copies?

MR. STONE: Yes, Your Honor.

MR. DAVIS: Yes.

JUDGE McGUIRE: I will have to go back. I will check with my office. As a matter of fact, I should have you check with my office because I'm hardly there anymore. And you can check and I'm sure you can access a copy. In fact, you might want to do that right now. Maybe we should take a ten-minute break.

As I recall, I did not allow any in camera treatment for any of her evidence. Is that correct?

MR. STONE: The one contested issue was the slides of the Samsung presentation and you ruled that would not be given in camera treatment.

JUDGE McGUIRE: Right.

MR. STONE: I think there were some other MOSAID documents that neither side opposed. If you

want, we can pull the order.

JUDGE McGUIRE: Why don't we do that and just get this resolved before we get started so you will be apprised.

MR. BURT: I appreciate it.

JUDGE McGUIRE: Let's go off the record and we'll take a minute and try to get this issue ironed out.

(Discussion off the record.)

JUDGE McGUIRE: At this time you may proceed with your inquiry of the witness, Mr. Stone.

MR. STONE: Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. STONE:

Q. Good morning, Dr. Prince.

Are you here pursuant to a subpoena?

A. Yes, sir.

Q. And let me ask you if you could pull the microphone closer to you. That would be helpful.

A. Is that better?

Q. That is better.

A. Okay.

Q. And you're not here happily I take it either?

A. I'm here because it's my civil duty to be here.

Q. I appreciate the fact that you're here.

And you've never testified in a trial or a hearing like this before, have you?

A. No, sir.

Q. Could you briefly tell us your educational background, Dr. Prince.

A. Yes. I have a bachelor's in physics and math, a master's in physics and math, an MBA in international marketing and a doctorate in physics with a dissertation -- or in finance -- excuse me -- that was interdisciplinary finance and business. It was in chaotic modeling of exchange rates.

Q. And when did you obtain your Ph.D.?

A. 1987.

Q. Where do you presently reside?

A. In Leander, Texas.

Q. And what's that near?

A. Austin.

Q. Okay. And how are you currently employed?

A. I run a small consulting company. We do memory -- technical services for the semiconductor memory industry.

Q. And what's the name of that company?

A. Memory Strategies International.

Q. How long have you been running Memory

Strategies International?

A. Since 1994, late '93, early '94.

Q. And could you briefly give us -- go back to your first full-time employment if you would, and I'll walk you through your employment history, if you could tell us your first full-time employment.

A. In the electronics industry?

Q. In the electronics industry.

A. Okay. My first full-time employment was in 1972 and this was with Fairchild Semiconductor in California.

Q. And how long did you stay with Fairchild?

A. I was with Fairchild until late '75, early '76.

Q. And then what was your next position?

A. I was at RCA Semiconductor in Ohio.

Q. And how long were you at RCA?

A. Six months.

Q. And then what was your next position?

A. I went to Motorola in Austin.

Q. And how long were you at Motorola?

A. I was with Motorola until 198' -- late '85, early '86, and I was in Austin until 1980, they had me in Scotland until 1983, and then I was back in Austin for two years.

Q. And then did you leave Motorola?

A. Yes, I did.
Q. What was your next position?
A. I was on sabbatical for a year. I was still working for Motorola during 1985, finishing my doctorate, and then I worked for Philips in Eindhoven in The Netherlands.
Q. How long did you work for Philips in The Netherlands?
A. Until 1990. And in 1990 I went to Texas Instruments and left there in late '93.
Q. And that's when you formed Memory Strategies International?
A. Yes, sir.
Q. And have you written several books?
A. Yes.
Q. Is it up to five at the moment?
A. Well, if you count my dissertation which was published, it's probably six, but it's five in this industry.
Q. And so five books in the area of memories?
A. Yes.
Q. Okay. Are you active in the IEEE?
A. Yes, sir.
Q. Could you tell us briefly what the IEEE is.
A. It's the professional organization for

electrical engineers and -- electrical and electronic engineers.

Q. And does the IEEE publish a journal?

A. They publish many journals.

Q. Is one of the journals they publish called Spectrum?

A. Yes.

Q. And have you been active from time to time in writing articles for Spectrum?

A. Yes. Actually Spectrum is the overall, the general magazine for the IEEE.

Q. I have placed a binder in front of you, Dr. Prince. I'm going to give a copy of this same binder to complaint counsel.

And I'd like you if you would to turn to the first document in your binder, which is RX-329. It will also come up on the screen, so whichever place is easier for you to review it.

A. This is pretty much out of focus. 329?

Q. Yes, ma'am.

Do you have that document in front of you?

A. I do, but the print is very small. Let me go down one more level of glasses.

Q. Okay.

A. Okay.

Q. Let me direct your attention -- it's going to be hard to read and you might need to take my word for it, but in the lower right-hand corner there's a date which is October 1992?

A. Yes. I see it.

Q. Okay. Were you involved in October of 1992 or the preceding months in putting together a collection of articles that appeared in the IEEE Spectrum?

A. Yes, I was.

Q. What was the purpose of that collection of articles, if you can share that with us, please?

A. Well, I was on the technical advisory board for the IEEE Spectrum and we tried to -- since this was a general magazine, we tried to present issues that were current in issues of the magazine, and one of the issues that was current at the time was the fast DRAMs, and I had been asked to pull together a magazine of articles on fast DRAMs.

Q. And how did you go about doing that? Did you contact potential authors?

A. Yes, sir.

Q. How did you select the authors? What were your criteria?

A. There were various fast DRAMs that were in the press at that point and I selected the ones that

were -- had the widest publicity.

Q. How long have you been active in the area of memories?

A. Since 1978.

Q. And at each of the different companies you've worked at since 1978, have you been involved with memories in each of those companies?

A. Yes, sir.

Q. How much of your work has been in the design area, how much has been in marketing, how much has been in other areas, if you can generalize?

A. I've never been in the design of memories. I have -- I was in process engineering and product engineering for three years and then I was -- it's easier to go back by company.

At RCA I was product engineer for the microprocessor memory line.

At Motorola the first two years I had the static RAM -- the first year I had the static RAM line. I was product engineer for the static RAM line. And then I was international marketing manager for the DRAM line, and this entailed design, helping get the DRAMs designed into customers in the international regions.

From '80 to '83 I was European marketing

manager for Motorola, and that was why I was in Europe, and I was helping to get the European customers designed in, and also Motorola was bringing their factory in Scotland up in memories and I was helping get this underway doing some product management work.

At Philips, I was originally strategic marketing manager for memories, which is sort of an overall person they have in each of the product areas, and then I was business manager for the Mega project, which was a European project to bring up Philips and Siemens, which is now Infineon, in DRAMs and static RAMs.

Q. Okay.

A. And at TI I was new product manager for the DRAM line.

Q. For the which line?

A. At TI I was new product manager for the DRAM line and flash.

Q. Was the article that we've marked as Exhibit RX-329, was this one of the articles that you asked someone to prepare for the edition of this IEEE Spectrum that was addressing fast DRAMs?

A. Yes, apparently it was, although I don't actually remember the specific article.

Q. Let me ask you about whether at the time, October of 1992 -- there's a statement in the article, and I just want to ask you if this is what you understood to be commonly discussed within the industry.

And we can bring it up on the screen. It might be easier to read.

If you go to the left-hand column, the very bottom, first full paragraph, the bottom full paragraph on the left-hand column.

I'm sorry. I'm being inarticulate, Matthew. Go to the left-hand column and the bottom full paragraph.

Is your screen still waving again?

A. It never was waving. It's simply out of focus, but I can read the material.

Q. Okay. My question is simply whether it was the general discussion within the industry in the 1992 time frame that the accepted dynamic RAM architectures and solutions had by that time been pushed to their limits.

A. Let me read what it says.

Q. Certainly.

(Pause in the proceedings.)

A. And what was your question?

Q. Was that generally accepted within the industry as you understood it in 1992?

A. Yes, in that the industry was dominated by the computer companies and computer companies needed faster DRAMs.

Q. Could you -- if you turn to the next page, page 2 of this particular article, RX-329, over on the right-hand column, under the first big heading there, you'll see a discussion of the word -- of the concept of throughput. It's about midway down that paragraph.

A. Yes.

Q. Can I ask you if you could just help us understand what throughput means.

A. Throughput was a synonym for data rate, and the data rate is the amount of data that moves down the bus in a given period of time.

Q. And is that a combination of the -- would that be measured in sort of bits per unit of time?

A. If you were a DRAM person, but it actually was measured in megabytes per unit of time because of the systems we've been talking about.

Q. And then let me ask you if you would to turn to the third page of this article, and there's a discussion that begins in the left-hand column of something called interleaving.

And would you explain if you could interleaving to us briefly.

A. Actually I'm not sure that I had focused on this particular description of interleaving before.

Interleaving generally meant that you were effectively widening the data bus so that you were getting more data through any given amount of time.

Q. And how was that done, if you can do it in general terms?

A. Well, you could either make the data -- you could either make the bus wider, in which case you got a higher data rate because more data was coming down the pipe at one time, or you could have it broken into, say, two buses and interleave them in time so that you are getting twice as much data down the bus at one time.

Q. And one final question, if you would just help us understand, there's a mention in the right-hand column in about the third full paragraph of something called clock skew?

A. Yes.

Q. Could you help us understand what clock skew means.

A. The problem here was that as signals -- if you have a signal edge, as it travels down the wire, it

becomes slightly out of phase with where it was when it started. So for instance, if you have a very large chip, the phase of the clock at one side of the chip might not be the same as the phase on the other side of the chip.

MR. STONE: Your Honor, we'd offer RX-329.

JUDGE McGUIRE: Objection?

MR. DAVIS: No, sir.

JUDGE McGUIRE: So entered.

(RX Exhibit Number 329 was admitted into evidence.)

BY MR. STONE:

Q. If you would now turn to the second article in your binder, Dr. Prince, which is RX-330.

A. Yes.

Q. Was this another one of the articles that was part of the collection of articles on fast DRAM that you put together for the October 1992 Spectrum?

A. Yes, sir.

Q. And do you know the author of this particular article?

A. Yes, I do.

Q. Is he someone you have worked with?

A. Yes.

Q. And what's his name, if you could help us with

that?

A. Roelof Salters.

Q. And at the time was he at Philips?

A. He is still at Philips and he was then.

Q. And had you worked with him when you were at Philips?

A. Yes.

MR. STONE: Your Honor, at this time we'd offer RX-330.

MR. DAVIS: No objection.

JUDGE McGUIRE: Entered.

(RX Exhibit Number 330 was admitted into evidence.)

BY MR. STONE:

Q. Let me ask -- I'm going to try to move this along, so skip one if you would, Dr. Prince, and go to RX-333.

Do you have that one in front of you?

A. Yes, I do.

Q. Now, is this an article -- you'll note that there seems to be several articles under the general title of Fast Interfaces for DRAMs, and it appears that the first one you coauthored; is that right?

A. Yes, sir.

Q. And was this an article in toto that was part

of that October 1992 collection of articles?

A. Yes, it was.

Q. And you wrote with Mr. Foss the first portion of this article on the first page?

A. Yes. Actually Dick had most of the input to this. I rewrote it into the appropriate style for the magazine.

Q. And when you say "Dick," you mean Richard Foss?

A. Yes.

Q. And he was at the time with MOSAID?

A. I'm sorry?

Q. At the time he was with MOSAID?

A. Yes, he was.

Q. Okay. And you are still on the MOSAID board?

A. '92. I was not on the MOSAID board in 1992.

Q. But you are today?

A. But I am today.

Q. Okay. With respect to this article -- well, let me ask you just about that.

How long have you served on the MOSAID board, as best you recall?

A. Six years I believe.

Q. And have you served on any other boards or advisory councils for various companies?

A. Yes. I've been on technical advisory boards.

Q. For which companies, as best you can recall them at this time?

A. Silicon Access Networks, Cavendish Kinetics, Cogent Systems. I'm trying to think if there were any others. Those are all I think I can bring up.

Q. In these articles where the term "interface" is used, could you give us a general description of what the "interface" means as it's used in this article.

A. As it's used in this article, it refers to the output -- input and output buffers of the DRAM, and what was looked at was the power supply voltage that was across the buffers and the voltage levels for the swing of the buffer.

Q. And was there at this time -- I notice it's mentioned in the portion that I think you wrote -- was there at this time an interest in reducing the swing voltage?

A. Yes.

Q. Why was that?

A. Two reasons. One was that we were reducing the power supply across the buffer, and this was to reduce power dissipation, and if you reduce power supply, then the swing also has to be reduced.

And the other was that if you reduced the swing and it runs at the same speed, then it doesn't take as

long to swing and it speeds it up.

Q. So reducing the swing, everything else being equal, would allow you to increase the throughput?

A. Yes.

Q. Were there other issues that were being discussed in the industry in October of 1992 that needed to be addressed to make faster interfaces?

A. Other than low swing interfaces?

Q. Yes.

A. Well, you needed to make the interfaces themselves low voltage and low swing, but if the circuits were as a result running faster, then you had to also worry about ground bounce and transmission line effects in the system.

Q. Just, again, I want to keep this at a level that we can try to understand, but if you could explain to us ground bounce.

A. Ground bounce. You have to understand what an output or an input -- what an output buffer is.

An output buffer is composed of two transistors, one of which is off when the other one is on. And when you switch from one of them being off and the other one on and back, there's a -- normally when it's stable, there's no current or little current flowing through it, only leakage.

When you switch them for a moment there's a spike of current because for a moment both of them are on. And when you have that spike of current, then that spike of current is from power to ground. And if there's any inductance in the ground line, it causes a reverse current and it causes a bounce on the current, and it's called a ground bounce.

Q. Were there other issues that were being discussed other than the ones you've mentioned -- oh, I didn't ask you about transmission line.

When you say transmission line issues were being discussed, could you just briefly explain to us what you mean by "transmission line."

MR. DAVIS: Your Honor, there's a lot of questions about what was being discussed in the industry, and I just wanted a clarification that Dr. Prince's testimony is not being asked for the truth of the matter.

JUDGE McGUIRE: Would you clarify on that, Mr. Stone.

MR. STONE: It is not. It's simply being asked to show what issues were being discussed within the industry as Dr. Prince was aware from her various positions.

THE WITNESS: The question was transmission

line?

BY MR. STONE:

Q. Yes, please.

A. When you have an output buffer swing, it's connected to a long line in the system and the line also swings and it -- a wave goes down the line, and if it's not properly configured, the wave comes back and interferes with itself, and this wave effect can slow the transmission down or interfere with the transmission, and these were called transmission line effects.

MR. STONE: Let me -- at this time, Your Honor, we'd offer RX-333.

MR. DAVIS: No objection.

JUDGE McGUIRE: Entered.

(RX Exhibit Number 333 was admitted into evidence.)

BY MR. STONE:

Q. Let me ask you if you'd turn to the next document in your binder, Dr. Prince, which is RX-332.

Is this another one of the articles that appeared in that October 1992 collection of articles in the IEEE Spectrum?

A. Yes, it is.

Q. And is this an article that was authored by

Mike Farmwald and Dave Mooring of Rambus?

A. Yes.

Q. Was this an article that you recall at the time discussing with them?

A. Only inasmuch as I asked them if they would write it.

Q. And why was it that you asked them if they would write it?

A. Because they were designing one of the DRAMs that was in the press at that point. People wanted to know what these fast DRAMs were, and I was trying to get articles on each one of them and on the issues.

Q. Were you familiar -- did you read this article when it came out?

A. I assume I did.

Q. Okay. And did you have an understanding at the time, October of 1992, either from this article or from any other source, that the Rambus proposal for a fast DRAM included the use of dual-edged clocking?

A. It was clear from the Rambus data sheets that the Rambus DRAM involved dual-edged clocking. I'm not sure exactly did they have -- I don't know if it's mentioned in this article, but I assume it is because that was one of the attributes of the Rambus DRAM.

Q. Okay. Let me just point you if I can to the

second page of RX-332. At the bottom of the left-hand column, you'll see a paragraph that begins with the word "transferring"?

A. Right. Right. And so it does mention dual-edged clocking.

Q. Okay. And was it your understanding at the time, October of 1992, that Rambus expected to receive royalties for use of its inventions?

MR. DAVIS: Objection, Your Honor. Vague.

THE WITNESS: I really didn't --

BY MR. STONE:

Q. Let me rephrase, Dr. Prince.

Let me ask you if you would to take a look on the first page of RX-332, in the second paragraph in the left-hand column.

A. I'm sorry. The first page?

Q. The first page, left-hand column, second paragraph, if you could.

A. Yes.

Q. And you'll notice it talks there about a royalty fee?

A. Yes.

Q. Did you have some understanding in October of 1992 or about that time that Rambus expected to receive or hoped to receive a royalty for the use of its

inventions?

A. Yes. Although dual-edged clocking, since toggle mode was already known, I didn't anticipate that was going to be one of them, but I didn't know what they were going -- what they patented. I don't look at patents.

Q. I understand. I understand.

You have some patents; right?

A. Yes.

Q. You have a patent on something called the revolutionary pinout?

A. Yes.

MR. STONE: Your Honor, at this time I'd offer RX-332.

MR. DAVIS: No objection.

JUDGE McGUIRE: Entered.

(RX Exhibit Number 332 was admitted into evidence.)

BY MR. STONE:

Q. Now, did you later, in 1994, write another article for the IEEE Spectrum that addressed fast DRAMs or fast memories?

A. Yes, I did.

Q. Turn if you would to the next exhibit in your binder, RX-465.

Is this a copy of the article that you wrote?

A. Yes, it is.

Q. Let me ask you just a couple of questions about it.

Let me move it into evidence first if I might. Your Honor, I'd offer RX-465.

MR. DAVIS: No objection.

JUDGE McGUIRE: Entered.

(RX Exhibit Number 465 was admitted into evidence.)

BY MR. STONE:

Q. And this appeared in the February edition of Spectrum; is that right?

A. 1994, yes.

Q. And about when was it that you wrote the article, if you recall, how much in advance of its publication?

A. I just almost missed the deadline. So I wrote it in late January, early February.

Q. Okay. Directing your attention to the very first paragraph in this article, there's a reference to the mismatched bandwidth of fast processors and the slower memory chips.

Do you see that reference?

A. Uh-huh.

Q. Is that something that's depicted then in the figure on the bottom of the first page as well?

A. Yes.

Q. Could you just briefly tell us what that mismatched bandwidths refers to.

A. Actually it's the speed of the processor. That's why I was looking, because I must have changed the chart that I used for that not too long after that.

It's actually the speed of the processor and the DRAM that are mismatched, and the DRAM can either be run faster or it can have a slower speed, be put on a wider bus and get the same amount of information through.

So it is the bandwidth that's mismatched.

Q. Is that something that you might refer to as a memory bottleneck? Have you heard it referred to as that?

A. It is one of the bottlenecks in memories.

Q. Okay. With respect to this particular article, if you could turn to page 3 of it, and let me ask you just to explain a couple of things on the document.

There's -- in the second column, the middle column, under the heading Synchronous Memories, you

list a variety. Cache DRAM, Rambus DRAM, JEDEC standard synchronous DRAM, are the three that I think are listed there.

A. Synchronous static RAMs are also listed because they were around before the synchronous DRAMs.

Q. Okay. And when you use the phrase "synchronous" in describing all of those various ones, what do you mean by the use of that term?

A. Synchronous specifically means that there are registers on the inputs and outputs of the RAM and the registers allow the RAM to be run under what they call the system clock.

Q. Then if you would turn to the next page, which is page 4 and the last page of this exhibit. And I'm going to ask you about the column on the left-hand side, the first column, and the second paragraph up from the bottom, the one that begins "Another method."

A. Yes.

Q. And when you talk here about another method, was that -- are you describing dual-edged clocking?

A. Yes, although at the time I would have said I was describing toggle mode. Yes.

Q. And by that would mean using the rising edge and the falling edge of the clock to --

A. Yes, sir.

Q. And was it your understanding in 1994 that you needed to move to this dual-edged clocking to obtain speeds over 200 megahertz?

A. It was the general wisdom I think of the industry at that point that it was one of the main ways we were going to be able to obtain speed. There was a lot of discussion about whether it was going to be possible because there was some difficulty with making the clock edges stable on both edges.

Q. So this issue of how fast you could go without dual-edged clocking was being discussed in the industry in 1994?

A. Oh, before 1994.

Q. And one of the issues being discussed was, if you went to dual-edged clocking, would you be able to stabilize the edges sufficiently?

A. Yes.

Q. And is that related to clock skew that you told us about earlier?

A. I guess so. I hadn't thought about that.

Q. Okay. Did you, after you found -- at the time that you submitted this particular article, RX-465, you were -- you had started Memory Strategies International; correct?

A. Yes, I had.

Q. And could you just briefly tell us the business, the different business activities of Memory Strategies International in the 1994 time frame.

A. I don't remember exactly when we started our different product lines. We did technical reports and we do technical reports on the different memory products.

We also do technical training. We started that in '94. We do technical training internal to the companies in the industry in the memory area. And we also on occasion do private reports for companies that ask for them.

Q. When you say you do technical training, you go to a company and provide courses or lectures?

A. Courses for their engineers.

Q. And when you talk about reports, would you do some reports -- you said you do some private reports.

Do you also do reports that you make available more broadly?

A. Yes. There are numerous reports on our Web pages.

Q. And were you in the 1994 time frame asked to do a private report for Samsung?

A. Yes, I was.

Q. And who at Samsung asked you to do that?

A. Joel Karp.

Q. As best you can recall, what did Mr. Karp ask you to do?

A. He asked for a report that would help them understand where the Rambus DRAM was in the market and also help them understand some of the technology of the product.

Q. As best you can recall, when about was it that he asked you to do that?

A. It was sometime in -- sometime in '94.

Q. And what did you do in response to his request?

A. I accessed all public information that I could find on the Rambus DRAM and made slides and went over to Korea and presented the report to a group of Samsung engineers.

Q. Do you recall about how many Samsung engineers were in attendance?

A. I would say that there were between fifty and a hundred. There were a very large number of them.

Q. When you say you put public information together, was there anything in the presentation that you provided that you obtained from other than public sources?

A. No.

Q. Let me ask you to turn to the final document in your binder if you would, which is RX-2166.

A. Uh-huh.

Q. Do you recognize this document?

A. Yes.

Q. Is this a copy of the slides that you put together for your presentation to Samsung in Korea?

A. It seems a little bit smaller than the presentation. It's a subset of the slides.

Q. Okay.

A. Is this -- oh, maybe it is. Maybe it is the whole presentation. Okay. Yes, it does appear to be the whole presentation.

Q. There may be a longer version. If there is, I'm going to look for it, Dr. Prince, if we take a break and I can try to show you that one as well.

A. Well, it also may be that the document that I was reviewing from the exhibits from the last subpoena was larger and I was thinking about a larger document. I think this is all there is.

Q. Okay. And then I want to just ask you a couple of little procedural questions about this.

In 1994, at the time of this presentation, did you take slides, transparencies that you had put on an

overhead? Is that how you showed it?

A. Yes. My presentation wasn't in my computer at that time.

Q. And then did you leave hard copies of the slides for people at Samsung?

A. No. They took the slides and made copies while I was there and returned the slides to me and returned a copy to me, which is what I provided in response to the subpoena.

Q. Right. You provided us a copy that they gave back to you; right?

A. Yes.

Q. And did that copy have on it some handwriting that was not your handwriting?

A. I don't remember any handwriting.

Q. Look at the very first page if you would. You'll see there's some writing in Korean?

A. Oh, that's not -- I didn't assume -- that wasn't handwriting because it's identical on every page. I assumed it was some kind of stamp.

Q. I mean -- and I won't belabor this point; it's not that important.

Look at the upper left corner on the first page. Right alongside the Memory Strategies International just to the left, or look on the screen

and you'll see where I'm pointing?

A. That isn't on the copy I have.

Q. That's not on your copy?

A. No.

Q. Oh, heavens.

MR. DAVIS: Your Honor, I'm not sure if this copy was provided by Dr. Prince.

MR. STONE: Oh, they put the wrong copy in the binder, Dr. Prince. Let me apologize.

JUDGE McGUIRE: Then do you want to take a second and reshuffle here?

MR. STONE: If we can, Your Honor.

JUDGE McGUIRE: All right. Let's go off the record.

(Discussion off the record.)

JUDGE McGUIRE: All right, Mr. Stone.

BY MR. STONE:

Q. I've given Dr. Prince a copy of RX-2153, which I believe is the copy that she produced at her deposition.

I'm sorry for putting the wrong one in the binder.

Looking at what is RX-2153, can you identify that as a copy of the slides from your presentation to Samsung?

A. Yes, it is. It has a lot of notations on it that weren't there that are due to this court action.

MR. STONE: Your Honor, I don't know if -- it's in evidence. Okay.

BY MR. STONE:

Q. Let me ask you some questions about this then.

And turn if you could to what I think is going to be, I hope, page 9, Dr. Prince.

A. Are you looking at the number at the bottom left or the bottom right?

Q. I'm looking at the number --

A. The BP number or the DKT number?

Q. I'm looking at the number at the very bottom left, if you can find page 9. The heading says "Status of Standardization."

A. Yes.

Q. Okay. And in this portion of your presentation were you talking about the status of standardization of a Rambus product?

A. Yes, I was.

Q. And how did you refer to it then? Did you call it an RDRAM or a Rambus DRAM or something else?

A. I don't know. It looks like I referred to it as the Rambus DRAM.

Q. Let me use that phrase then when I ask you

questions about this report if that's okay.

At the very top of this page you say "de facto standardization." Do you see that?

A. Yes.

Q. And in 1994 at the time of this presentation, did you use that phrase to refer to a part that would be supplied by more than one source to a viable segment of the market? Was that your definition, as it says in the first sentence?

A. That's right. That's what I said in the first sentence.

Q. And was that the definition you were generally using at the time?

A. Yes.

Q. At the very bottom of this page, in the last paragraph, it says, "A further danger of a de facto standard is the lack of assurance that the standard is maintained by all vendors."

A. Yes.

Q. Do you see that reference?

A. Yes.

Q. Could you explain what you meant by that.

A. Well, if you have a standard that has been reviewed by a standards committee and everyone has agreed to what the standard will look like, then a

customer who buys it will be assured that the part that they get from any one of the suppliers will indeed be the part that will work in their system.

The danger with a de facto standardization is there is nothing to assure that the part that is bought is going to be the same as the part bought from some other supplier or indeed from that supplier earlier.

So there's more of a risk to the user to use a de facto standard.

Q. And was that a risk that you understood that at the time of your presentation that Rambus needed to find a way to address?

A. Actually I was making this to Samsung. It was a risk that I wanted Samsung to be aware of if they went with a de facto standard.

Q. And did you know at the time of your presentation what, if anything, Rambus was proposing to do to address that risk?

A. To the best of my knowledge, nothing. I don't believe Rambus ever presented any part of their technology for standardization.

Q. And do you know if at the time of your presentation Rambus was requiring each of the manufacturers to comply with a Rambus specification?

A. I don't know what Rambus was doing at that time.

Q. Okay. Turn if you would to the next page of this document, if you don't mind, Dr. Prince.

A. Uh-huh.

Q. The heading here is Potential Areas for Patents.

A. I'm sorry. What page?

Q. The very next page, page 10. So this will be page 10 of -- I forgot the exhibit number. I'm sorry. 2156? 53?

On page 10 of RX-2153, the heading is Potential Areas for Patents. Do you see that?

A. Yes.

Q. And was -- and you then list four subheadings: vertical surface mount package, protocol, distributed clock, differential interface. Do you see those four?

A. Yes.

Q. Were those four areas in which you thought Rambus might obtain patents?

A. I was asked to, by Samsung, to comment on what areas they potentially could file patents under, and those are areas that appeared to me possibly for patents.

Q. And these were that Rambus would file, not

Samsung?

A. That Rambus would file.

And I was not making a judgment that these were suitable for patents. I was simply saying these are areas that they might have filed patents under.

Q. I appreciate that.

At the very bottom of the page is some language that you've been asked about before, and there's a reference there to "Many of the large systems houses believe that the Rambus patents are challengeable by previous internal work and/or patents."

Do you see that first sentence?

A. Yes, sir.

Q. Now, is that information that came to you in a public fashion so that you weren't sharing any proprietary information with Samsung when you told them this?

A. Yes, it was.

Q. And there's a reference in the next sentence to "The early concern about the impact of the Rambus patents on the major systems houses and vendors seems to have diminished considerably."

Do you see that?

A. Yes, I do.

Q. Can you help us to place a time frame on the early concern? When was that early concern, if you can help us?

A. I don't know that I can put a time frame on it.

When Rambus first started talking about their product, they were very secretive and nobody really knew what they had. After it was clear what they had, then many of the big companies reviewed the patents that they had already -- prior work that they had already had and there was discussion various places in the industry that much of this seemed to have prior art.

Q. And all of that information even about these early concerns came to you in a public, not a confidential fashion?

A. Yes, sir.

Q. Turn if you would to I believe it's going to be page 34 of this document. It's headed RamLink Overview.

A. Yes.

34 is not RamLink Overview.

Q. That's the pagination difference in mine. Hang on a second and I'll find it.

A. 37?

Q. Yes. If you would turn to 37, the RamLink

Overview.

And if you'll see that -- I think that this discussion continues on for four pages?

A. Yes.

Q. RamLink overview motivation, RamLink physics and RamLink logical?

A. Yes.

Q. Was the information -- did you participate in the RamLink development?

A. Yes, I did. I was on the IEEE RamLink committee.

Q. And the information that you put in here about RamLink was based in part on your work on the committee but was also public at the time; right?

A. Yes.

Q. And then if you would, turn to the very next page after that, which would be page 41 I believe.

A. What's at the top of the page?

Q. Rambus Marketing Study, Technology Trends, The Rambus Interface.

A. Yes.

Q. And looking at page 41 of RX-2153, when you talk about interface here, are you using that phrase in the -- to refer to the same features as you described earlier when I asked you about interface in one of the

articles?

A. No. Interface here I had actually used a Rambus data sheet and I was indicating information here from the data sheet that I was using.

Q. Okay.

A. I myself would not have thought of the phase-lock loop and the FIFO a part of the interface.

Q. You would have the phase-lock loop and the FIFO as something else?

A. Yes. I would have considered it logic on the DRAM.

Q. And the reference you're making to phase-lock loop is the next to the last paragraph where it says "a PLL (phase-locked loop)"?

A. Yes.

Q. And then the last paragraph on that page is where the reference is to FIFO?

A. Yes.

Q. So you would have considered that logic on the DRAM in your terminology?

A. Yes. It was, and to my knowledge, it was internal to the DRAM.

Q. And turn if you would to the next page, which is page 42 of this exhibit.

And you here describe a feature of a low

voltage swing?

A. Yes.

Q. And would you consider a low voltage swing to be part of the interface as you were using the terminology?

A. Yes.

Q. And you also described here data being transferred on both edges of the clock; correct?

A. Yes.

Q. Turn if you would to the next page, which is page 42 -- I'm sorry -- page 43. Under the heading Bandwidth, there's a reference in this discussion to the Rambus channel?

A. Uh-huh.

Q. Do you see that reference?

A. Yes.

Q. What did you mean at the time of this presentation in June of 1994 by the phrase "Rambus channel"?

A. To the best of my knowledge, I was using it in the sense that Rambus appeared to be using it, and they were using it to mean the bus to their DRAM.

Q. And did you understand at the time that Rambus used "interface" to refer to some features and "channel" to refer to other features?

A. I hadn't thought about it.

Q. Okay. In looking at their data sheets, did you recall that they had a discussion in their data sheets of both interface and channel?

A. Yes. In that, as I said, the channel was the bus and the interface, as they discussed it, was both the input/output buffers and also some -- they also included in that the logic that controlled the interface.

Q. And then turn if you would to -- I believe it's going to be page -- give me just a minute to find it -- I believe it will be page 46 of Exhibit RX-2153.

Does that have a heading Validity of Rambus in System Environment and then the next heading is Latency?

A. Yes.

Q. Okay. And I want to ask you just for a moment about the last paragraph on this page with the heading Reliability of Phase-lock Loops on DRAM, and take a moment if you need to just refresh yourself as to that.

A. Yes.

Q. Was there a discussion within the industry in June of 1994 as to whether phase-lock loops or PLLs could be reliably implemented on the DRAM?

A. Yes, there was because we had never implemented clocks on a stand-alone DRAM that I knew of. And there was a question of whether the noise from the clock, the phase-lock loop clock, would cause a disturbance problem in the DRAM.

Q. Okay. Let me ask you --

A. Actually I'll have to -- I said we'd never implemented it. The MoSys DRAM I believe had a phase-lock loop, and I'm not sure what time frame they appeared in, although I think they appeared after the Rambus DRAM.

Q. Okay. Turn if you would -- let me find the page in this document if I can -- turn if you would to the very last page of this exhibit, which I think is going to be 85.

A. 85.

Q. Well, I have the number wrong. I can't read the page numbers on the copy that Mr. Davis was kind enough to share with me.

A. What's the heading?

Q. 95. Let's go to 95.

A. Uh-huh.

Q. Do you have that page in front of you?

A. The one that starts "Technology Lead?"

Q. The one that starts "Technology Lead."

A. Yes.

Q. Okay. At the time of your presentation in June of 1994, did you share with Samsung that Rambus' technology lead might depend at least in part on whether the Rambus patents were valid or not?

MR. DAVIS: Objection. Leading.

MR. STONE: Certainly. Let me withdraw.

BY MR. STONE:

Q. There's a reference on this page under the heading Technology Lead to the statement: "This depends on whether the Rambus patents are valid or not."

Do you see that statement, Dr. Prince?

A. Yes.

Q. Is that something you shared with Samsung at the time?

A. Well, it was on one of the slides I presented to them.

Q. Did you express any view yourself as to whether any Rambus patents were valid or not valid?

A. I had never seen a Rambus patent.

Q. And when you presented this --

JUDGE McGUIRE: All right. Wait a minute. Well, okay. I guess it answers the question. If you haven't seen it, then you can't make that judgment? Is

that your testimony?

THE WITNESS: That's absolutely true. And I make a practice of not reviewing patents.

JUDGE McGUIRE: All right, Mr. Stone.

BY MR. STONE:

Q. And Dr. Prince, at the time when you gave this presentation to Samsung, can you tell us what it is you were saying about the Rambus patents in the context of this slide?

A. Yes. If Samsung was interested in this technology and there were no patents covering it that were valid, then Samsung could go do this technology themselves.

If they were interested in the technology and there were valid patents, then clearly they were going to have to license it.

I mean, it was a very practical business comment I was making here.

Q. Okay. And do you know -- and at the end of the presentation, your recommendation to Samsung was that they consider alternatives other than Rambus?

A. My recommendation -- they had asked me to talk about both Rambus and the RamLink. They knew I was on the RamLink committee. And my recommendation to them and, if you go through this presentation page by

page, the clear import of this presentation was that they should use the RamLink rather than the Rambus.

Q. And did the RamLink product ever come to market?

A. No, it didn't.

Q. Do you know whether Samsung signed a license with Rambus?

A. I believe they did.

Q. And do you know today whether Samsung manufactures Rambus DRAM?

A. I believe they do.

Q. Okay. Dr. Prince, thank you. I know this is not where you wanted to be this morning and I appreciate you taking the time. I have no further questions.

A. Thank you.

JUDGE McGUIRE: At this time we'll entertain the cross-examination by complaint counsel, Mr. Davis.

MR. DAVIS: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. DAVIS:

Q. Good morning, Dr. Prince.

A. Good morning.

Q. Did you want to take a break or anything? Are you okay?

A. How long are you going to go?

Q. Not very long.

A. Okay.

Q. Earlier you talked about the need for registers on a DRAM for it to be synchronous. Do you recall that?

A. Not just the registers. I mean, not just a DRAM. Any asynchronous RAM, if you want to make it synchronous, you have to put registers on the inputs and outputs.

Q. Are you aware of something called the mode register on SDRAMs?

A. Yes.

Q. Is that the same thing? Was that what you were referring to?

A. No. No. A register is a latched -- a double latch on the interface into which the clock signal is latched and then the processor can go away and do something else.

Previously, the asynchronous RAMs, DRAM and SRAM, the processor had to sit there and hold the signal on the RAM. The advantage of the synchronous interface is that the signal could be latched into a register, and then the processor can go off and do something else and come back after a given latency to

pick up the information. It essentially made the RAM a digital-state machine, like all the other logic chips on the circuit.

Q. Thank you.

Also earlier you were talking about the need to stabilize clock edges when you went to dual-edged clock or toggle mode for --

A. Not something I'm really an expert on.

Q. I was just wondering if what you were talking about was the duty cycle, the need to maintain a 50 percent duty cycle?

A. I'm really not an expert on that, but as I recall the discussion at the time, it had more to do with the rise and fall, making sure that the rise and fall of the leading and falling edge were the same.

Q. Were the same length or something?

A. Yeah. Right.

Q. Okay. Thank you.

Well, let's go back to RX-2153. And that's -- Dr. Prince?

A. Hold on a second.

Q. Yeah. Sorry. I want to show it to you because I think that it's not going to be in the book (indicating).

A. Okay. That's the -- oh, it's the Rambus

presentation -- or the Samsung presentation. Okay.

Q. Right. The one that he gave you later.

A. Uh-huh.

Q. Oh, I see you put it in the binder?

A. I put it in the binder.

Q. Earlier you described the reason why you were giving that presentation. Do you remember that?

A. Yes. Samsung was interested in doing a higher-speed DRAM. The two potentials that seemed to be considered in the market at that point were the Rambus and the RamLink, and they wanted to understand more about them.

Q. So this presentation was designed to help Samsung decide whether or not to license the Rambus DRAM?

A. Yes, sir.

Q. If you could turn to page 7 of the exhibit, and I hope it's the seventh page.

A. Yes. Status of standardization?

Q. Yes. Exactly. Thank you.

Now, this page has a list of six DRAM features. Do you see that?

A. Yes.

Q. Why were -- how did you come to decide to put these six particular features on this list?

A. These were the features of DRAMs that were being considered for standardization at JEDEC at that point, and JEDEC is the primary standardization body for RAMs, not specifically these features but these types of features.

Q. And is this also a logical -- sort of a logical breakdown of how you look at a DRAM?

A. Possibly, but it's much more -- I'm sure I was thinking about the things that potentially could be brought for standardization.

Q. And so the purpose of this page was to describe whether any of these features had been brought to a standard-setting body like JEDEC for standardization?

A. Yes.

Q. And by "standardization" you're referring to formal standard-setting rather than de facto standard-setting?

A. I'm probably biased, but I believe the only real standardization was formal standardization.

Q. So in this list you're referring to the formal standardization by industry standards committees, for example?

A. Yes. And the reason for this is because when something comes for formal standardization, it has the

review of peers throughout the industry. Everyone gets a chance to review it and make comment, and if there are good and bad features, they can be modified. And what ultimately comes out for the users in the industry is the most adequate device that the industry collectively can prepare.

Q. So you were describing these technologies and the standardization of them as something that Samsung should consider in determining whether they should license RDRAM?

A. I was suggesting that -- I was suggesting to them very strongly that they should not use a nonstandard DRAM because it did not have the kind of review that would let them have a quality, uniform RAM coming in-house.

Q. So was it your understanding at the time that you were writing this that standardization at JEDEC would have benefited Samsung as a potential licensee of RDRAM?

A. Yes. It didn't have to be standardization at JEDEC, but JEDEC is where the RAM standardization was done.

But yes, I believe that standardization would have benefited the Rambus DRAM. It would have given the reviewer peers and it would have -- I believe it

would have helped make a better part.

The RamLink was created by a standards -- a very competent, industry-quality standards group and had much review throughout the industry, and it's one of the reasons why I recommended the RamLink, because this was a part that had been widely reviewed by extremely qualified people through the entire industry.

Q. And when you said it didn't have to be JEDEC, you meant it also could be IEEE, for example?

A. Yeah. The IEEE had a RAM committee. It could have been brought there also. JEDEC happens to be the committee that does RAM standards.

In this case RamLink -- let me explain a little bit. RamLink was an IEEE committee only because the IEEE had been engaged for a considerable period of time in standardizing the scalable coherent interface as a replacement for the future bus backplane.

Q. That was my next question: RamLink was standardized at the IEEE?

A. And you see the future bus was getting old. We needed a very high-speed interface and the people involved in the scalable coherent interface were the supercomputer scientists of the industry from IBM,

Hewlett-Packard, CDC, Apple. These were guys that had been working most of their lives in supercomputers and they were defining an entire backplane, an entire set of components that would make an adequate, very high-speed system and they needed a RAM. And they configured the RamLink RAM not as a generic market component but as a RAM that would fit very well into this backplane. And it had significant review.

Q. I'm sorry.

A. I'm sorry.

Q. I didn't mean to cut you off.

Could you turn to the next page.

A. Uh-huh.

Q. Is it fair to say that -- well, why don't you take a look at the page. I was going to ask you a general question about the page.

(Pause in the proceedings.)

A. Yes.

Q. Is it fair to say that this page describes some of the benefits of formal standard-setting that you were testifying to earlier?

A. Yes, sir.

Q. Could you turn to the next page, please.

A. Uh-huh.

Q. You talked about this a little bit a few

minutes ago.

Just so I understand what you mean by "de facto standardization," would you consider DDR SDRAM to be a de facto standard?

A. No. Because DDR SDRAM was standardized by the JEDEC committee with open review in the industry.

Q. Did you consider SDRAM to be a de facto standard?

A. No. Well, it is a de facto standard if the definition of "de facto standard" is that many people make it. But it also is a true standard because a standards committee has reviewed and accepted it.

Q. So I was understanding your definition of "de facto standardization" as being a standard that wasn't set by some formal committee.

A. I am very clear in here in what I called a de facto standard and I am also limited -- if you look in the second paragraph, I had a question whether the Rambus was truly a de facto standard because it hadn't had the review that is required, I believe is required for a part to be generally useful to the users in our industry.

Q. So SDRAM was a true standard because it was considered by JEDEC in this case?

A. Because it was widely reviewed by the people

both who would be making it and using it.

Q. Did that also apply to EDO, extended data out?

A. Yes. That was a JEDEC standard.

Q. And to -- what was the standard --

A. Page mode.

Q. Fast page mode and then page mode?

A. Well, actually it was page mode and then fast page mode.

Q. Okay. Were those also true standards in that sense?

A. They were JEDEC standards. And they had the review of the standards committee, yes.

Q. Were you aware of or are you aware of any DRAM that hasn't been standardized by a formal standard-setting committee like JEDEC or IEEE that's become a commodity DRAM?

A. Yes.

Q. And what is that?

A. This was the last generation of video RAM, and Samsung made it and they brought it for standardization at JEDEC, and we in our foolishness refused to consider it because it deviated from the direction we had been going on video RAMs. But it was simpler, it was more cost-effective, it was smaller, and it didn't have all the bells and whistles we had been putting on, but the

user community wanted it, and even though we refused to standardize it, Samsung produced it anyway and they basically own that market.

So if you provide the user community what it wants, periodically a de facto standard happens, not very often. You remember it when this happens. It's a lesson to the standards committees.

Q. Now, could you turn to the next page.

A. Uh-huh.

Q. And this is another page you talked about earlier?

A. Yes. Potential areas for patents, yeah.

Q. Now, the use of programmable CAS latency and the use of programmable burst length in a DRAM, are those listed in this list?

A. Are we on the same page?

Q. Potential areas for patents?

A. No, they're not.

Q. By the summer of 1994, the JEDEC SDRAM standard had been published by that point; right?

A. Yes, it had.

Q. And both programmable CAS latency and programmable burst length were in that standard?

A. Yes, they were.

Q. Do you remember thinking in the summer of

1994 that Rambus might own programmable burst length or programmable CAS latency in DRAMs?

A. That certainly had never occurred to me. We probably would have been very -- we would have considered them longer in putting them in the synchronous DRAM if we had any idea that anyone had a claim to this.

Q. So when you were putting together the slide, you weren't thinking of programmable CAS latency and programmable --

A. No, sir.

Q. -- programmable burst length as being potential Rambus patents?

A. No.

Q. Dual-edged clocking is not listed here, is it?

A. No, it's not.

Q. That had been presented at JEDEC in the -- I guess the early '90s in the form of toggle mode by IBM?

A. No. It was presented in a paper that Howard Kalter did at the ISSCC I believe in the late '80s. Anyway, there was work that IBM had done and published on toggle mode.

Q. And Howard Kalter had brought toggle mode to JEDEC at some point?

A. Yeah, I think he did bring it to JEDEC actually, and we rejected it because we were concerned about the integrity of the clock edge at the time.

Q. And this was sometime between 1990 and 1992?

A. I remember Howard's technical paper. I don't remember when it was brought to JEDEC.

Q. Do you remember Mark Kellogg presenting this technology at JEDEC?

A. I don't know. I don't recall when it was presented at JEDEC. I would be very surprised if Mark was the one who presented it, but I don't remember who presented it.

Q. I may not have been accurate. I may have made a mistake.

A. Well, Mark was doing modules at the time, so I would not have anticipated it, but he could have.

Q. Well, let me show you CX-34.

A. Is this in my binder?

Q. No. I'll be giving it to you.

May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. DAVIS:

Q. Now, unfortunately, the text here is very small.

A. This is minutes of one meeting and all the

attachments; right?

Q. That's what I was going to ask you.

Do you recognize this document?

A. I don't recognize this specific document, but it's clearly the minutes of a meeting, and I suppose -- I can't look through them all, but I suppose these are the attachments. This is what they normally looked like after a JEDEC meeting.

Q. And if you look on the second page, the very second page of the document?

A. Yes.

Q. And that's a list of others present?

A. Yes.

Q. And if you go to -- do you see the list of TI people?

A. Yes.

Q. And do you see yourself as one of the people?

A. Yes, sir.

Q. Okay. So could you turn to page 30 of this.

A. The JEDEC numbers. You're referring to --

Q. No. What you would look at is the numbers on the lower right-hand corner. Do you see where it says CX-0034, there's a dash and then a number?

A. Actually it corresponds to the JEDEC numbers. Okay. Yes, I have it.

Q. Oh, it does.

Do you recognize this?

A. No.

You understand I went to JEDEC meetings for twenty years a week at a time four times a year.

Q. Yes.

A. And there are many documents.

Q. And I'd like to point you to a particular document, and I think I've lost my place on that.

If you could turn to page 32.

And there's a list of items on that page?

A. Yes.

Q. If you see on the left-hand side, there's a Roman numeral and then a letter, so Roman numeral I. I want to point you to the text associated with Roman numeral I.D.

A. IBM.

Q. Yes.

And do you see where it says -- the first star, it says "dual clock edge"?

A. Yes.

Q. Does that refresh your recollection that dual-edged clocking or at least some form of dual-edged clocking was presented at JEDEC in the early 1990s?

A. If it's in the minutes, it was presented.
Q. It doesn't refresh your recollection, though?
A. No.
Q. Okay. You can put that aside.
Do you remember thinking in the summer of 1994 that Rambus might own the concept of dual-edged clocking in DRAMs?
A. I don't remember ever thinking about it.
Q. You don't remember ever thinking that Rambus owned dual-edged clocking in DRAMs?
A. No.
Q. The use of a PLL or a DLL on the DRAM is also not mentioned on this list or -- you probably need to pull that list up again. It's the -- it's the Potential Areas for Patents page?
A. Right.
Q. And do you remember if PLL on DRAM or DLL on DRAM was listed on that page?
A. I don't recall, but I would not have -- I cannot imagine that I would have put either of them down as a potential -- do you want me to go back to that page?
Q. Well, if you could try to look at the screen in front of you, it is actually there.
A. Okay. No, neither PLL nor DLL are there.

Q. Do you remember thinking in September of 1994 that Rambus might own the concept of PLL on the DRAM or DLL on the DRAM?

A. I really didn't think about patent issues. That's something I have stayed away from and not thought about, so no, I don't recall ever thinking that.

Q. So when you put together this list, you weren't thinking of Rambus potential patents on PLL on the DRAM or DLL on the DRAM?

A. I was putting together areas that occurred to me that they might be able to come into JEDEC and make a proposal for standardization, and these are the items that occurred to me at the time.

Q. And I just want to make sure that the testimony was clear, that PLL on the DRAM and DLL on the DRAM isn't one of those areas?

A. It's not one of those areas that I thought about at that time.

Q. Now, referring to the paragraph below the last, you talked about that this morning as well?

A. Uh-huh.

Q. It says, "Many of the large systems houses believe" -- do you see that first part of that?

A. I see that. Yes.

Q. By "the large systems houses," are you referring to companies like IBM and HP?

A. Yes, I was. I was referring to the users of the DRAMs as opposed to the vendors.

Q. So you weren't referring to a DRAM vendor like Micron, for example?

A. No, sir.

Q. So in this list, were you -- you aren't referring to patents that Rambus might have that would impact the future development of JEDEC-compliant DRAMs?

A. I didn't -- I was not -- I did not know what patents Rambus had. I had been asked to comment on particular areas that they might be able to or might have patents, and these were the areas that occurred to me.

MR. DAVIS: Okay. No more questions, Your Honor.

JUDGE McGUIRE: Thank you, Mr. Davis.

Mr. Stone, redirect?

REDIRECT EXAMINATION

BY MR. STONE:

Q. On this same page, Dr. Prince --

A. It's vanished.

Q. We'll bring it back up.

Page 10 of 2153, RX-2153.

You'll notice under the heading Distributed Clock it says, "Rambus has declared this patent with the JEDEC JC-42 standardization committee."

Do you see that?

A. I do.

Q. Did you look at the patent that is referred to there?

A. Never. No, I didn't.

Q. Okay. So you didn't have any idea what was described in that patent?

A. No, I didn't.

Q. Did you ever look -- that's fine. No further questions. Thank you, Dr. Prince.

MR. DAVIS: No more questions.

JUDGE McGUIRE: Okay. Then that's it, Dr. Prince.

THE WITNESS: Thank you.

JUDGE McGUIRE: Thank you for coming today and you're excused from this proceeding.

Let's take a short ten-minute break. When we return, you can call your next witness.

MR. STONE: Thank you, Your Honor.

(Recess)

JUDGE McGUIRE: At this time the respondent may

call its next witness.

MR. PERRY: We would call to the stand Mr. Farhad Tabrizi.

JUDGE McGUIRE: Sir, would you please come to the bench and be sworn by the court reporter.

- - - - -

Whereupon --

FARHAD TABRIZI

a witness, called for examination, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. PERRY:

Q. Good morning, Mr. Tabrizi.

A. Good morning.

Q. Sir, I've placed up there on the bench in front of you the two deposition transcripts from your depositions in this case and I believe the other one was in the Micron matter in case we need to refer to them.

Could you state, please, who your present employer is.

A. Hynix Semiconductor, Inc.

Q. What is your current title at Hynix?

A. Vice president of marketing.

Q. What are your current responsibilities?

A. I'm in charge of marketing on a worldwide basis for Hynix Semiconductor, Inc.

Q. Are you based here or abroad?

A. I'm based in San Jose, California.

Q. Now, Hynix used to be called Hyundai; correct?

A. That is correct.

Q. And how long have you been -- how long were you at Hyundai?

A. Since April of 1994.

Q. And in 1995 you became chairman of the SyncLink Consortium; correct?

A. That's correct.

Q. And at that time, during the time you were chairman of the SyncLink Consortium, you remained employed by Hynix or Hyundai; right?

A. That's correct.

Q. Now, prior to the formation of the SyncLink Consortium, the SyncLink memory device was being developed within the IEEE; correct?

A. That's correct.

Q. And that stands for the International Association of Electrical Engineers, approximately?

A. I believe so.

Q. Close enough?

A. Close enough.

Q. And Richard Crisp of Rambus was attending those IEEE meetings that had to do with SyncLink; right?

A. If I recall, I saw him at some of the meetings.

Q. And the SyncLink Consortium was formed as a result of Mr. Crisp wanting to attend those IEEE meetings about SyncLink; correct?

A. SyncLink Consortium was formed to develop the next generation high-speed interface. Maybe part of it was following the bylaws that caused Richard Crisp not to attend, but it wasn't just because of Richard Crisp.

Q. Would you pick up your deposition in the FTC case, please, which is dated November 20, 2002.

A. Okay.

Q. And look at page 86, please.

And read to yourself your answer at lines 3 to 5.

(Pause in the proceedings.)

Do you see that you say there: "We created the consortium as a result of Rambus wanting to attend the meeting, and it was their right to attend the meeting. IEEE meeting was an open meeting to any individual"?

Do you see that?

A. I see that.

Q. Is that a correct statement?

A. That's a correct statement.

Q. Now, you were concerned at the time that Rambus would get ideas from the IEEE meetings and run and file a patent application before the other companies could; right?

A. That was one of the reason.

Q. And soon after the SyncLink Consortium was formed, the members learned that Intel was considering choosing Rambus as the next-generation memory technology. Do you remember that?

A. I do.

Q. I'd like to show you an exhibit in this case marked as RX-694, which are some SyncLink Consortium minutes from March of 1996.

May I?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. And do you see on the first page that you're listed as an attendee?

Do you see that, you're listed as an attendee?

A. Yes, I see that.

Q. And would you look on page 2. About twelve

lines down there's a line that begins "Intel"? Do you see where it says, "Intel is seriously considering Rambus II for next generation"?

A. Yes, I see that.

Q. And you would agree that at least by March 1996 you were aware that Intel was seriously considering Rambus as the next-generation memory technology; right?

A. That's correct.

Q. And by September of 1996 you had become concerned that if Intel chose Rambus as the next-generation memory device that the DRAM manufacturers would become a foundry for Intel; right?

A. That's correct.

Q. Let me ask you about a document from that time period, September 1996, RX-778.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. Is this an e-mail that Mr. Sogas, S-O-G-A-S, from Hitachi sent to you in September 1996?

A. It appears that way.

Q. And is this an e-mail that you had drafted and sent to him for his comment and review?

A. That's correct.

Q. And it says, in part, "To whom it may concern" up at the top. Do you see that?

A. I see that.

Q. Let's look at the first two paragraphs of this e-mail.

You say, "This issue" -- or the e-mail says, "This issue has major impact in our future as a memory supplier. So please here hear me out very carefully."

Do you see that?

A. I see that.

Q. And then it says: "As you may know by now, Intel and Rambus visited Japan and Korea in the week of September 9. The objective of this meeting from Intel's point of view is to convince DRAM suppliers to use Rambus II architecture for their next-generation main memory starting 1998."

Do you see that?

A. I see that.

Q. Had you been in any of those meetings in Japan or Korea in that time period?

A. It's possible, but I don't recall the specific of that meeting.

Q. Well, let's look a little further down in this e-mail to the fourth paragraph.

Do you see the sentence that starts "with Intel

controlling"? Do you see that?

Do you see it says: "With Intel controlling the CPU, the chipset and the SSRAM already and by us going down a Rambus II path, this will give them the control of DRAMs and other CPU makers. We will become a foundry for all Intel activities."

Do you see that?

A. I see that.

Q. And near the end of the e-mail, there's a statement about -- that says, "I urge you" -- do you see the statement that begins "I urge you" and it says, "I urge you to please educate others and get their agreement to say 'no to Rambus and no to Intel domination'"? Do you see that?

A. I see that.

Q. Were you trying at the time to get the agreement of the other DRAM manufacturers to say no to Rambus and no to Intel domination?

A. No. This e-mail was sent out initially to my own management. Jim Sogas, I know him for a long time. At that time I was thinking about sending this e-mail out to other DRAM companies. I sent him because I was very emotional at the time, I sent him to see if it made sense or get his advice.

Anyway, I sent it to Jim Sogas, but I don't

recall sending it to other DRAM companies.

Q. Would you look at page 120 of your transcript in the FTC matter, please.

Page 120.

A. Which one?

Q. The FTC transcript dated November 20, 2002.

A. Okay.

Q. At page 120.

A. All right.

Q. And do you see beginning at line 4 I asked you the question, "Were you trying to get the agreement of the other DRAM manufacturers to say no to Rambus and no to Intel domination?" and you answered, "It appears from this letter that that's what we were urging"?

Do you see that?

A. Yeah. At the time I was under impression that I sent this e-mail out, but I find no record that I sent this e-mail out, so this e-mail never went out to other DRAM companies, so I was mistaken at my previous deposition.

Q. And you kept all your e-mails from the 1996 time period; is that correct?

A. Yeah. We kept most of -- all of my e-mails that -- yeah, we kept a good record of all my e-mails.

Q. So you made sure that there were no e-mails

destroyed in the 1996 time period; is that right?

A. No. We never destroyed anything. We kept everything and we've provided everything.

Q. And was that kept in your personal PC or is there a server at Hynix that keeps all the e-mails from the 1996 time period?

A. Our server is backed up on a monthly basis, and since this situation, we have advised them not to delete anything, not to destroy anything, keep everything, and we had record for a long time, so...

Q. Now, by December of 1996, you knew that Intel was going to choose Rambus as the next-generation memory technology; right?

A. That's correct.

Q. Let me show you Exhibit RX-808, if I could.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. Do you see that these are SyncLink Consortium meeting minutes from December 1996 where you attended?

A. It appears that way, but I haven't read the whole document to see if that's the exact minutes.

Q. Well, look at the very first line down below the list of names.

Do you see that your name appears?

It says, "Tabrizi: It now seems likely Intel will choose Rambus. We need to decide how we proceed."

Do you see that?

A. I see that.

Q. And you understood at the time it was Dr. Gustavson's responsibility to keep the minutes of the meetings?

A. That is correct.

Q. Now, on the top of the next page, the first four lines -- pull those up -- if you could look at those.

It says: "Many suppliers are paranoid over the prospect of a single customer, e.g., Intel having control of market. We can't resist such a possibility individually. We need some united strategy."

Was that a statement you made at this meeting?

A. I don't recall.

Q. And then there's a reference to an Internet e-mail reflector. Is that what supply@hea.com was?

A. That's a distribution list or an e-mail reflector.

Q. And if somebody from another DRAM manufacturer had sent an e-mail to that reflector, it would be sent out to the distribution list; is that right?

A. That is correct.
Q. And that was maintained at Hyundai?
A. I put it together and I maintained it.
Q. And someone at this meeting proposed a meeting of DRAM manufacturer executives in Japan; correct?
A. That's correct.
Q. And that meeting occurred in January of 1997; correct?
A. That's correct.
Q. And you went?
A. Yes, I was.
Q. And before the meeting -- before that meeting in January 1997, you sent several e-mails to other DRAM manufacturers urging them to stick together against Rambus, didn't you?
A. I urged them to continue support for SLDRAM. I never urged them to stick together against Rambus.
Q. Well, let me show you a document marked as RX-802.
May I, Your Honor?
JUDGE McGUIRE: Go ahead.
BY MR. PERRY:
Q. This, Mr. Tabrizi, is a series of e-mails provided to us by Mr. Hans Wiggers. And if you'll look at the bottom of the second page of the exhibit, the

very bottom -- I'll give you time to look at this -- at the very bottom it appears to be an e-mail addressed to two people at Hewlett-Packard.

Do you recognize those names, Mr. Sporon, S-P-O-R-O-N, and Mr. Erasmus? Do you just recognize the names?

A. Yes, I do.

Q. And if you'll see at the next page, there appears to be an e-mail from you? Do you see that?

A. Yes.

Q. And it says, "Gentlemen, I believe in a fact that Intel decision to go on a Rambus route was pure political and domination and control over the DRAM suppliers and not technical."

Is that something that you told the folks from Hewlett-Packard in December 1996?

A. I sent this to the members of the SLDRAM Consortium, including Hewlett-Packard.

Q. If you'll look in the second paragraph, I want you to find the line that starts with "As I have mentioned many times before."

It says: "As I have mentioned many times before, Intel does not make DRAMs, we do. And if all of us put our resources together, we do not have to go on this undesirable path. The path of control and

domination by Intel."

Is that something you sent to the other members of the SyncLink Consortium at the time?

A. Yes, I did.

Q. And then in the last paragraph, it says, "I am asking all of you to stick together on this matter and have your key executive attend the closed meeting on January 10, 1997 in Tokyo."

Do you see that?

A. I see that.

Q. And you were asking the members of the SyncLink Consortium to stick together; right?

A. Of course.

Q. And you did go to the meeting in Tokyo in January 1997?

A. Yes, I did.

Q. If you'll look on the first page of this Exhibit RX-802, do you see that you had forwarded to the SyncLink members an e-mail from Mr. Appleton, the president of Micron?

A. Yes, I see that.

Q. And let me show you if I could another e-mail that you forwarded. This will be RX-809.

May I?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. Is this an e-mail that you sent in December 1996 to DRAM manufacturers forwarding an e-mail from Mitsubishi executives?

A. It appears that way.

Q. Now, at the meeting of DRAM executives in Tokyo in January 1997, you made a presentation to the executives about the long-term industry outlook if Intel stayed with Rambus; right?

A. I was concerned about the Intel not providing an alternative in terms of open standard and committing solely their main memory solution to a proprietary Rambus solution. I was really concerned for the industry.

Q. And you made a presentation to the executives about your concerns?

A. I did.

Q. Let me show you a document about that, RX-849.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. Do you see that this is entitled SyncLink Consortium Executive Meeting, Yokohama, Japan, January 10, 1997?

A. Yes, I do.

Q. Do you see the pages 2 and 3 comprise an agenda for the meeting?

A. Yes, it does.

Q. And on page 3 of the exhibit, at the bottom, it says, "Discussion of the long-term DRAM industry outlook if SyncLink is not successful" and there's a reference to you?

A. That, I see.

Q. If I can take you, please, to the page in the exhibit where I believe there's another reference to that, it's page 43 in the exhibit. The page numbers are on the lower left corner.

Do you see the slide at the bottom that says, "Discussion of long-term DRAM industry outlook if SyncLink not successful"?

A. I see that.

Q. And that's the beginning of your presentation at this meeting; right?

A. No. I presented at the beginning and this is toward the end, kind of open discussion.

Q. But this was part of your presentation?

A. This was part of my presentation.

Q. And on the next page, if you could, please, I have a couple of questions about the bottom slide, which says "Possible future scenarios if SyncLink is

not the next-generation memory solution."

Is that a slide you presented at the meeting?

A. It appears that way and I recall maybe I presented it.

Q. And your first bullet point is that "DRAM manufacturers would lose control of specification and the gross margins will decline."

Do you see that?

A. I see that.

Q. And it was your view at the time that if Intel went forward with the choice of Rambus as the next-generation memory device that the gross margins of the DRAM manufacturers will decline?

A. That was my feeling.

Q. And at the bottom it says, "All DRAM companies will become foundries for a single-source CPU manufacturer."

Did you make that statement to the group of executives?

A. I did.

Q. And the single-source CPU manufacturer, was that a reference to Intel?

A. That's correct.

Q. And that was your concern at the time?

A. That is.

Q. And at the end of that meeting in January 1997, the executives were asked to give comments about what they had heard; is that right?

A. That's correct.

Q. And you heard Dr. von Zitzewitz from Siemens make some comments?

A. Everybody made comments.

Q. Did you hear Dr. von Zitzewitz from Siemens, now Infineon, make comments?

A. I remember.

Q. Did you hear him encourage the other manufacturers to refuse to license Rambus technology at the 1 or 2 percent level?

A. I don't recall if he asked them to refuse.

Q. Did you hear him say that Rambus was unacceptable?

A. I heard that him say.

Q. Did you hear him say that he was disappointed that some of the other companies at the meeting had made statements indicating they would accept Rambus as the next-generation memory module?

A. I don't recall that.

Q. Well, let me show you CX-2250.

If I may, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. If you'll look about one-third of the way down, you'll see an e-mail that appears to be from Terry Lee at Micron dated January 13 to you and to Mr. Chen from Mitsubishi. Do you see that?

A. I see that.

Q. And that's about two or three days after the meeting in Japan; right?

A. That's correct.

Q. And Mr. Lee says, "These are my notes."

Do you see that?

A. Yes.

Q. Well, let's look on the second page. Down towards the bottom there's a paragraph that's headed Siemens.

And do you remember Dr. von Zitzewitz saying that the control concerns you had expressed were realistic?

A. It says, "Control concerns are realistic." It doesn't say you have concerns.

Q. Do you remember him saying that control concerns are realistic?

A. Yes. According to Terry Lee's minutes or the summary of the meeting, that's what he put as what Siemens said. I don't know if that's what Siemens said

exactly.

Q. Well, look a little further in at the line that begins "disappointed."

Do you remember Dr. von Zitzewitz or anyone else from Siemens saying that they were disappointed with some statements made at the meeting from the other manufacturers accepting Rambus II?

A. I see that this meeting summary from Terry Lee says that.

Q. Do you remember Dr. von Zitzewitz saying that point?

A. I remember he was really disappointed. I don't remember exactly what he said.

Q. And these comments by the Siemens folks were then reported to the other consortium members at the next meeting of the consortium; right?

A. We tried to summarize all the comments and write the minutes to the best of our knowledge.

Q. Let me show you that meeting minutes if I could. It's RX-855.

May I?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. Do you see that you're listed as attending the meeting of the SLDRAM Consortium January 14 and 15,

1997?

A. Yes, I see that.

Q. Then if you'll look down on the first page, about four lines down in the text there's a reference to Mr. Lee's notes.

Do you see that?

A. Yes.

Q. And those notes have been placed in the PDF and been made available to the members of the consortium; is that right?

A. That's true.

Q. Then about three more lines down it says: Siemens was eloquent. No future RB road map. Letting one company control industry is crazy. .1 percent royalty okay, 1-2 percent ridiculous. Rambus not acceptable -- RB not acceptable.

Do you see that?

A. I see that.

Q. Do you remember someone reporting at this meeting, January 14, 1997, that Siemens had taken that position, those positions, at the meeting of the executives?

A. It appears that way.

Q. Was there agreement reached at this meeting that a 1 percent or a 2 percent royalty for Rambus was

ridiculous?

A. No agreement. This was Siemens' comment and it was reported as a Siemens comment.

Q. Did you understand that Siemens was encouraging the other DRAM manufacturers to feel the same way?

A. They were just showing their own frustration, and I don't know if they were or, you know, other manufacturers were listening. They were just showing they were very disappointed with this situation.

Q. Well, shortly after this meeting in January 1997 you set up an e-mail network that was exclusively set aside for the executives of the DRAM manufacturers to talk to each other; right?

A. No.

Q. Well, let me show you RX-938.

May I?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. Do you see that these appear to be the meeting minutes from June 1997 of the SLDRAM Consortium and that you're listed as being present?

A. It appears that way.

Q. Well, my only question on this document is on the first page, in the middle of the text where it

says, "We have two other reflectors."

A. I see that.

Q. supply@hea.com for DRAM suppliers and supplyexec@hea.com for the executives of DRAM supplier companies. Do you see that?

A. I see that.

Q. And is it correct that Hyundai was -- is it correct by this time that Hyundai had set up an e-mail reflector so that the executives of DRAM supplier companies could communicate with each other by e-mail?

A. The main purpose of the e-mail setup was that I could or a member of the consortium could communicate or transfer e-mails to the executive. I don't recall a single executive sending e-mails to each other. It was for me and other members to send important information to executives, not just every information.

So at the January meeting in Japan we got the name of the executive, and I didn't want to send to every one of them, so I created this supply executive so key messages that needs to go to executive could just go, so it was for us to communicate to executive.

Q. And Hynix has preserved all of the e-mails that were sent to that e-mail reflector; right?

A. I frankly think maybe one or two maybe maximum

is gone in that e-mail and I think we have a record of it.

Q. Have you gone back to count?

A. I really didn't -- we didn't use it that much.

Q. Were you automatically copied on any e-mail that went through that reflector?

A. I -- no. If they would copy me -- I was part of the executive, so I could receive it, so I put my name as one of the executives.

Q. And so you kept those?

A. I think so.

Q. And throughout this time period you kept up regular communications about Rambus with other members of the SyncLink Consortium; right?

A. That was my job.

Q. Let's look at RX-1105 if we could.

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. This appears to be an e-mail to you from Mr. Mailloux at Micron attaching an article. I'm not going to ask you about the article, which is entitled Price Pressures Slow DRAM Transitions, but I would ask you to read to yourself the e-mail on the first page.

(Pause in the proceedings.)

A. Do you want me to read the whole article?
Q. No. Just the e-mail.
Have you had a chance to look at the e-mail?
A. Okay.
Q. Is this an e-mail that you received from Mr. Mailloux at Micron in 1998?
A. I don't recall, but it appears that way.
Q. What was his position at the time at Micron? Do you know?
A. He was in charge of marketing I believe.
Q. And he sent you an article that had come from the Electronic Engineering Times; correct?
A. I think so.
Q. And he told you that he had called up the reporter and talked to him for about an hour, about the article; correct?
A. That's what he says in the e-mail.
Q. And he says in that first paragraph, "In short I told him that at any density and any process that is available in 1999, RDRAM is at least 30 percent cost adder for Micron."
And then he asked you, he encouraged you to call the reporter and give him Hyundai's views on it; right?
A. I see that.

Q. And then in the last paragraph of his e-mail, he begins with "Anyhow, please visit me if I end up in jail."

Do you see that?

A. I don't see that.

Q. The last paragraph of this e-mail.

Do you see where Mr. Mailloux says, "Anyhow, please visit me if I end up in jail"?

A. Yeah, I see that.

Q. Did you respond to this e-mail?

A. I don't think so.

Q. Did you call the reporter?

A. I don't recall.

Q. Two months later, a little less than two months later, Mr. Mailloux became concerned that Hyundai had gone over to the dark side and joined the Rambus forces. Do you remember that?

A. I don't recall.

Q. Let me show you RX-1155.

May I?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. And again, this is -- this appears to be an e-mail from Mr. Mailloux where he attaches an article. Do you see that?

A. It appears that way.

Q. And he's attaching an article by Mark Ellsberry. Do you see that?

A. I see that.

Q. And Mr. Ellsberry at the time was your boss; right?

A. Yes, he was.

Q. What was his title at the time?

A. Vice president of marketing.

Q. Well, let's look at a little bit of his article and get a flavor for it.

Do you see it's entitled DRAM Face Tough Times in PC100 Era? Do you see that?

A. I see that.

Q. And PC100 was an SDRAM; right?

A. That's correct.

Q. And he says about ten lines down, "There are several major issues to confront before fully launching into PC100 system designs."

Do you see that?

A. Yes.

Q. Now, look on page 2. In the first full sentence there he says, "What's next after PC100? There are two schools of thought: Rambus and the double data rate SDRAM seen by many as a long shot.

The DDR specification is undergoing slow and tedious creation."

Do you see that?

A. I see that.

Q. So he had referred to DDR as a long shot in his article; right?

A. He did.

Q. And then Mr. Mailloux, if we go back to his e-mail, which is only three lines long at the top of the first page, Mr. Mailloux says to you: "Mark seems to give a message at the end here. He only refers to DDR as a long shot and does not even mention SLDRAM. Hope Hyundai has not caved in to the dark side."

Do you see that?

A. I see that.

Q. And you understood him to refer to Rambus as the dark side; right?

A. I have no idea what he referred to as dark side.

Q. And did you call Mr. Mailloux and reassure him that Hyundai had not caved in to Rambus?

A. I don't think it's saying that we have caved in to Rambus. He was just disappointed not seeing SLDRAM as the one solution that we all working hard being mentioned by my boss. So nothing to do with

Rambus.

Q. So you had no idea what he meant by "the dark side"?

A. No idea.

Q. Well, let me show you another e-mail that you received about a year later from a fellow at Mitsubishi, RX-1421.

May I, Your Honor?

Now, you saw this at your deposition.

Do you remember that this is an e-mail from Mr. Chou at Mitsubishi that you received in March of 1999?

A. I see that.

Q. And he says, "Why is LG spending Hyundai money for the tester?"

Do you see that?

He's asking you a question; right?

A. Well, yes.

Q. And LG you understood to refer to LG Semicon?

A. I think so.

Q. And at the time, in the spring of 1999, Hyundai was in the process of acquiring LG Semicon; is that right?

A. That's true.

Q. And at the time, LG Semicon had been preparing

to produce Rambus memory devices in volume; right?

A. That's true.

Q. And the question Mr. Chou from Mitsubishi was asking you was why LG Semicon was spending Hyundai's money to acquire a Rambus testing device; right?

A. That's correct.

Q. He was questioning your judgment on that purchase; right?

A. I have no idea what he was questioning. Since we were merging with them, he thought everything should be kind of on hold waiting for the merger, and they were ordering a big number of testers.

Q. And you agreed that the purchase of the testers was premature?

A. No. I -- since we were merging, he was just questioning why, you know, maybe at Hyundai we have some tester, we should wait for the merger. I don't know why he was asking me.

So to answer your question, I don't know why -- what -- we were merging at the time and everything was on hold, so...

Q. So that LG Semicon's plans to ramp up Rambus production was also on hold; right?

A. At the time of the merger, the agreement was that I think we would consult each other before buying

any major investment, so...

Q. So any purchases of equipment or capital spending that had to do with the ramp of Rambus production would be put on hold; right?

A. Not just Rambus. I mean, when you're merging, you just want to get a consensus from the two company, you don't want individual company -- I have no idea why he sent me this e-mail and I have no idea if they were buying tester or not buying tester.

Q. That wasn't your job; right?

A. No, it wasn't.

Q. All right. Let's move back to April 1998.

You received an invitation in April 1998 from a man named Bert McComas to attend a seminar about Rambus; correct?

A. I don't remember if I received an invitation or I was called or --

Q. Let me show it to you. RX-1138.

May I?

Now, you knew in April 1998 that Mr. McComas was an industry analyst?

A. Yes, I did.

Q. And is this an e-mail that you received from him in April 1998 entitled Rambus Strategy Seminar - Monday, April 13th?

A. Yes, I did.

Q. And it begins, "Please do not forward this message to Intel or to Rambus."

Do you see that?

A. I see that.

Q. And then he says: "I am contacting you to inform you of an important and exclusive seminar to be held in the Silicon Valley on Monday, April 13. The topic is Rambus strategies for DRAM manufacturers."

Does that refresh your recollection that you received an invitation from Mr. McComas in this time period to attend a Rambus strategy seminar?

A. I recall receiving this e-mail.

Q. Now, in his e-mail before he gets to the outline, in the fourth paragraph he says, "In light of the current conditions, can you afford to sustain your current place on the Rambus road map?"

And then he says: "At this pivotal time how should you alter your internal and external Rambus strategy? What potential disaster awaits if your company maintains the status quo?"

Do you see that?

A. I see.

Q. At some point in time did you see Mr. McComas give a presentation to DRAM manufacturers about

Rambus?

A. I believe he did.

Q. And you saw it? At some point in time; right?

A. I think I attended, yes.

Q. Well, let's look on the second page. In the second heading it says: "Strategic options for the memory manufacturer. Will Intel make you regret being a Rambus supplier? How? The safety in being last to market."

Do you remember Mr. McComas explaining what he means by "the safety in being last to market"?

A. I don't know what he meant by that, but I can give you my own explanation.

Q. No. Did you ever hear him explain what he meant? That was my question.

A. I don't recall what he explained.

Q. Now, Mr. McComas had sent you a draft of this e-mail before he sent it out to other people to sign off; right?

A. Yeah. He sent it to me to get my advice that if this is something that we need to do and if it's okay with me to send it to my consortium. And I told him it's okay.

Q. And by your consortium, you meant the SyncLink Consortium?

A. Yes. I was the chairman at the time.

Q. May I hand you RX-1139. Thank you.

Is that the draft he sent you about an hour before he sent the final? An hour and one minute, to be precise?

A. It appears that way.

Q. It says "draft pitch for Rambus seminar"?

A. That's true.

Q. Do you see that it does not have the introductory line that says, "Please do not forward this message to Intel or to Rambus"? Do you see that?

A. I see that.

Q. And isn't it the case that you suggested to Mr. McComas that he add that line, "Please do not forward this message to Intel or to Rambus"?

A. I didn't make that recommendation.

Q. You did tell him that you were okay with his draft; correct?

A. I didn't go really over the draft. I thought the idea of having this seminar by third party at that time may be something that he wanted to make money, and I said it's okay with me.

Q. Would you look, please, at your FTC deposition that's dated November 2002 at page 166.

A. Okay.

Q. At lines 6 through 11, do you see where I asked you, "Did you call Mr. McComas and talk to him in between 9:30 a.m. and 10:30 a.m. on the 3rd of April 1998?" and you answered, "I'm not sure if I called or he called, but I told him I'm okay with his draft"?

Do you see that?

A. I see that.

Q. Was that a true statement?

A. Yeah. It still is the same statement, yes, I was okay with the draft and I was okay with the idea of him sending this to my SLDRAM Consortium.

Q. And you knew in this time frame, early April of 1998, Mr. McComas was trying to make sure that Rambus and Intel did not attend this seminar; right?

A. Yeah. He probably didn't want to cause a lot of enemy.

Q. Let me show you a document you received, an e-mail I think you received from Mr. Desi Rhoden. RX-1149.

May I?

Do you see that this e-mail is addressed to you and Dr. Betty Prince?

A. I see that.

Q. And Mr. Rhoden was at VLSI at the time;

correct?

A. I think so.

Q. And he's currently the chairman of AMI-2?

A. He is.

Q. Now, this says Betty and Farhad. Do you see that?

A. I see that.

Q. Does this refresh your recollection that you knew that Mr. McComas' main focus was to make sure Rambus and Intel did not attend?

A. Can you repeat the question?

Q. Well, let me ask you to look at the portion in the first paragraph that starts with "his main focus" and goes down to "restraint of trade."

Do you see the portion that says: "His main focus appears to make sure that Rambus and Intel do not attend and therefore has been very restrictive on who can attend. If he says everyone except Rambus and Intel, then it is restraint of trade; while if he says only suppliers, then most of who he wants can attend without there being a charge of restraint of trade"?

Do you see that?

A. I see that.

Q. Does that refresh your recollection that you were aware in the April 1998 time frame that

Mr. McComas was trying to keep Rambus and Intel out of the meeting?

A. Is that my recollection that?

Q. Yes. Do you remember that at the time?

A. Yeah, I remember.

Q. And then Mr. Rhoden says, "Believe me, Bert will be willing to repeat his remarks (for a price of course)."

Do you see that?

A. I see that.

Q. And you did hire Mr. McComas to repeat his remarks this time to the DRAM manufacturer executives; right?

A. I don't know if it was a repeat or I -- yeah, he came to one of our consortium meeting and he made a presentation.

Q. Let me show you another e-mail from that same time period from a Mr. Cartelli, who appears to have worked at TI, RX-1166.

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. Did you know a Mr. Roberto Cartelli in April 1998?

A. Yes, I did.

Q. And do you see that you're copied on this e-mail from Mr. Cartelli to Mr. McComas?

A. I see that.

Q. And I won't belabor this one, but let's look at paragraph number 1.

Is it your recollection that Mr. Cartelli and you had talked and agreed to invite Mr. McComas to address the SLDRAM manufacturer executives in June of 1998?

A. Can you repeat your question?

Q. Sure.

Let me help you out a little bit.

Do you see your name appears on the right side about two-thirds of the way down, says "Farhad and I" --

A. Farhad and I.

Q. -- "are planning to rearrange the agenda to create a one-hour slot for your pitch"? Do you see that?

A. I see.

Q. Does that refresh your recollection that you and Mr. Cartelli had agreed to invite Mr. McComas to speak to the manufacturer executives in June?

A. It looks that way.

Q. And you were present for that presentation at

the executive summit in Monterey in June?

A. I think so.

Q. Now, did you agree with Mr. Cartelli that his presentation will stimulate discussion among industry executives?

A. Definitely. I mean, he's a third party and he had a lot of energy, and so we felt that he brings a lot of energy to the consortium presentation.

Q. I'm going to give you a collection of four exhibits that relate to that executive summit in Monterey, and to speed things up, I'll give these to you all at once.

May I?

But I'm not trying to rush you, so if you need time to look at them when I ask you a question, take your time.

And I'll go document by document, so I'll give you time when I get a document to look at it.

If I could ask you to look at RX-1202, the first document in your stack, which is entitled SLDRAM Executive Summit, Monterey, California, June 25, 1998.

Can I ask you to pick up that first document and look at page 2 where it says "Agenda"?

A. Yes.

Q. And do you see where it says "introduction" by

the chairman? Is that a reference to you?

A. It is.

Q. So you were at this meeting and you gave an introduction?

A. I did.

Q. If you'll look on page 3, is it correct that at the end of the meeting you gave a presentation on action items and conclusion?

A. Yes, I did.

Q. And looking up to the slide at the top of that page 3, do you see that there were some guest speakers?

A. Yes, we had.

Q. And the third guest speaker is a reference to Inquest? Do you see that?

A. Right.

Q. Is that Mr. McComas?

A. I think so.

Q. And it says "What problem is solved by SLDRAM?" Right?

A. That's correct.

Q. Well, let me ask you to go to the third document in your stack, RX-1188.

That's it.

And do you see that's entitled SLDRAM Executive

Summit, What Problem Is Solved by SLDRAM? Bert McComas of Inquest? Do you see that?

A. I see it.

Q. And his first slide down at the bottom says, "What problems do we face? Tactical. Manage price competition, profitability."

Do you see that?

A. I see that.

Q. And you heard him make this presentation; right?

A. I don't recall, but I was there when he made it.

Q. You had reviewed his slides ahead of time?

A. No, I did not.

Q. You understood Mr. McComas in this presentation to be pointing out that the industry should be coming up with a way to manage price competition?

A. I have no idea what he meant by that.

Q. Well, let's look at the next page, page 2, where it's entitled Intel's Battle for Control, and it says, "Intel/Rambus are using your money to take control of the DRAM industry."

Did you hear him explain what he meant by that?

A. I don't recall, but he did present this, so...

Q. Well, let's look at the end of his presentation to page 5.

At the bottom it says "What should SLDRAM Inc. become?" Do you see that?

A. I see that.

Q. And then on the next page, he says, "Fragmented competition undermines all DRAM manufacturers."

Do you see that?

A. I see that.

Q. And did you understand him to be saying that competition had led to an unprofitable situation for the DRAM manufacturers?

A. I don't see that.

Q. Do you remember what he said when he described this chart?

A. I don't recall.

Q. Now, there was another industry consultant at that executive summit as well; right, Mr. Victor de Dios?

A. I believe so.

Q. And I'll ask you to pick up RX-1204. It's the last document in that stack.

A. I see that.

Q. And did he make a presentation -- strike that.

Do you remember him making a presentation at this meeting of DRAM executives?

A. Who?

Q. Mr. de Dios.

A. Yes. But this is HP presentation.

Q. Well, if you'll look, I believe you'll find Mr. de Dios' presentation if you'll look to page 4 of the document. This is how this was produced to us by IBM.

A. Yeah.

Q. Do you see a slide that says "de Dios and Associates" at the top?

A. Yeah, page 4.

Q. Right.

A. Yeah, that's it.

Q. And it says "Structural Changes in the DRAM Market." Do you see that?

A. Yes.

Q. And you were present when Mr. DeDios gave his presentation?

A. Yes, I was.

Q. And one of the things he refers to is too many DRAM manufacturers. Do you see that?

A. I see that.

Q. And did he make the point that there was an excess of capacity in the industry that was creating pressure on prices?

A. I have no idea what he means by that.

Q. The point just before that refers to an out-of-control spot channel.

Does spot channel refer to the spot price market?

A. Yeah.

Q. And it says: "Many of the problems are industry problems, not company problems. Competition will not resolve them."

Did you hear him say those words at this meeting?

A. I don't recall.

Q. Now, going back to Mr. McComas' presentation at this meeting of DRAM executives, did his presentation in fact stimulate discussion among the industry executives as you had hoped?

A. I -- I mean, if you look at the minutes and maybe we can get some feelings, but you know, he made the presentation. HP made a presentation. Compaq made a presentation. IBM made a presentation. So there was some discussion about the industry.

Q. Was one of the things Mr. McComas suggested

during his presentation at this June 1998 summit that the manufacturers share their information on their RDRAM production plans in order to create a shortage of RDRAM and keep prices up?

A. He suggested that he can become a third party, that everybody can share their production number with him, then he can make analysis that if there was a demand-supply imbalance, but I don't think anybody went with this suggestion.

Q. And what do you mean when you said "supply-demand imbalance"?

A. When you have -- supply is what we produce. Demand is what the customer and, you know, the consumer buys.

Q. And you were concerned in this time period that there not be an oversupply of RDRAM because that would drive prices down?

A. Oversupply of anything will drive the price down. When you produce too much and there is not enough demand due to whatever reason, then the prices collapse.

Q. Well, let me show you RX-1208.

Now, this is a document that was not prepared by you. I'm just going to ask you if it refreshes your recollection about a meeting you attended.

If I could, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. This was produced to us by Infineon, and I'll ask you to look at page 4 where there's a reference to that June 1998 SLDRAM executive meeting.

Do you see the very last bullet point at the bottom? It says, "What problem is solved by SLDRAM (guest speaker Bert McComas)"?

A. I see that.

Q. Do you see that it says, "McComas made suggestion to the audium that every DRAM vendor sends the Rambus production plan for the next year in order to cross-check whether Intel has managed to generate an oversupply situation"?

Do you see that?

A. Yes.

Q. Did anybody in the meeting respond to Mr. McComas by saying it was a good idea, bad idea?

A. I think there were mixed feelings. I was against it. I don't want to share my production number with anybody, so I didn't, you know, promote this idea.

Q. Have you ever asked other DRAM manufacturers to share their numbers with you on RDRAM?

A. No. That's something we may ask, but I don't think anybody would respond because it's very confidential data.

Q. Have you ever asked them, you personally ever asked for somebody else's RDRAM production estimates?

A. No, I have not.

Q. Well, three weeks later Mr. McComas asked you for advice on how to make his project work. Do you remember that?

A. Yes.

Q. Let me show you that. RX-1232.

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. This is an e-mail from Mr. McComas to you dated August 15, 1998; correct?

A. It appears that way.

Q. And he says in the first paragraph: "Farhad, may I have your advice on constructing this project. I mentioned this during the SLDRAM conference. Please keep our discussion completely confidential. If this is seen as an SLDRAM project, it will probably fail."

Do you see that?

A. I see that.

Q. And he was asking you for advice on how to

structure a request for production information from other DRAM manufacturers; right?

A. I think he was trying to get my support for his project.

Q. And one of the things that he says in the paragraph just under the dotted line, do you see where it says, "During the critical production ramp-up phase of direct Rambus, DRAM vendors will need a constant flow of information to help make wise decisions and to walk the fine line between a pleasant shortage and a disastrous oversupply"? Do you see that?

A. I see that.

Q. Did you agree with him that DRAM vendors needed that information to avoid a disastrous oversupply?

A. I mean, that's the intelligence the DRAM companies gather over time to make sure that their product is in good demand and there's nothing unique to this situation.

Q. So you agreed with him that that was important to have that information?

A. Of course.

Q. Why is a shortage pleasant for a DRAM manufacturer?

A. Prices go up.

Q. And your response to Mr. McComas was that the industry was guaranteed to have an oversupply of Rambus chips in your view; right?

A. I agree.

Q. And you didn't want there to be an oversupply of Rambus chips; correct?

A. I don't want to be oversupply of anything.

Q. Including Rambus memory devices?

A. Including Rambus.

Q. And let me show you RX-1251.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. Is this your response to Mr. McComas' August 1998 e-mail about his production forecast project?

A. It appears that way.

Q. And your view as stated here was that we are guaranteed to have an oversupply of Rambus chips; right?

A. I was just telling him I don't think his service can be valuable, because regardless of what he thinks, Intel is the final decision maker in terms of how much chipsets to produce and how many DRAMs are needed. So I didn't -- I just wanted in a nice way

tell him just forget about it.

Q. It was your view that we're guaranteed to have an oversupply of Rambus chips; right? It was your view at the time?

A. I mean, that was my belief that we will have an oversupply because of many technical problem that Rambus was failing and the chipset was having problems, so too many people producing product that is not going to be used will cause oversupply.

Q. And that concerned you greatly, didn't it?

A. Pardon me?

Q. That concerned you greatly?

A. Oh, of course.

Q. That there would be an oversupply of Rambus chips and that would drive price down?

A. Because, again, the ramp-up was not ready. The Intel was not ready. So if we produce too much product and we cannot sell it, the price will collapse below the cost.

Q. The price will be zero if you couldn't sell it; right?

A. Yeah. And that's exactly what happens.

Q. Well, it had been your prediction in the fall of 1998 that Rambus devices would make up 40 percent of the DRAM market in 2000. Do you remember that?

A. I -- that was very optimistic, my point of view.

Q. Well, let me see if I can refresh your recollection and show you RX-1273.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. And it says -- this was produced to us by Hynix, so it's a lengthy document. I'll just point out a couple of things to you.

Do you see up at the top it says "980922 SLDRAM minutes"?

A. Yes.

Q. And let me point you to just one statement that's attributed to you on page 6 of the exhibit and see if it refreshes your recollection.

Do you see up at the top it says, "FT: Intel with all their power will make their RDRAM happen from 1999 to 2000, will probably get 40 percent of the market over that time frame"? Do you see that?

A. I see that.

Q. Does that refresh your recollection that it was your view in the September 1998 time period that the Rambus device would get about 40 percent of the market in 2000?

A. That was your view that if everything works out and since Intel is very much committed to Rambus it will at least get 40 percent because Intel has 80 percent of the market.

Q. And you believed that in order for that kind of market penetration to occur, Intel needed to create an oversupply of RDRAM chips so the price would come down; right?

A. Intel wanted to have the price of Rambus very low in order to be able to design it in, so pricing was an important factor in terms of what percentage of their total requirement will be.

Q. And that's because the OEMs would be more likely to order substantial quantities of chipsets or chips, RDRAM chips, if the price was very low?

A. They're comparing RDRAM with the existing product that is available in the market, and at that time it was SDR and everything compared to SDR, what premium Rambus can have over SDR, and they would tell us if it's more than 5 percent, they cannot touch it. And --

Q. "They" being the OEMs?

A. The OEMs would tell us that 5 percent is the price that they need to have.

Q. And so you took steps in the fall of 1998 to

try to be sure that the RDRAM production would be low so that the price premium would stay higher than that 5 percent level; right?

A. My job in our company is to make sure we build the right product for the right segment for the right customer according to their demand, so we do this on a monthly basis, we do a six-month rolling forecast and we build our production based on customer need.

Q. And you didn't want the right product to be the RDRAM; right?

A. No. That's not the case.

Q. Well, you took steps in the fall of 1998 to try to ensure that RDRAM production stayed low so that the price premium stayed higher than that 5 percent level; right?

A. That was my own point of view that I want to make sure that the Rambus from Hynix point of view or Hyundai point of view is not in an oversupply situation.

Q. Well, you believed at the time that Intel would not change course away from Rambus unless the Rambus device failed to get market penetration; right?

A. This is not just true for Rambus. For any product, if it doesn't become a low cost to manufacture, it never becomes reality. The issue is

cost, cost, cost.

Q. And one way to cause Rambus to fail to get market acceptance was if the OEMs were convinced that even if the production volumes went way up, the prices weren't going to come down?

A. Because of the inherent reason that Rambus packaging, testing, die size was expensive, they all get the cost number from us and they felt the cost is around 40 percent higher, so they felt it would not come down.

Q. So if the OEMs were convinced that even after production ramp-up the prices would stay up, the OEMs are not going to accept Rambus, that's your view at the time?

A. The price of PCs would continue going down and the low cost was a critical issue at the time.

Q. And so was it your view at the time that if the OEMs were convinced that even after production ramp-up of Rambus the price would still be high, they weren't going to adopt Rambus?

A. Absolutely.

Q. And so you took steps in the fall of 1998 to convince other DRAM manufacturers to try to convince OEMs that even though production was going up, prices would still stay high; right?

A. I don't know what you're talking about.

Q. Let me show you some documents from that time period.

I'm going to start with RX-1280A. Actually I'll give you two at once, RX-1280A and RX-1293A.

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. If you'll take a moment and look at those, I'd like to -- may I put the board over here?

JUDGE McGUIRE: Go ahead.

(Pause in the proceedings.)

BY MR. PERRY:

Q. Now, the first document I gave you is dated September 25, 1998. Do you see that?

A. Yes.

Q. And you sent it to a group of Hynix executives in Korea; correct, as well as copying it to folks here in this country?

A. That's correct.

Q. And it's entitled RDRAM Pricing Forecast and Strategy; right?

A. That's correct.

Q. And you said, "Gentlemen, we have been thinking a lot about what is the proper pricing

strategy for RDRAM devices"; right, and then you went on from there?

A. I see that.

Q. And then you gave some price projections for RDRAM by quarter by device; right?

A. Yes.

Q. And then the second document I gave you is dated about ten days later; right, October 6, 1998?

A. That's correct.

Q. And that's a document that you sent out to the sales force, the Hynix sales force in this country; right?

A. I think so.

Q. And you were telling them that they could use the attached RDRAM pricing forecast for their OEM accounts; right?

A. That's correct.

Q. And in fact you encouraged them to distribute these to the key accounts; correct?

A. That is my recollection.

Q. Well, I don't want to spend a long time comparing the numbers on these two, but I want to compare just two sets of numbers if I could and ask you to help me put this on the board.

May I?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. Now, I've written "RDRAM ASP."

Do you use "ASP" to refer to average selling price?

A. Yes, we do.

Q. And if you'll look on the first document, September 25, 1998, do you see the column for second quarter '99? Do you see that column?

A. I do.

Q. And down below that, there's a reference to a 64M. Is that a 64-meg device?

A. That's correct.

Q. And the package price for that in this September document is $16.57; right?

A. That's correct.

Q. Okay. And if you'll look, please, on the document you sent to the sales force, which is RX-1293A, do you see the second quarter '99 projected ASP there?

A. I do.

Q. And is that number $26.40?

A. That's correct.

Q. And now if you could, do the same exercise for the 72-meg.

What's the second quarter '99 price that's listed on Exhibit 1280A? Is it $20.21?

A. What time frame?

Q. Second quarter '99.

A. $20.21.

Q. And do you see in the October 6, 1998 document that was sent to the sales force that the projected ASP is $30.80? Is that right?

A. That's what that figure is.

Q. So is it correct that, just doing the math, that from document 1280A dated September '98 to document 1293A dated October '98 that the projection went from $16.57 to $26.40 for the 64-meg device?

A. You have to consider that this was our original discussion point that we started internally.

Q. I'll let you explain that in just a second, but did I just get that right?

A. This is totally two different document that you're comparing apples to oranges, so I don't --

Q. I'll ask you that in a second.

Did I get the numbers right off the documents? The numbers that appear in the document are now on the board?

A. Yes.

Q. Now, explain to me why it's not apples and

apples.

A. This one is the price that goes outside to our salespeople as a negotiating --

JUDGE McGUIRE: Now, sir, I don't know which one you're talking about for the record. You need to point out which one you're referring to.

THE WITNESS: This one, the RX-1293, the table, this is our projected pricing to start a negotiation with our customer, so usually our marketing people have a lower backpocket pricing that they keep to negotiate to that price.

And frankly, at that time the Rambus was just for initial volume. The pricing was very much subject to yield. If the yield -- if you look at it, 2Q99 assumption in the other chart shows 60 percent yield. If the yield assumption would have changed to 50 percent, that -- so this is internal discussion how we come up with pricing. This is what we give customers to start the negotiation.

So that's why I'm saying it's totally different. This is internal pricing strategy; this is external pricing projection (indicating).

BY MR. PERRY:

Q. And in your memo on internal pricing strategy you said you wanted to make about $3,000 per eight-inch

wafer; right?

A. That's correct.

Q. And that would mean in order to keep to that target that as your yield went up, your prices would go up, too?

A. No. This was like if you want to make a fixed $3,000 per wafer how many die we have, what's the yield. Then we calculate into pricing. As the yield goes up, then the price comes down, but we still make $3,000 a wafer, so that was our kind of a goal to make $3,000 per wafer regardless of the yield.

Q. Now, you referred to the backpocket pricing for the sales reps; right?

A. That's right.

Q. Well, look on the October 6, 1998 document.

A. This one?

Q. Yes. The one that went to the sales force, RX-1293A?

A. That's correct.

Q. Do you see a reference to a 10 percent discount?

A. For strategic accounts we can have as much as 10 percent.

Q. And you understand "strategic accounts" means the more important customers; right?

A. Right.
Q. Now, that refers to a 10 percent discount?
May I approach, Your Honor?
JUDGE McGUIRE: Yes.
BY MR. PERRY:
Q. The difference between $16.57 and $26.40 is about 60 percent, isn't it?
A. If you did the math.
Q. Would you just take my word for it on the math?
A. He looks like a knowledgeable guy.
Q. And the difference between the $20.21 and the $30.80 for the 72-meg is about 50 percent, isn't it? That one is a little easier.
A. That's true. But one thing I wanted to point your attention, if you look at the Q499 of this pricing, the table, the Q499 pricing has dropped to $15.00, so in two quarters the price has dropped to below what you were saying, so this is just a price projection based on yield and nobody was placing big volume at the time, so I don't think there's a big deal in terms of this price difference with that price difference, but if --
Q. And you knew that in October 1999 those key accounts were making their decision on where to go, DDR

or RDRAM or PC100; that's what this memo you sent to the sales force says?

A. This memo, if you research the background for it, IBM requested us to fill out a table for them as a price projection, and I -- and that request by IBM started this chain e-mail, this other big document, that how should we come up with pricing (indicating).

So it was a request by IBM and we filled it out and we gave it to them.

Q. Well, the October 6, 1998 memo that you sent to the sales force doesn't talk about IBM in particular, does it?

A. No. After I did this for IBM, then I came up with the basis for our pricing. Then we provide it to everybody.

Q. And you encouraged the sales force to distribute these prices to their key accounts who were then at that time making their decision on DDR versus RDRAM versus PC100; right?

A. Yes. And the reason for it is because Intel was telling everybody it's only going to be 5 percent premium, and it would cost us at least 50 percent more.

I mean, you guys have our cost numbers. We can look at it. It cost us at least 50 percent more. I

wanted to make sure my OEM knows it's going to cost them more than 5 percent. Intel and Rambus was telling everybody that it's going to be 5 percent premium. And that was absolutely incorrect, and that's what I wanted to show them, that their premium that they're considering should be realistic.

Q. It was just a few months later that you were saying publicly that the die size for Hyundai was just 10 percent larger than SDRAMs, wasn't it?

A. Exactly.

Q. Okay.

A. But die size is only part of the issue. You have to -- package cost is about 250 percent premium. Test cost is 240 percent. So the combination of all would be around 40 percent premium. We have a lot of document to show that.

Q. And you remember those numbers?

A. I do.

Q. Well, in this same month, October 1998, isn't it true that Hynix gave RDRAM production forecasts to Intel that were deliberately inflated?

A. We wanted to be on the good side with Intel, and Intel was not happy with our ramp-up, so we gave them a very optimistic number on our side.

Q. You thought they'd be happier with Hynix if

they were lied to; is that right?

A. No. If we showed them that we have difficulty to produce large volume, especially since the market is not ready and Intel chipset is not ready, if we don't show them big volume, they will not probably be happy, so we were very optimistic early on.

Q. Let me show you Exhibit CX-2330.

May I, Your Honor?

Now, this is an e-mail from a Mario Martinez to a gentleman named Gee Soo Kim. Do you see that?

A. I see that.

Q. And Mr. Martinez worked for you at the time, he reported directly to you; right?

A. Yes, he did.

Q. And it's dated October 18, 1998.

Do you see in the second sentence it says "from HEA's perspective"? Does that refer to Hyundai America?

A. Yes, it does.

Q. "From HEA's perspective, we can overstate our direct Rambus production so Intel can feel we are more aggressive on our ramp-up."

Do you see that?

A. I see that.

Q. And isn't it the case that Hynix gave Intel

inflated production numbers in the fall of 1998?

A. When we saw the original number, they were so small that I was really shy to give this to Intel, and so we massaged the number a little bit to show more aggressive ramp-up, yes, we did.

Q. And in that same month you urged other manufacturers also to give Intel inflated price projections and inflated production numbers, didn't you?

A. I have no recollection of that.

Q. Let me show you RX-2192.

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. Do you see that this is headed Meeting at Micron: Definition of SLDRAM and Virtual Channel Architecture and that you're listed as attending?

A. It does show that, but I don't know what is this.

Q. Well, let me help you with it before I ask you anything substantive.

There's a list of people who were present, if you could pick it out.

Do you see that in addition to you there's five or six people listed from Micron?

JUDGE McGUIRE: Okay. Mr. Perry, before we go further, let's lay a foundation as to the time frame we're referring to.

MR. PERRY: Yes, Your Honor. I believe that this was a document prepared by Infineon, by Mr. Benedix of Infineon, in October of 1998. There are references on the last page to two meetings that I'm not saying that this gentleman was at on October 16, 1998.

BY MR. PERRY:

Q. So if I could ask you now to turn back to the first page.

A. Again -- sorry.

Q. Let me ask you a question.

JUDGE McGUIRE: He hasn't asked you a question, Mr. Tabrizi. Let's wait.

BY MR. PERRY:

Q. Do you remember being at Micron in Boise for a meeting to discuss NEC's virtual channel architecture and its possible use in SLDRAM where Mr. Lee was present from NEC?

A. I don't recall attending a meeting, a particular meeting in Boise to discuss SLDRAM.

Q. And you've met Mr. Benedix before, you know him to be an Infineon person; right?

A. I don't recall.

Q. Well, let me ask you about the statement that's attributed to you at the bottom of page 2 and see if that refreshes your recollection that you were at this meeting.

A. Okay. Which page?

Q. Well, do you see where -- at the bottom of page 2, do you see where it says "Other information collected during and besides the meeting"? Do you see that?

A. Other information collected during and beside the meeting.

Q. Right.

JUDGE McGUIRE: I don't see that. Can we blow that up? There we go.

BY MR. PERRY:

Q. And then down at the bottom it says "according to Farhad Tabrizi." Do you see that?

A. I see what it says here.

Q. It says: "According to Farhad Tabrizi, Hyundai has given Rambus ASP projections for end of next year of two to three times of today's SDRAM prices; they also gave to Intel a production projection of three times their actual plans. They encourage every DRAM manufacturer to do the same in order to let Intel not

generate a Rambus oversupply."

Do you see that?

A. I see that.

Q. Did you at a meeting of other DRAM manufacturers encourage them to give Intel inflated production projections and inflated Rambus price projections in order to keep Intel from generating a Rambus oversupply?

A. Absolutely not. I would not say that type of information in a technical meeting in a public forum. This is absolutely not correct.

Q. And you have no idea why that sentence appears in that trip report?

A. I have -- I mean, first of all, it says, "Other information collected during and besides the meeting," so I don't know if I was talking to him or -- you know, I have no recollection of this saying to anybody.

Q. Well, you followed up a few months later to check on Micron's RDRAM production volume to make sure it wasn't getting too high, didn't you?

A. I have no recollection of that.

Q. Let me show you RX-1386.

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. Now, there are three blocked-out spaces on this document, and that's been a problem for both sides. Some of the Hynix documents had company names marked out. In this document I believe it's RDRAM and Rambus that are blocked out.

Do you remember sending Mr. Terry Lee at Micron an e-mail in February of 1999 asking him about his anticipated -- Micron's anticipated or projected RDRAM production in 1999?

A. What it appears to be is a Nikkei electronic newspaper article saying that Micron will have 18 percent of the Rambus production, and it was kind of -- to me it was kind of impossible, so I sent it to Terry Lee, which I have many contact at SLDRAM just -- and I calculated that will mean 16 million pieces. And I just sent it to him to see if is that a possibility.

I mean, I wasn't sharing information. I was just -- anyway, I sent it to Terry Lee, yes, I had.

Q. And based on your prior understanding from Mr. Lee or others at Micron, you didn't think that was a realistic number of what they would be producing for RDRAM?

A. Because at the time early in '99 the Rambus Camino chipset was not ready and Intel was delaying.

There's no reason for somebody to produce 16 million pieces without the market being there.

Q. So you asked Micron if the forecast was really a possibility; right?

A. Yes.

Q. You didn't believe it was true that Micron would be producing that much; right?

A. That's correct.

Q. Did Mr. Lee get back to you?

A. Actually not. And Mr. Lee's job is technically. He doesn't even know what production number he should do or not, so it was just a kind of casual comment that are you guys doing this much. I didn't expect an answer.

Q. Well, a few months later in the summer of 1999 you became concerned that Samsung might be producing so much RDRAM that there would be an oversupply and the price would come down; right?

A. I have no idea what you're talking about.

Q. Let me show you RX-1487.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. This is a series of e-mails, and I'd like to take you just to page 3. This was produced to us by

Hynix.

Do you see the date in the middle of the page July 20, 1999?

A. Yes, I do.

Q. And it says to you, Farhad Tabrizi?

A. I do see that.

Q. At HEA.

What was your title at the time in July 1999?

A. Either director or vice president. I have -- one of those two.

Q. And the subject that's listed is Rambus recommendations and issues. Do you see that?

A. I see that.

Q. And it says: "Farhad, I reviewed your Rambus proposal and agree wholeheartedly with your recommendations. However, I would like to add some additional requests and questions," and then there is a number 1.

Now, a portion of this e-mail is from Mr. Martinez and a portion of this is from you; is that right?

A. No.

Q. Which portion is from you?

A. The portion that is from me I think is the first page that goes to Dr. Kim. "Hello, Dr. Kim."

The first -- it's page 6 of 6.

Q. Well, your name appears on page 3. It says, "Farhad, I reviewed your Rambus proposal."

A. So this was --

Q. Do you see that?

A. Yeah. The page 6 was my proposal, so his -- Mario's comment is based on the page 6 letter to Dr. Kim. At that time we were merged with LG and we had to review the two companies' Rambus product and make a decision which way to go.

Q. So Mr. Martinez is responding to your proposal that's on page 6 of the exhibit; is that right?

A. I think so.

Q. And if you'll see, page 6 of the exhibit is dated July 18, 1999, whereas page 3 is July 20; right?

A. So it's after, so...

Q. So Mr. Martinez has reviewed your proposal, he says he agrees with your recommendations and he has some additional requests and questions; right? That's on page 3.

A. I think so.

Q. And so, for example, on item number 1, he says, "We drop HEI's 288Mb. Too risky to do," and then you say, "Sir, I don't have any argument with you"; is that right?

A. That's not my comment.
Q. Who made those comments?
A. Those comment went to -- I think -- I believe it's the gentleman who used to work at LG and for the time being he had some responsibility for the Rambus project.
Q. You received a copy of this, didn't you?
A. I did receive the copy.
Q. And you read it at the time?
A. I don't recall at the time, but I did receive a copy, it appears that way.
Q. You reviewed Mr. Martinez' response to your proposal about Rambus; right?
A. Frankly, Mr. Martinez usually writes very long e-mails, so I kind of reviewed it and forwarded it. I didn't read the whole thing.
Q. And who was the individual who used to work at LG Semicon that you think was writing these responses --
A. Mr. --
Q. -- where the carets are?
A. Mr. S.H. Ahn, A-H-N last name.
Q. And where is he now?
A. He's no longer -- after we merged with LG, he stayed with us a couple of months. He left.

Q. Where did he go?

A. I have no idea.

Q. And would you look on the next page, page 4.

A. Yes.

Q. Look under item 6.

A. Okay.

Q. Do you see where Mr. Martinez says: "With Samsung building significant amounts of product, we need to work with them to limit the supply in the market, otherwise we both will be competing for market share which will result in an oversupply. We have to meet with Samsung and discuss our and their production plan, TAM analysis and targeted market share"?

Do you see that?

A. I see that.

Q. And that was a proposal that Mr. Martinez was making to you at the time, wasn't it?

A. No. I mean, he was making comment on my original request, yes.

Q. It was a response to your proposal; correct?

A. I didn't send my proposal to Mario and I didn't expect him to comment on my proposal. I sent it to head of R&D which basically had picked which technology we should choose, so Mario just made the comment on his own behalf.

Q. What was his position at the time at Hynix?
A. Marketing manager.
Q. And what I just read to you was a response by him to your July 18 proposal; correct?
A. Again, Mario made his feeling known that it's going to be oversupply and he felt that we should talk to Samsung and --
Q. And then in response to that someone said: "I have connection in Samsung. If I know what time you are available, I will try set up meeting with key person in Samsung in Seoul, Korea."
Do you see that?
A. I see that.
Q. Did you say that?
A. No. This is again Mr. Ahn, H.S. Ahn.
Q. And it says: "And I will try persuade them. Actually they also have same idea for Rambus business compare with you."
Do you see that?
A. I see that.
Q. Did you talk to Mr. Ahn about his discussion with Samsung where they have the same idea that Mr. Martinez had had?
A. I don't think never any discussion took place with Samsung. I -- this didn't come to my attention at

all, and if it would have, I would have rejected it from the beginning, so this was something Mario did and Mr. Ahn commented on it.

Q. So you're confident you never even read that paragraph?

A. Pardon me?

Q. Are you confident you never even read that paragraph?

A. Frankly, before I come to this preparation for this testimony, I have never seen those two paragraph. That's my truest statement.

Q. Now, it is true, isn't it, that the top executives at Hynix were aware of your desire to kill Rambus?

A. My top executives were always aware I was pro industry standard. I always thought Rambus had its own place in the market. I believed in them. I thought they have a good solution. But for the main memory I have always been pro standard. I think it benefits consumer, it benefits everyone.

Q. Let me ask it again.

Did you ever tell Sang Park that you wanted to kill Rambus? Force them from the market?

A. Yeah, I may have used that -- yes.

Q. Let me show you an e-mail that you sent to him

in June of 2000.

Who is Mr. Sang Park in June of 2000?

A. He was our president and COO.

Q. Is he still with Hynix?

A. No, he's not.

Q. That's RX-1661.

May I?

JUDGE McGUIRE: Go ahead.

BY MR. PERRY:

Q. Is this an e-mail that Mr. Park sent to you on June 8, 2000?

A. That's correct.

Q. And he says, "Farhad, thanks for your input."

Do you see that?

A. I see that.

Q. And the rest of this document is your e-mail dated that same day to him; correct?

A. That's correct.

Q. And you say, "Dear Park SJN, This is a private e-mail to you with my suggestions"; right?

A. That's correct.

Q. Well, look on the second page.

Do you see in the bottom of the carry-over paragraph -- just where it starts with "if Intel" -- do you see where it says: "If Intel does not invest in

us, I really want to ask you to let me go back to my old mode of RDRAM killing. I think we were very close to achieving our goal until you said we are absolutely committed to this baby"?

Do you see that?

A. I see that.

Q. When was it that you thought that you were very close to achieving your goal of killing RDRAM?

A. When basically my mentioning of RDRAM killing it's as an exclusive, proprietary solution for Intel architecture. Intel -- this is October 2000. This is June of 2000.

Q. June of 2000.

A. By June of 2000, Intel had many delays and cancellation of their chipset and DDR by this time has come in already and they were positioning DDR as the next-generation main memory, and during this time Sang Park, our new president, came join our company and he put Rambus as the highest priority and he allocated many dollars and wafers to Rambus.

So since the market was not ready, since Intel was having a lot of problem, I felt that it's really premature to invest all this money into loading wafers on Rambus and I told him he's making a mistake and if he wants to, it's fine, but I think basically Intel is

looking at the alternative for main memory and is not looking at exclusive Rambus.

JUDGE McGUIRE: Now, what are you talking about when you say Sang Park, our new president, had joined our company and put Rambus as the highest priority and allocated many dollars to Rambus? What context are you talking about? What was he doing in that time period?

THE WITNESS: So we get together for a product planning meeting and we decide the priority of the product, and at that time Samsung was one of the main suppliers for Rambus and Sang Park wanted to compete with Samsung head to head.

JUDGE McGUIRE: Okay.

THE WITNESS: So he'd ordered our factory to load all of our factory with Rambus and he wanted to compete with Samsung. He said if Samsung is enjoying Rambus prices are high, I want to share that. And I felt that since Intel is kind of backing away from Rambus and Hynix is trying to put all this investment into Rambus, it's kind of oxymoron.

JUDGE McGUIRE: All right. Go ahead.

BY MR. PERRY:

Q. And you're aware that Samsung has continued to make substantial profits on its RDRAMs since?

A. I have no idea what Samsung is making in profit.

Q. Now, the question I asked you before was: What time period was it when you thought you were very close to achieving your goal of RDRAM killing?

A. I think it's between late '98 and 2000 when Intel was having major problem with their chipset and continued delaying and Camino was canceled, so I think -- I always believed Rambus is very difficult to manufacture and I made that known to everybody, so during that time, Rambus was kind of killing itself for technical reason, and you know, I was promoting DDR and SLDRAM at the time.

Q. So your reference to your old mode of RDRAM killing was to Rambus suicide; is that your testimony?

A. Yeah, Rambus suicide, me watching it on the sideline.

MR. PERRY: I have nothing further, Your Honor.

JUDGE McGUIRE: Okay. It's ten to one. Let's take a break. We'll convene back in this courtroom at ten minutes after two.

(Whereupon, at 12:50 p.m., a lunch recess was taken.)

A F T E R N O O N S E S S I O N

(2:11 p.m.)

JUDGE McGUIRE: Mr. Perry, it just occurred to me as I go by there, you ought to -- okay. You got it. Let's mark that as DX-270 I believe.

MR. PERRY: Yes, Your Honor. I have a sticker here that says DX-270, and with your permission --

JUDGE McGUIRE: Actually I think it looks pretty good at the end of your finger, but go ahead.

(DX Exhibit Number 270 was marked for identification.)

MR. PERRY: And also over lunch I talked to Mr. Oliver about some exhibits I'd like to move in. It's a list of them. He has no objections to the list.

RX-694, RX-778, RX-802, CX-2250, RX-1105, RX-1139 and RX-1166, we would move those in.

JUDGE McGUIRE: So entered with no objection; correct?

MR. OLIVER: No objection, Your Honor.

(RX Exhibit Numbers 694, 778, 802, 1105, 1139 and 1166 were admitted into evidence.)

(CX Exhibit Number 2250 was admitted into evidence.)

JUDGE McGUIRE: All right. Having done that at

this time, we'll entertain the inquiry of the witness by complaint counsel.

CROSS-EXAMINATION

BY MR. OLIVER:

Q. Good afternoon, Mr. Tabrizi.

A. Good afternoon.

Q. I'd like to start off if I could with a document that I believe is the last document that Mr. Perry showed you. It's RX-1487.

Do you still have that in your pile?

A. Okay.

Q. It should have a sticker towards the lower right that reads "Oh 17 1-9-03."

A. I see it on the screen, but I can't find it here.

Okay. I got it.

Q. It says -- in the lower right-hand corner it says RX-1487.

May I approach, Your Honor?

JUDGE McGUIRE: Yes.

(Pause in the proceedings.)

MR. OLIVER: I apologize, Your Honor.

BY MR. OLIVER:

Q. Mr. Tabrizi, do you have RX-1487 in front of you now?

A. Yes, I do.

Q. I'd like to ask a couple of questions about the document first if I could, though, to put it in some perspective.

At some point in 1999 Hyundai and Lucky Goldstar agreed to merge; is that right?

A. That's correct.

Q. Did you have any role in combining the operations of Lucky Goldstar and Hyundai?

A. Yes, I did.

Q. What was your role?

A. I was asked to look at the two companies' product line and try to make a recommendation as far as which product line we're going to select to continue forward.

Q. As part of that function did you assess the status of Lucky Goldstar's Rambus production capabilities?

A. Yes, I did.

Q. What did you find?

A. That Rambus -- that LG, Lucky Goldstar, was very much advanced on Rambus and they were ready to mass-produce devices in volume production.

Q. Did that impact any recommendations that you made?

A. Yes, it did.

Q. And how did it affect your recommendations?

A. Based on my recommendation, I suggested that we should pick the Lucky Goldstar Rambus product as the preferred one and put -- combine the both company best engineers to develop the next-generation Rambus.

Q. Was that a recommendation you made within Hyundai?

A. Yes, I did.

Q. If you could turn, please, to page 6 of RX-1487.

A. Yes.

MR. OLIVER: Sorry. If you could hold on just a moment, Your Honor. The document was produced backwards, so we have a disconnect between our version and their version.

JUDGE McGUIRE: All right.

(Pause in the proceedings.)

BY MR. OLIVER:

Q. Now, Mr. Tabrizi, on page 6 of the document, of the version RX-1487 that you have, this is an e-mail with the caption at the top Farhad Tabrizi 7-18-99?

A. That's correct.

Q. And that is an e-mail that you wrote?

A. That is correct.

Q. What was the purpose of that e-mail?

A. Dr. Kim was the head of our R&D, research and development, and I was making known to him my recommendation regarding Rambus project.

Q. If I could direct your attention towards the bottom of the page, please, there's a line that begins, "Pursue LG's next 128M device."

Do you see that?

A. Yes.

Q. Let me read a portion of that to you.

"Pursue LG's next 128M device using 0.18/0.16 micron by combining our RDRAM designer in one place, potentially in LG building in Seoul, that's where all the RDRAM projects being developed."

Do you see that?

A. Yes, sir.

Q. Now, what did LG refer to there?

A. Lucky Goldstar.

Q. Now, why did you recommend combining all RDRAM designers in one place?

A. Again, we wanted to develop the next-generation project and we wanted to put our best engineers together in one place, and since I picked the LG product, I felt it's better to put them in the LG building so they're all familiar with the

environment.

Q. And then below that it reads, "Also put our both companies best engineers to work on 256M/288M RDRAM design using next-generation process."

Do you see that?

A. That's correct.

Q. And what did you mean to convey with that sentence?

A. So currently 128-meg was in full production and 256-meg was the next product that we were going to develop, and I wanted to be one of the leaders in Rambus, so I asked them to put our best engineers to develop the next-generation Rambus project.

Q. Okay. Thank you. You can set that document aside, Mr. Tabrizi.

Mr. Tabrizi, this morning Mr. Perry asked you quite a number of questions and showed you a number of documents with respect to SyncLink. I'd like to ask you some more general questions to try to fill in some of the gaps, if I could, that were left by Mr. Perry's questions.

First, could you please explain your understanding of what was the SyncLink Consortium.

A. SyncLink Consortium was an organization of DRAM suppliers and DRAM users and third-party vendors for a

joint development of the next-generation process by sharing expenses, engineering resources and also cross-licensing among themselves.

Q. Let me start by asking, when did you personally become involved with SyncLink?

A. I believe I was part of the IEEE RamLink meetings in the '90s and then in '95 the SyncLink Consortium started.

Q. You mentioned RamLink.

What was RamLink?

A. RamLink, it's an IEEE specification that is packet-based DRAM.

Q. And then when you first became involved with SyncLink, that was also a committee of the IEEE?

A. At the beginning, the SyncLink was a committee of IEEE.

Q. Now, based on your understanding, what was the IEEE?

A. IEEE was electrical engineering association for standardization activities.

Q. Were you a member of the IEEE in 1995?

A. Yes, I was.

Q. Are you still a member today?

A. No, I'm not.

Q. Now, to your knowledge, was Hyundai a member of

the IEEE in 1995?

A. No. IEEE membership is by individual people, it's not by company, so I was member as Farhad Tabrizi, not as Hyundai Electronics.

Q. Now, what was your understanding of the purpose of the SyncLink committee within the IEEE?

A. SyncLink -- within IEEE every project has a PAR or project authorization number that they will issue, so they had tried to develop the specification for that project.

Q. And within the IEEE, did you participate in a particular project?

A. RamLink and SyncLink.

Q. Now, what did you understand the purpose of the SyncLink project would be in IEEE?

A. SyncLink was a subset of RamLink. RamLink was a generic bus that you could connect any kind of memory to it. SyncLink we kind of wanted to be a specific to synchronous DRAM type of product and...

Q. Was the purpose to create a standard?

A. Yes, it was.

Q. And did you have an understanding as to the type of standard that was being created?

A. Our next-generation memory open standard that was going to be presented at JEDEC.

Q. What do you mean by an open standard?

A. Open standard means everybody will have free access to the specification, they will be able to develop the product without anybody's blocking patent and basically free of any kind of architectural propriety.

Q. You mentioned JEDEC.

In 1995, what, if any, was the relationship between SyncLink and JEDEC?

A. They were both a standard committee, and as far as the project was related to each other, they should have give each other updates.

Q. In 1995, were SyncLink and JEDEC working with the same technologies?

A. JEDEC was working on the core DRAM project and the SyncLink was working on the kind of overall -- the component plus the bus that link them together.

Q. Were there any other differences between the work being done at JEDEC and the work being done at SyncLink?

A. No.

Q. Are you familiar with the term "multiplexed bus"?

A. Yes, I am.

Q. Was there work being done at -- or did the work

being done at SyncLink involve a multiplexed bus?

A. At JEDEC the devices that we were working were fully nonmultiplexed. That means the address, the command, the data are all separate pins.

At IEEE RamLink, the bus was fully multiplexed. That means address, data, command all on one bus.

But the SyncLink was somewhere between the two. We made the address and command on one bus and data on a separate bus.

Q. Now, with respect to organizational rules, did SyncLink have -- that is, the IEEE SyncLink committee, did SyncLink have rules similar to those of JEDEC?

MR. PERRY: Your Honor, I didn't ask anything of this witness about rules of either organization. I think it's beyond the scope.

MR. OLIVER: Your Honor, I'm simply trying to establish some basic background with respect to SyncLink.

JUDGE McGUIRE: Well, then don't ask him about the rules then. If you can do that without asking, you know, about the rules, because it is beyond the scope.

MR. OLIVER: Your Honor, if I could also point out, Mr. Tabrizi was on our witness list and we did reserve the right to call him back as a rebuttal

witness, and rather than forcing us to call him a second time, we would appreciate as a courtesy, as we extended to respondent, the opportunity to go beyond the scope on certain issues in order not to have to call him back a second time.

MR. PERRY: It's really not a courtesy issue, Your Honor. Mr. Tabrizi is not on their rebuttal list. They chose not to call him in their case in chief, and that means they're limited to what's in the scope. We have a tight schedule.

JUDGE McGUIRE: Sustained. I mean, that's my holding that I first indicated.

BY MR. OLIVER:

Q. Mr. Tabrizi, at some point in time did SyncLink cease being a committee of the IEEE?

A. Yes, it did.

Q. Can you please explain what happened?

A. As I mentioned earlier, we wanted to productize the IEEE RamLink project into a product that is manufacturable. At the same time, the IEEE, the rules of disclosure and patents were not satisfactory in terms of individual people were represented, not companies, so with all this in mind, we decided to create a consortium to develop a next-generation product.

Q. Now, did you have an official role in the SyncLink Consortium?

A. Yes. I was nominated and elected as the chairman for the SyncLink Consortium.

Q. What were your responsibilities as chairman?

A. My responsibility as the chairman was in many aspect -- one was I was the spokesman for the consortium.

Second, I wanted to promote the SLDRAM activities to make sure that the product gets developed in time. And also within our own companies our job was to promote, so I have to provide material to promote SLDRAM within ourselves.

Q. Now, what was your understanding of the goals of the SyncLink Consortium?

A. To develop the next-generation open standard, royalty-free device specification that could meet the customer requirement.

Q. Now, based on your understanding, why was the consortium formed outside of the IEEE?

A. One of the main reason I believe was the patent policy and openness about individual members sharing the information without worrying about somebody getting a patent.

Q. Was there any issue with respect to funding

involved in the decision to form the SyncLink Consortium outside the IEEE?

A. Yes. As I mentioned earlier, we wanted to develop the next-generation product, so we needed to fund development of a test chip, development of actual prototype, work with the users to develop a board, test this board, so all of these things was being done at the consortium.

Q. Now, you had mentioned a concern about the policy of the IEEE as not being suitable for the SyncLink Consortium.

Can you please explain in a little more detail what the concern was with respect to the IEEE policy?

A. Again, the IEEE policy, since the individual participants were representing themselves, they were not representing any company, they had no obligation to, in terms of patent disclosure. It was kind of vague enough. It wasn't like JEDEC, very solid patent disclosure.

And also we wanted to have cross-licensing among the members, so if somebody brings an idea that we utilize in the standard, we wanted to make sure it's open and is cross-licensed.

MR. PERRY: Your Honor, excuse me. There was a motion to exclude Mr. Keefauver, who we wanted to

testify before this hearing about patent policies of other standard organizations. We would move to strike that testimony or we would move to have the right to bring in Mr. Keefauver.

JUDGE McGUIRE: You do not have the right to bring in Mr. Keefauver because I've already ruled against that, so you do not have that right.

MR. PERRY: I'm sorry. I didn't mean to get hot on that. It's just that motion was hard-fought. We lost an expert. They said other patent policies of other organizations are completely irrelevant.

JUDGE McGUIRE: And that's going to apply here as well, Mr. Oliver.

So I'll let you comment, though, if you wish.

MR. OLIVER: I believe we thought Mr. Keefauver to explain how -- an expert opinion as to what the JEDEC rules were. This question goes solely to why the SyncLink Consortium was formed. It has nothing to do with how one interprets --

JUDGE McGUIRE: Wouldn't the testimony -- he can testify as to the -- how SyncLink was formed based on his personal knowledge, but I thought the answer as well entailed the policy of JEDEC. Is that not correct or am I missing something?

MR. PERRY: It was IEEE, Your Honor.

JUDGE McGUIRE: IEEE.

Then he will not be allowed to testify regarding -- I will uphold that motion as it pertains to testimony only regarding the IEEE.

MR. PERRY: And I do apologize, Your Honor.

JUDGE McGUIRE: I'm sorry?

MR. PERRY: I do apologize for getting upset.

JUDGE McGUIRE: All right. But I will -- I will accept the answer regarding how SyncLink was organized and its patent policy.

Are we clear on that?

MR. OLIVER: Yes, I think we are, Your Honor.

JUDGE McGUIRE: All right.

BY MR. OLIVER:

Q. At the time that the SyncLink Consortium was formed, what was its organizational structure?

A. At the beginning, we formed different task groups. One mainly was technical. The other one was business. And at some point later we created the patent committee as well.

Q. And at some point in time was a corporation formed?

A. Yes. From when we split up from the IEEE, we created an incorporation and we have bylaws.

Q. Now, as you understood it, at the time that the

SyncLink Consortium was formed, did the consortium intend to apply for patents in its own name?

A. Yes, we did.

Q. Based on your understanding, why was it decided that the consortium should apply for patents?

A. There were a lot of concern that a lot of new ideas are coming to this meeting and we have to protect the members. Our patent policy was fully defensive. We just didn't want other people to file patents on our technology.

Q. Now, at the time that the SyncLink Consortium was formed in 1995, what was your understanding of the policy of SyncLink with respect to royalties?

A. We --

MR. PERRY: Excuse me. It's outside the scope. I did not inquire about any patents that SyncLink might own of this witness.

JUDGE McGUIRE: Mr. Oliver?

MR. OLIVER: Your Honor, again I'm trying to establish some background with respect to the SyncLink Consortium. Mr. Perry asked many questions about the SyncLink Consortium and about SyncLink Consortium documents. I'm trying to lay these in context.

JUDGE McGUIRE: I'll entertain it to that

extent, but I'm going to keep a pretty close hold on this. If he gets too far beyond what I thought was the issue of the scope, then I'll cut you off.

MR. OLIVER: Thank you, Your Honor.

BY MR. OLIVER:

Q. Mr. Tabrizi, do you have the question in mind?

A. Yeah. We had never intended -- there was a lot of discussion that we should collect royalty or not, should we have some value for the members, but our goal and my goal was always open standard, no royalty.

MR. OLIVER: Could I have just a moment, please, Your Honor.

(Pause in the proceedings.)

In light of the objection so far, we are skipping some material, Your Honor, and I'm just trying to keep my outline and my colleagues correct.

JUDGE McGUIRE: All right.

BY MR. OLIVER:

Q. Now, Mr. Tabrizi, when you first became involved with the SyncLink Consortium, what did you see as the market for the end product of the consortium's work?

A. We were looking at the next-generation main memory architecture that could be used in various of

application, PC, personal computer, servers, workstations, various segments of the market.

Q. Now, how did the SyncLink Consortium go about doing its work?

A. We created a road map. We set a timetable as far as what's our goal in terms of when we're going to have a sample, when we're going to have a spec. We planned on developing an initial test chip, so some companies participated in developing test chip. Hyundai and Mitsubishi developed test chip. IBM developed a motherboard. Micron did simulation. HP did environmental analysis.

So the job was shared among the members to develop this -- the infrastructure needed to develop our next spec.

Q. You've mentioned a number of different tasks that different companies were contributing.

Can you explain to us in a little more general terms what the participants were sharing generally within the SyncLink Consortium?

A. So the task was divided. As I said, initially we had to develop a test chip to see how these devices worked from output to input, and then we had to test this test chip, so IBM volunteered to test these devices to see how fast they are going.

And meanwhile, we had to apply the test chip knowledge to a PC, personal computer, environment, so HP volunteered to do that.

And there were tester company like Teradyne that was doing the testing and there was packaging company who was trying to define the next-generation package.

So every month we get together, we share our data, and we have more action item for the next time.

Q. Were there any financial resources shared within the consortium?

A. Yes. The cost of the development of the first chip was divided among all the participants.

Q. Was there -- was there any requirement of contribution of money to the consortium?

A. There was.

Q. And what was the purpose of that?

A. Again, cost-sharing of all the expenses we had. We basically do a special assessment as we needed for different projects.

Q. Was there any know-how or design experience shared within the consortium?

A. It was.

Q. Can you please explain that?

A. Sure. Again, our goal was to develop a

low-cost high performance, and there were many solutions on the table, and people would come with pluses or minuses on each proposal, and we looked at it in very detail, and certain companies have more expertise than others, but they would take tasks back to their company to do further analysis.

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked RX-785. It appears to be an e-mail from Peter Gillingham to you and a number of others dated October 12, 1996, so I'll give you a moment to look at that document.

(Pause in the proceedings.)

A. Yes.

Q. Do you recognize RX-75?

A. Yes, I do.

Q. And what is this document?

A. This document is a proposal by MOSAID at the request of the consortium asking for the scope of development of a prototype chip.

Q. If I could ask you to turn, please, to the second page.

A. Yes.

Q. The first full paragraph there begins, "MOSAID is willing to implement the SLDRAM in any conventional 64M process selected by the consortium."

Do you see that?

A. I see that.

Q. Could you please explain for us first of all what MOSAID was proposing to do at this point.

A. MOSAID is a design house. They don't have their fab. They were willing to design a 64-meg device for the consortium members.

Q. By the way, were they doing this on a voluntary basis or how was this taking place?

A. No. They're a design house. They do this for money. We contracted them. I believe it cost about two to three million dollars to do this project.

Q. And when you say that "we contracted," who was the contracting party with MOSAID?

A. SLDRAM Consortium members.

Q. Did the consortium members independently contract with MOSAID or was it the consortium itself that contracted MOSAID?

A. SLDRAM Inc., the incorporation, did the contract with MOSAID.

Q. The paragraph then continues: "This may be a difficult choice because a consortium member may not

want to disclose their process capabilities to other members. MOSAID can keep all process documentation confidential, but we would also have to prevent distribution of schematics, layout and other deliverables to other consortium members."

And then the final sentence: "The selection of a pure foundry that can be accessed independently by all consortium members may solve these problems."

Do you see that?

A. I see that.

Q. Can you explain your understanding of the issue that's being discussed in that paragraph?

A. Yes. Each company's process technology or process parameters are very confidential data and we kept that very confidential to ourselves. And our concern was that if, for example, Hyundai shared their product process information with MOSAID, then MOSAID had to share that information with other members, and we weren't willing to do that.

Q. Now, within Hyundai, did you take any steps to try to obtain support within Hyundai for SyncLink?

A. Yes, I did.

Q. What did you do?

A. There were various phases to this. Between -- prior to '96, actually the next-generation memory was

an open -- any technology could have an option, SLDRAM, DDR or Rambus. I felt that within our company we can promote SLDRAM to be the next generation, so I wanted to convince my management that open standard has a benefit to both ourselves and to the consumer and I was begging their support for continued development.

Q. I think you've already partially answered this question, but to your understanding, was Hyundai considering producing other next-generation DRAMs at that time?

A. Yes. We were producing DDR and we were producing Rambus, and SLDRAM was in the development stage.

Q. Now, in the 1995 time frame, did you favor Hyundai obtaining a license from Rambus?

A. Yes, I did.

Q. Why?

A. At that time we felt that Rambus has good patents on the packet-based DRAM, the Rambus architecture, and we felt for certain product in application has a very good potential, so what we recommended our management that we should sign Rambus.

Q. Now, in trying to obtain internal support within Hyundai for SyncLink, was it ever part of your

personal strategy to convince your managers at Hyundai to stop supporting RDRAM?

A. No. I felt very strong for both of them.

Q. And in trying to obtain internal support for SyncLink, was it ever part of your personal strategy to convince your managers at Hyundai to reduce the level of support that they were providing for RDRAM?

A. No.

Q. Were you successful in convincing your managers to provide some level of support for SyncLink?

A. They kept the SyncLink project active with minimum support and they were putting a lot of resources on Rambus and DDR.

Q. Now, you mentioned that Hyundai was supporting three DRAM architectures. Actually I think you said they produced two of them.

I'd like to take you back to a slightly earlier time frame, to 1996. And I assume that in 1996 Hyundai at that time was not producing Rambus or DDR; is that right?

A. I believe we were producing the original Rambus, the concurrent Rambus, not the direct Rambus. DDR we were probably in an R&D prototype.

Q. Well, with respect to your understanding in

the 1996 time frame, looking towards the next-generation architecture, based on your understanding, who would determine which of the three architectures to buy?

A. The customer.

Q. With respect to selecting among these three architectures, what role, if any, did you understand that Intel would have?

A. Sure. Intel has a major role. Intel builds processors, microprocessors, and they also build this bridge or the chipset that connects the processor to the memory, so whatever this bridge requires we have to produce.

So during late '98 Intel decided that that bridge will exclusively support Rambus.

Q. I believe you meant end of 1996 Intel decided that it would support Rambus?

A. Right. Late '96.

Q. Now, based on your understanding in 1996, could DRAM makers introduce SyncLink DRAMs if there are no chipsets available to work with SyncLink?

A. No, they could not.

Q. Again, based on your understanding in 1996, could DRAM makers introduce SyncLink DRAMs if Intel did not produce supporting chipsets?

A. There is still a remaining market that Intel doesn't have. Other than Intel processors, there are UNIX-based processor. There is Apple-based computer Macintosh. They use Motorola processors. And there are other application that we felt that Rambus did not fit like a server application, Rambus could not work in there, so we felt SLDRAM can play in the server market.

Q. Now, a moment ago you referred to the Intel decision to support Rambus as its exclusive choice for main memory in connection with before.

That occurred in late 1996; is that right?

A. That's correct.

Q. Now, at the time that Intel announced that decision, were you concerned about that decision?

A. Very much.

Q. Can you please explain why?

A. I believed in options and alternatives and I believe in open standard. I felt that Intel by selecting a sole, exclusive, proprietary solution as their only solution, I felt that the industry really would lose a lot of innovation and would result in having a very costly device, very difficult device to manufacture as exclusive source, so I was very worried about our industry.

Q. Now, following Intel's decision to support RDRAM exclusively, did you have any concern about Hyundai's access to future specifications?

A. I did.

Q. Can you please explain that?

A. Yes. I had prior experience with Intel that they would control which company can get a spec and which company cannot get a spec. A spec is a specification. And really for me it was very hard trying to obtain a spec from Intel, so if I don't have a spec, I cannot build anything, so my whole company will be in jeopardy if Intel decide that they don't want to share their spec with Hyundai.

Q. We discussed a moment ago your efforts to convince your management to support SyncLink.

Now, with respect to the 1996, late 1996 time period, can you give an approximate estimate as to your understanding of the support that Hyundai was providing for Rambus architecture?

A. Yes. Rambus was a fully multilevel project within our company. We had at least two or three project and engineering team working on various Rambus project at that time.

Q. Can you give some idea of the number of engineers that were working to support the Rambus

architecture?

A. I can say easily that there were about a minimum of 50 engineers working on Rambus project.

Q. Now, at that time was Hyundai also supporting JEDEC-compliant DRAMs?

A. Yes. We had many project on JEDEC-compliant DRAM, and as you know, continuously we shrink products, so continuously we have to put resources on it. So we had many, many JEDEC standard project.

Q. Now, in the late 1996 time frame, can you give some idea as to how much support Hyundai was providing to the SyncLink architecture?

A. I can tell you that I was getting maybe one or two engineers, if any, full-time.

Q. Now, what impact, if any, did the Intel announcement that it would support RDRAM as its exclusive choice for next-generation memory have upon the amount of support that Hyundai put behind the SyncLink architecture?

A. They -- management wanted to basically reduce or basically eliminate the project because they felt that the Intel has spoken and Rambus will be the next generation, so there is no need for SLDRAM.

Q. Did you continue to advocate a place for SyncLink within Hyundai?

A. I always advocate that we should continue at least the development work and make sure there is an open standard out there as alternative.

Q. Can you please explain why you continued to promote SyncLink within Hyundai?

A. First of all, I had a lot of reservation about Rambus. I knew it's very difficult to manufacture, and SLDRAM was not as revolutionary as Rambus, not as basic as SDR, so it was kind of a half way, and I felt that SLDRAM could be a cost-effective alternative to Rambus.

Q. Now, this morning you were asked about a meeting among executives in January of 1997. Do you recall that?

A. Yes, I do.

Q. What in your understanding was the purpose of that meeting?

A. After the Intel announcement, I had to decide either to stop the efforts or to get some level of support from the DRAM companies to continue at least our development activity, standard activity. I felt that after the Intel announcement we would lose all those activity.

Q. Why did you think as of January or late 1996 or January of 1997 that after the Intel announcement you

might lose support for SyncLink?

A. Because, as you know, Intel domination with the personal computer is about 80 percent of the market, so -- and also the design resources was very difficult to get, so our management is trying to minimize the number of project, and since Intel was already decided, SLDRAM was the device, that they did not want to put resources, they were not sure about the outlook for SLDRAM.

Q. Now, was it your understanding that during or after the meeting in Tokyo in January of 1997 that any of the DRAM suppliers present at the meeting agreed to support SyncLink to the exclusion of RDRAM?

A. Absolutely not.

Q. Was it your understanding at or after that meeting that all of the DRAM suppliers present agreed to support SyncLink?

A. They -- it varies company by company, but they kind of showed us a green light to continue the standard work and minimum development.

Q. In your view, was the meeting a success?

A. Semi-success.

Q. Can you please explain why you thought it was a semi-success?

A. Because I felt that before the meeting for sure

they were going to cancel the SLDRAM project within their company. After the project, I felt that they still want us to continue at least development work, so in that sense it was successful, but they did not really commit to put major resources on SLDRAM, and that was the not-so-successful part of it.

Q. Now, as a result of the meeting in Japan, did Hyundai make any changes in the level of support it provided for SyncLink?

A. No.

Q. As a result of the meeting in Japan, did Hyundai change in any way the level of support it provided for JEDEC-compliant SDRAM?

A. No.

Q. As a result of the meeting in Japan, did Hyundai change in any way the level of support it provided for Rambus' RDRAM?

A. No.

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a copy of a document marked RX-938. I believe Mr. Perry asked you some questions about this document this morning.

These are the SLDRAM Consortium minutes of

June 11 and 12, 1997. I'd like to ask you about a slightly different part of this document.

If I could direct your attention to the first page, the paragraph that begins, "There were not as many here from Japan as we had hoped."

Do you have a copy of the document?

A. Yes, I do.

Q. And if you would look at the paragraph that begins, "There were not as many here from Japan as we had hoped."

Do you see that paragraph?

A. Yes, I do.

Q. And then I'd like to direct your attention to the last sentence: "We may need to promote SLDRAM more within our own companies. This is not a U.S. standard but belongs to all our companies in Japan, Korea, et cetera."

Do you see that sentence?

A. Yes, I do.

Q. What did you mean by "We may need to promote SLDRAM more within our own companies"?

A. DRAM is a commodity and it's global and there is no -- not such a thing as local standardization. Everything is done on a worldwide basis, so I wanted more participation of all companies, U.S., outside

U.S., global industry.

Q. If I could ask you to turn, please, to page 2 of RX-938.

At the top of the page, the carryover paragraph, and the last sentence there reads: "It has been difficult for companies to provide engineers at this time, too many projects going on at once: Rambus, SyncLink, DDR."

Do you see that?

A. I see.

Q. Can you please explain your understanding at the time of what that sentence meant?

A. Our contract with MOSAID required that individual companies send an engineer to MOSAID to help them to design this project. And I was seeing difficulty from various company trying to assign the right engineer to the project. And the main reason at the time, for the first time in industry we were working on three different standard or three different product, and that caused resources to be divided, and we didn't have enough resources for SyncLink.

Q. You referred to engineers at MOSAID. Perhaps I should go back and read the entire paragraph and put that in context.

Looking at the bottom of page 1: "Also,

Vanguard is now sending an engineer to MOSAID, which will reduce our cost. The MOSAID contract is for 2.5 with four engineers and raise 125K per missing engineer. MOSAID would prefer to have the engineers instead of the extra money. The status now is two engineers coming from Hyundai, one from Siemens and one from Vanguard."

Can you please explain what was being reflected in that paragraph?

A. Yes. When we contracted MOSAID, MOSAID required that some of our engineers go there to help them with the design. They said they would increase the cost of project by 125,000 for each engineer that doesn't show up.

So -- but they said they'd prefer engineers than 125,000. So they were looking for help from various companies' expertise.

Q. And that is why there were two engineers from Hyundai, one from Siemens and one from Vanguard going to MOSAID?

A. That's correct.

Q. Effectively those engineers would be contributing to the SyncLink design effort; is that right?

A. They would.

Q. Then the next sentence: It has been difficult for companies to provide engineers at this time, too many projects going on at once: Rambus, SyncLink, DDR."

I assume that refers to projects going on at the companies?

A. Yeah. At our own individual companies, we were all having our own independent design in all of those three standard or three devices. So it was very difficult to lend any other engineers other than our own project.

Q. And as of mid-1997, was that also true at Hyundai; in other words, was Hyundai continuing to support these three different architectures?

A. Yes, we were.

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked CX-2294. The first page is an e-mail from T.C. Chou to certain individuals, including you, dated July 23, 1997, and beginning at the second page there's a document with the title DRAM Product Roadmap July 1997.

Do you recognize CX-2294?

A. Yes, I do.

Q. Can you please explain briefly within Hyundai what the DRAM product road map was?

A. Product road maps are prepared for our outside customers, third-party enablers like Intel, so we prepared this road map to show what product we are developing at what time frame.

Q. Okay. And I don't want to spend a lot of time on this document, but if I could ask you just to turn, please, to page 5.

A. Yes.

Q. And does page 5 reflect the product road map at this time for SDRAM?

A. It does.

Q. Or at least for certain SDRAM products?

A. Yes.

Q. And if I could ask you to turn, please, to page 7.

A. Yes.

Q. And you'll see in the second and third rows toward the right-hand side references to DDR SDRAM in those two rows?

A. Yes, sir.

Q. Do those two rows reflect road maps for DDR SDRAM products?

A. Yes, it does.

Q. And if I could ask you to turn, please, to page 9.

If I could direct your attention to the second and the third rows on page 9, can you please explain briefly what's reflected in those two rows?

A. Yes. This one slide shows our road map for SLDRAM and Rambus. The second row shows our 64-meg direct Rambus. And the third row shows our 16-meg and 18-meg concurrent Rambus. The next column shows what we have today. It says "Current Generation." And the first product we will have for Rambus was October '97. And then it shows that we will have the 16-meg and 64-meg at those time frames.

Q. And can you please explain just very briefly what's reflected in the top row?

A. The top row shows the schedule of our SLDRAM.

Q. And would it be fair to say that based on this particular DRAM, this chart shows SLDRAM being introduced sometime after RDRAM?

A. Yes. This shows that SLDRAM was scheduled for second quarter and third quarter of '99 versus Rambus we had it from second quarter '98.

Q. If I could ask you to turn, please, to page 17. This is a slide entitled Positioning, and I'd like to direct your attention to the third and fourth bullet

points.

Starting with the third bullet point: Drive non-Intel chipset companies to support DDR SDRAM. Do you see that?

A. Yes, I do.

Q. Can you please explain your understanding as of July 1997 of what was meant by that bullet point?

A. Yes. Since at that time Intel was already decided to go Rambus for their chipset, non-Intel chipset company means the companies that can support Intel, but they have their own chipset. These companies could include like Via Technology or ADSL or VLSI that could build chipset for processor that could interface to DDR.

Q. So in other words, you were trying to or Hyundai was trying to get these companies to build chipsets that would support DDR SDRAM?

A. Yes, sir.

Q. If I could direct your attention to the next bullet point, keep an eye on Intel strategy with direct RDRAM, do you see that?

A. I see that.

Q. Can you please explain your understanding of what was meant by that bullet point in July of 1997?

A. Sure. Considering this was a DDR SDRAM, if you

look at the top of the foil, so this was a DDR position, at the time we wanted to make sure that Intel's strategy selection of the DRAM was -- everything go smooth, even in terms of the Camino chipset working, and everything is the way Intel wants it, so just monitor the success of the direct Rambus.

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked CX-2297. The first page is an e-mail from Mr. Martinez to a Mr. Badding, with a copy to you, dated September 16, 1997. Attached to that is a document with the title IBM Supplier Forum '97 and DDR.

Do you recognize CX-2297?

A. Yes, I do.

Q. What is this document?

A. This is a collection of all document, just the presentation material around '97 time frame.

Q. If I could direct your attention to page 2, the title page, IBM Supplier Forum '97, with a date August 21.

Did you attend that IBM supplier forum?

A. I think so.

Q. And did you review these slides at about this

time?

A. Yes, I did.

Q. If I could ask you to turn, please, to page 3. There's a caption in the upper left-hand corner that reads "DDR" and then underneath that "Hyundai DDR position."

A. Yes, sir.

Q. Can you please explain just in general terms what is depicted on page 3?

A. Yes. This shows what's our position in various application. There are three major segment for memory usage. One is PC, personal computer. The other one is server application, which is the high-end server. And the other one is graphic application.

For PC application at the time was SDRAM-6, and the next generation we knew that is direct Rambus, and DDR was question mark because we didn't know if Intel would look at it or other company will use DDR in PC, but the Rambus was decided at the time.

Server application currently was SDRAM-6 and in the future will use DDR or SLDRAM because Rambus could not fit in that application.

And the graphic applications were going from 143-megahertz DDR to 200-megahertz DDR and beyond that.

Q. If we could look in particular at the PC application row there, why do you say that it was decided that Rambus or RDRAM would occupy that square?

A. Because Intel already made that decision known and Intel, as I said, had 80 percent market share at the time, so that was the decision we needed to have.

Q. If I could ask you to turn, please, to page 25 of CX-2297.

A. Yes.

Q. This is a chart with a caption Main Memory Trend. Do you see that?

A. I see that.

Q. Again, would you please explain in general terms what this page depicts.

A. Yeah. At the top you have the time frame. At the left you have the application. Mainframe and supercomputer was the top application and then server workstation the next application, and then HE PC is high-end PC and LE PC is low-end PC, and mobile application is like notebook or other application that is portable.

So this depicts which type of memory at what time frame will become the choice and how we see it at Hyundai Electronics. Definitely from 66-megahertz SDRAM the high-end PC was going to 100-megahertz PC

in '98 and in 1999, according to Intel, would go to Rambus, direct Rambus.

And on the part we put DDR SDRAM because Rambus did not work in a server market, so DDR had the choice. And after DDR, again, we felt that for the high-end server and mainframe application there is opportunity for SLDRAM.

Q. And SLDRAM there refers to SyncLink?

A. Yes.

Q. Perhaps if we could take a couple of examples just to be certain that it's clear.

Looking at the HE PC, that's the high-end PC?

A. Yes.

Q. And I take it that you were reading from left to right --

A. Yes.

Q. -- when you were reading the generations of memory that would occupy the high-end PC space?

A. Yes. So first in '96 the PCs were using EDO, in '97 they moved to 66-megahertz SDRAM, in '98 they moved to 100 megahertz, and from beginning of '99, according to Intel, they would use Rambus exclusive.

Q. Then looking at the top column, which I think you said is the high-end supercomputers and servers, following that approximately to the right, that would

move from EDO to 100-megahertz SDRAM to DDR SDRAM to SyncLink; is that right?

A. Yes, sir. Yes.

Q. If I could ask you to turn, please, to page 76.

A. Yes.

Q. This is a page with a caption PC Chipset Vendors Status?

A. Yes, sir.

Q. Can you please explain again in general terms what is depicted on this page?

A. Yeah. In order for a memory to work in any system, it has to work with a chipset. A chipset is this bridge between processor and memory.

So we followed the chipset companies' status very closely and we picked that, you know, each chipset company -- again, this was a DDR company -- what's each company's position on DDR memory.

For example, Intel has no plan to use DDR, only for the server application they will use. OPTi no plan, and it goes on, so forth.

Q. Okay. With VIA it says, for example, "Deep relationship with SEC, have made chipset and M/B."

Do you see that?

A. Yes, I do.

Q. And SEC there refers to Samsung?

A. Yes, they do.

Q. Have made chipset and M/B. I assume M/B refers to motherboard?

A. Yes, it does.

So at the time VIA had already made a chipset that worked with the Intel processor and Samsung DDR.

Q. And ALi says "will develop."

Does that mean that they will develop a chipset that works with DDR?

A. They had planned to develop, but they were still not sure which way to go, which type of DDR they should use.

Q. And is that what is meant in the box to the right there where it says "follow JEDEC standard"?

A. Right. So they wanted to wait and until JEDEC -- at the time there were different discussion about DDR, bidirectional versus unidirectional, and they wanted to make sure they wait until JEDEC finalized the decision.

Q. The next row next to AMD reads, "Need DDR SDRAM, have started new chipset div. with VIA."

Can you please explain your understanding at the time of what that refers to?

A. Right. AMD, they were very -- they were developing a chipset to use DDR and they were working

with Via to make sure that the VIA chipset works with the AMD processor.

Q. Now, if you look towards the bottom of the page, there's a line "graphics memory" and three companies listed there.

Can you please explain in general terms your understanding of what was depicted in that portion of the page?

A. Sure. Graphics memory usually tend to have a different requirement for memory. They usually want faster devices. And this depicts the three graphic companies, S3, Trident and C&T, Chips & Technology, which was purchased by Intel.

And in the second column it shows when do they need those chipset. S3 needs it as early as Q198. Trident needs it first half of '98. And Intel C&T needs it first half of '98.

Q. If I could ask you to turn, please, to page 78.

It's a slide with the caption Marketability. If I could direct your attention to the third bullet point, under PC Market, it reads, "Depends on Intel strategy."

Do you see that?

A. Yes.

Q. Can you please explain your understanding at

the time of what that referred to?

A. Sure. At that time DDR had no choice of being in the PC market. It depend on Intel strategy. If Intel sees that Rambus is not going to happen, then they may consider DDR, but really it depends on what Intel decides, if the PC will use DDR or not.

Q. If I could ask you to turn, please, to page 81.

A. Yes.

Q. It's a slide with the caption Positioning?

A. Yes.

Q. And if I could ask you to take a look at the first bullet point which reads, "Should pull in the schedule of 16M DDR SGRAM for graphics application."

Could you please explain your understanding at the time of what that means.

A. Yes. Based on the PC or graphic chipset requirement, we felt that we need to improve our schedule for 16-meg graphic DDR to meet the chipset requirement.

Q. Then the second bullet point reads, "For main memory, develop DDR SDRAM only for high end server, not for PC market."

A. So our goal for PC memory was on the high-end server because Rambus could not work in the server and that's the only market we were focusing for DDR in the

PC market.

Q. And the third bullet point reads, "Need to prepare backup solution for future-generation DRAMs such as direct RDRAM (PC market) and SyncLink (high-end market)."

Do you see that?

A. Yes.

Q. Can you please explain your understanding at the time of what that bullet point meant?

A. Yes. Since DDR was not being utilized in memory, main memory, as I said, again, main memory was about 80 percent of the market, we should have had direct Rambus and SyncLink for that market.

Q. Then the fourth bullet point reads, "Keep an eye on Intel strategy with direct RDRAM for PC market."

Do you see that?

A. I see that.

Q. Can you please explain your understanding at the time of that bullet point?

A. Right. Basically our ramp-up and our strategy with respect to Rambus depends on Intel's strategy, how quickly they will ramp up, how soon they want it, so we had to continuously monitor Intel progress and we did with respect to direct Rambus.

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked CX-2263. It's an e-mail from T.H. Jung or "Jung" to a Mr. Tabnak, copied to a number of individuals including yourself, dated November 18, 1997.

Do you recognize CX-2263?

A. Yes, I do.

Q. What is this document?

A. This is a kind of a meeting summary by one of our marketing staff in Korea to one of my guys and copying me.

Q. Now, if I could ask you to turn, please, to page 4.

A. Yes.

Q. About halfway down the page there's a caption Roman numeral III, DDR?

A. Yes.

Q. Underneath that: HP will use BDDR bidirectional DDR 2.5V in high-end system WS/server from 1999.

Do you see that?

A. Yes.

Q. Can you please explain your understanding at

the time of what that referred to?

A. Yes. There were, again, a couple of different variation of DDR within JEDEC, and HP told us that they will use the bidirectional version with two-and-a-half-volt power supply in their high-end system server market, workstation market, from '99.

Q. And HP there referred to Hewlett-Packard?

A. Yes. That's correct.

Q. Was it your understanding at the time that this referred to Hewlett-Packard workstations and servers that were being designed specifically to work with DDR?

A. That's correct.

Q. By the way, again, based on your understanding, where did the information in this e-mail come from?

A. This came from the customer itself. They visited us in Korea and this meeting minute came from their visit with Hynix, with Hyundai.

Q. In other words, from Hewlett-Packard?

A. Yes. Correct.

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked

CX-2264. This is an e-mail from D.K. Park dated November 20, 1997, to three individuals, copying a number of individuals.

If you'll look on the list of cc references, the third line from the bottom, in the middle of that line I think you'll see your name.

A. Yes, I do.

Q. Do you see that?

A. Yes.

Q. Do you recognize this document?

A. Yes, I do.

Q. By the way, in November of 1997, who was D.K. Park?

A. D.K. Park was our local field application engineer in Korea calling on IBM.

Q. If I could ask you to turn, please, to the second page. And I'd like to direct your attention to the first full paragraph on this page:

"The reasons IBM is in favor for servers are that DDR is the logical migration from current SDRAM, two-way DDR interleave offers flexibility over four-way SDRAM interleave and x4 organization is good for system reliability issues like chipkill protection using ECC. And open standards are influenced by multiple system customer."

Do you see that?

A. Yes, I do.

Q. Can you please explain your understanding at the time of what was being reflected in that paragraph?

MR. PERRY: Excuse me, Your Honor. There's no foundation for him to testify about what IBM said at this meeting in Korea. He's not listed as being present.

MR. OLIVER: I'll withdraw the question, Your Honor.

BY MR. OLIVER:

Q. Mr. Tabrizi, do you have an understanding as to why you were copied on this e-mail?

A. Yes. I am in charge of marketing and I ask my field people to send me the customer requirement and why each customer prefers what product and the reason for it.

Q. Why did you ask people to send you documents of this sort?

A. Because we have to make a decision in terms of product priority, production quantity, so this directly relates in terms of what product at what time frame and how many quantity we should build for our customer.

Q. Did this relate to your job responsibilities at Hyundai at the time?

A. Yes, it did.

Q. And did you review this e-mail when you received it?

A. Yes, sir.

Q. When you reviewed the e-mail, did you have an understanding of what was being reflected in the paragraph on page 2 that I just read to you?

A. Yes. The word "chipkill" means in a server system you want to have a continuous operation. If one memory fails, you want a system to detect that and continue operation without failure. And in order to do that, you need to have x4 devices. x4 means 14 output. And at the time Rambus was not offering any x4 devices, so there was no solution for server application with the chipkill.

So in that sentence it says IBM wants DDR because they could not use Rambus for the chipkill reason.

Q. If I could direct your attention to the next paragraph, it reads, "Plus IBM compared DDR with direct Rambus for the next-generation DRAM features for servers."

And then underneath that there's a table

listing a number of features with two columns, Direct Rambus and DDR DRAM. Do you see that?

A. Yes, I do.

Q. Again, at the time you received this e-mail, did you have an understanding of what was reflected in that paragraph and table?

A. Yes. IBM was comparing the pluses and minuses of direct Rambus and DDR for their server application and each row was depicted.

For example, ECC means error correction capability. Direct Rambus poor, DDR good.

Maximum density means how much memory you can put in a system. For direct Rambus poor, for DDR SDRAM good.

Bandwidth. Rambus was very good, high bandwidth, and DDR was okay.

Cost issue. Direct Rambus was very poor, very expensive to make. DDR SDRAM was okay.

Packaging. Rambus required a new packaging, so in terms of option, it was a poor option versus DDR which was continuing to use the same packages, it was okay.

MR. PERRY: Your Honor, I think he's beyond the question, and I think if he's talking about what IBM talked about at the meeting, there's no foundation for

it. He simply seems to be reading the document.

MR. OLIVER: I'm just asking for his understanding at the time.

JUDGE McGUIRE: Well, I mean, it's self-evident here and all he is doing is reading from the document that's going to be entered, you know, into the record. It speaks for itself.

So if you want to ask him about his understanding, fine, but I'm not going to allow him just to go ahead and read what the document otherwise clearly indicates.

MR. OLIVER: Your Honor, I did want to ask him specifically about one line in this table which --

JUDGE McGUIRE: Go ahead.

MR. OLIVER: -- unfortunately was the very next line.

BY MR. OLIVER:

Q. I did want to ask you specifically about the line "open standard spec" and just ask your understanding of what that referred to.

A. Yes. Of course, as you know, DDR is an open standard, so they gave it a good mark, and direct Rambus is proprietary, so they gave it a poor mark in terms of it being open.

Q. Okay. Thank you.

May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked CX-2303. The first page is an e-mail from Young S. Park to you dated February 19, 1998, subject Dell meeting material, and attached to that is a Dell Dimension-Hyundai memory road map.

A. I see.

Q. Mr. Tabrizi, do you recognize this document?

A. Yes, I do.

Q. What is this document?

A. This document is the meeting material from a Dell meeting that we had in Korea.

Q. Now, do you recall seeing this document in or about February of 1998?

A. Yes, sir, I recall.

Q. Do you recall whether you saw this document before the meeting with Dell?

A. This is a collection of the standard documents that we present. I don't know if I saw it in this order or this unique, but I'm familiar with some of the foils before the meeting.

Q. Let me ask you to turn, please, to page 7.

A. Yeah.

Q. And let me ask you if you were familiar with this page at the time.

A. Yes, I am.

Q. Can you please explain your understanding at the time of what was depicted on this page?

A. Yes. We were trying to align our road map with Dell requirement in terms of Rambus. We showed our three projects that we were working to Dell, 64-meg, 128-meg and one 256-meg, with their schedule, and Dell requirement for Rambus in Camino chipset started in Q2,99, so what we are trying to show to Dell is we are ready to support you in Q2,99 with our 64-meg, and as your need increases, we will support you with 128-meg and 256-meg Rambus product.

Q. On this page, what do the letters ES refer to?

A. Engineering sample.

Q. In other words, that was the expected date of when Hyundai would have engineering samples available?

A. Yes. Engineering samples are the first samples that comes out of the production line. And CS is the customer sample that is the same ES, but it has gone through internal qualification.

Q. Would it be fair to say then that ES is used for internal testing within Hyundai?

A. ES is used internally. We also give it to

customer for evaluation. As soon as the internal reliability is finished and as soon as the customer got issues finished, if there is no problem, we call that CS.

So that same ES becomes CS. It's just during the time we're going to qualification, we call it ES.

Q. Immediately above this table is a line that reads "Katmai/Camino using direct Rambus in Q2,99" and an arrow down onto the DRAM.

Can you please explain your understanding at the time of what that refers to?

A. Yes. That was Dell requirement. They were going to launch the Camino chipset in middle of second quarter, and that arrow shows that, the Dell requirement for Rambus product.

Q. What was the Camino chipset?

A. Camino chipset set was the first chipset that Intel was developing to interface between their processor and direct Rambus.

Q. So this line item refers to Dell's launch of products that would incorporate the Intel Camino chipset?

A. Yes, sir.

Q. Now, as of February of 1998, was it your understanding that Intel planned the Camino chipset to

support any memory other than direct Rambus?

A. No. Not at the beginning. Exclusive memory for Camino was Rambus and no other memory.

Q. If I could ask you to turn, please, to page 15 in CX-2303.

A. Yes, sir.

Q. It's a page with the caption Direct RDRAM Die Size Estimation. Do you see that?

A. Yes.

Q. Can you please explain in general terms what's depicted on this page?

A. Sure. This was prepared for Dell meeting and Dell wanted to know what is the die size for each product, SDRAM and RDRAM, and RDRAM -- there were two type of RDRAMs, 72-meg and 64-meg. This shows the dimension of the die.

So for example, 72-meg was 7.3 millimeter by 14.4 millimeter. The total area would be 105.12 millimeters squared.

So this was all compared to SDRAM, the bottom row.

For example, 64-meg SDRAM total die size was 84 meg -- 84 millimeters squared. Sorry. And that was using .25 micron technology. Then if we shrink that to .22 micron technology, it would be 65

millimeter, same for Rambus product. 72-meg went from 105 to 81. But when you compare 81.3 to 65, you see that there is 25 percent bigger, so that is what we call die penalty.

Q. In each case that was being compared to the SDRAM die size?

A. Yes. SDRAM was every comparison. Everybody wanted to compare Rambus to the SDRAM because that was the biggest-volume commodity memory at the time.

Q. If I could ask you to turn, please, to the next page, page 16 of CX-2303.

A. Yes, sir.

Q. That page that has the caption Direct RDRAM Cost Estimation. Do you see that?

A. Yes.

Q. Again, can you please explain in general terms what's depicted on this page?

A. Sure. There are various elementary costs of a device, of course the die cost, package cost, test costs. That will give you the total cost for the device. Then we have some other costs associated with the module. That is depicted in the -- below.

So the base again is synchronous DRAM.

MR. PERRY: Oh, I'm sorry. Your Honor, I was just going to object that there's no foundation for him

to describe this. He has no experience in manufacturing and he wasn't -- he has --

JUDGE McGUIRE: I can hardly hear you, Mr. Perry. I don't mind if you step up to the microphone.

MR. PERRY: There's no foundation that he provided input into preparing this particular chart or that he has any background in manufacturing cost, so I believe that there's no foundation.

JUDGE McGUIRE: Mr. Oliver?

MR. OLIVER: Your Honor, he did have responsibility for it, for marketing activities, and among the information that he and people reporting to him had to provide to customers were the cost differentials between RDRAM and SDRAM. That was what the customers were asking for and that's what they were providing, and I believe Mr. Tabrizi demonstrated he did in fact have very good knowledge of the type of information they were preparing to provide to customers such as Dell.

MR. PERRY: All that's been demonstrated is that other people provided the information to him, and if that's all he was going to say, is that other people provided this information to me and I forwarded it to customers, I would have no objection to that. He's now

been asked to explain the chart and explain what manufacturing --

JUDGE McGUIRE: That is -- now, we've gone through this before in four or five episodes in this hearing, and I have not allowed testimony on charts that have been prepared or seen by witnesses, so I'm going to sustain it.

You can ask the question regarding the information he has received from other sources, but don't ask him to interpret a chart that he had no involvement in.

MR. OLIVER: Thank you, Your Honor.

BY MR. OLIVER:

Q. Mr. Tabrizi, do you recall having seen page 16 of CX-2303 in or about February of 1998?

A. Yes, I had.

Q. And do you recall the context in which you saw that page?

A. Yes, sir.

Q. Can you please explain the context in which you saw that page?

A. Yes. We were trying to show the direct Rambus cost estimate. Again, cost -- there are various elements to the cost, die cost, package cost, test cost, so we compared that to the synchronous DRAM for

various product, DDR SDRAM and direct Rambus.

And direct Rambus we put two column. One is at the initial stages of that. That means a small volume. And another one is at mass production volume. And the resulting was that --

MR. PERRY: Excuse me, Your Honor. It's beyond the scope of the question.

JUDGE McGUIRE: Sustained. It is beyond the scope of the question.

The question is can he explain the context in which he saw that page, and he's gone back and is explaining the column, so that is beyond the scope, and that answer at this point will not be considered.

So let's try to stick -- and I'm going to ask you, Mr. Oliver, when you ask the question, if you think he's going beyond it, interject yourself because that will probably save some time.

MR. OLIVER: Okay. I will do that, Your Honor. Thank you.

BY MR. OLIVER:

Q. Mr. Tabrizi, in the early 1998 time frame, did you have any other request from customers to provide estimated cost information concerning direct RDRAM?

A. Yes, we had.

Q. Did you have an understanding as to why you

received a request of that sort from customers?

A. Yeah. A customer wanted to select their next-generation product and they wanted to know where does Rambus fit in terms of which segment of the personal computer based on the cost and price they could select and how does the cost compare with DDR.

So we were getting a lot of inquiries asking for our cost projection for various type of memory.

Q. And were you personally involved at that time in explaining some of those cost estimates to customers?

A. Absolutely.

Q. As of approximately February of 1998, did you have an understanding of the cost estimates that were set forth on page 16 of CX-2303?

A. Yes, I am.

Q. Can you please explain the bottom row of the table, the top half of page 16 of CX-2303?

A. Sure.

MR. PERRY: Objection, Your Honor. There's been no foundation laid that he had any input in preparing this.

THE WITNESS: I had.

JUDGE McGUIRE: Well, we're back to the same place we were about two minutes ago, Mr. Oliver. Now,

what's your response to that objection based on what I've already concluded?

MR. OLIVER: Your Honor, my response is that this is information that he was being requested to provide by customers, that he saw at the time, that he had an understanding of and that he explained to customers. And I think if he was capable of explaining it to customers, I would submit that he should have proper foundation to explain it here in the record as well.

MR. PERRY: But that's not been the testimony. The testimony is from time to time he was asked for this kind of information. There's been no testimony linked to this document.

MR. OLIVER: He said that he has seen this page.

JUDGE McGUIRE: All right. Overruled. I will hear the question.

MR. OLIVER: Thank you, Your Honor.

THE WITNESS: I actually was involved in preparation of this document. I did all of this document based on the engineering formula that I got, how much test time it takes.

So what we showed here is that the direct Rambus at the initial stage will cost about 18 percent

more to produce, and when we go to production, the cost will come down to about 13 percent. This is just a component.

On top of the component cost there was some additional cost like the module cost and the heat spreader cost that would add to that.

So we were just showing SDRAM, DDR and Rambus cost. And I was very much involved in producing this.

BY MR. OLIVER:

Q. If I could direct your attention to the lines underneath the table beginning with "other cost adder." Do you see that?

A. Yes.

Q. Can you please explain in general terms what was reflected by the various lines underneath the caption Other Cost Adder?

A. Sure.

Direct Rambus had other costs. We had to pay royalty, so that was additional cost.

Also for direct Rambus we had to change the infrastructure of the packaging and our assembly because direct Rambus used a different type of package, so we had to buy new equipment.

Also, we had to invest for a new tester because Rambus requires a high-performance tester, and each of

those testers is in multimillion-dollar range, so those are the investment that we have to cost.

On top of that is assembly and test cost. The Rambus especially required that we put this component on a printed circuit board and we call those modules, and a Rambus printed circuit board costs about one and a half times the original DIMMs. They're due to multiple layers needed, eight layers. So that was additional cost.

So there were a lot of other costs other than just the die cost that we talked about earlier.

Q. If I could pick up just one element, you mentioned new investment with respect to testers.

At that time, based on your understanding, approximately how much did a tester for RDRAM cost?

A. Each fab -- each fabrication building has about 30,000 wafers throughput per month, and we require about ten tester per fab.

So each tester cost about $8 million and we needed ten of those per fab and we have 11 fabs, so it depends on what percentage of the total market was Rambus how many fabs we needed to convert. If we needed to convert all of our fab, we needed about a billion-dollar investment, if half of it, $500 million.

Q. If I could ask you to turn, please, to page 17.

A. Yes.

Q. And if I could ask you to describe just in very general terms what's depicted on this page.

A. Yes. It's just showing our status in terms of product schedule and also shows what is our strategy.

So our strategy is to -- do you want me to continue?

Q. If you could explain the strategy just in very general terms, please.

A. So Rambus was very high speed, so we wanted to be early and be very aggressive and learn the technical knowledge as soon as possible. And also our strategy was to look at the packaging infrastructure because Rambus was a totally new package and we wanted to focus on that package as a next generation.

So again, get the know-how, be the first, and push the package that Rambus want.

Q. If you could turn, please, to page 18.

A. Yes.

Q. And if you could please explain that page just in very general terms.

A. This shows our DDR status and our strategy. Again, it was targeted to the application that we could get like workstation, server and non-Intel PC main memory, and of course it's an open standard and we were

very committed to it.

Q. If you could turn, please, to page 21, the page with the caption SyncLink Consortium.

A. Yes.

Q. Can you please explain, again in general terms, what's depicted on this page?

A. Yeah. It shows the status of the consortium, when was established, who are the members, what's the membership fee, and what's the activity in the consortium.

Q. If I could direct your attention under the third bullet point, licensees, and then under that, there's a listing of suppliers, users, others and new members. Do you see that?

A. Yes.

Q. Specifically users, next to that it lists Apple, HP and IBM. Do you see that?

A. Yes, sir.

Q. Now, by "users" did that mean customers?

A. Yes.

Q. In other words, companies that purchased DRAMs?

A. Companies that are planning on using DRAMs, yes, purchasers.

Q. And were these three companies members of the

SyncLink Consortium?

A. Yes, they were.

Q. Were they generally present at SyncLink Consortium meetings?

A. Yes, they were.

Q. If I could direct your attention now to the next main bullet point that reads: Membership fee, initiation fee 50K, annual fee 25K. Do you see that?

A. Yes, sir.

Q. Were those the only fees that were paid by members?

A. Yes.

Q. I'm trying to figure out how this adds up to the MOSAID --

A. This wasn't the only fee. This was just a member fee. From time to time when we needed to do a special project, as I said earlier, we do a special assessment.

So the MOSAID project was two and a half million dollar. We divided it among all the members, so each company had to pay like 170,000 more for that project.

So this was just for the secretary and, you know, just minimum fee.

Q. If I could ask you to turn to the next page,

please, page 22, the page with the caption SyncLink DRAM.

Can you please explain in general terms what's depicted on this page?

A. This again shows our product status for SLDRAM and the strategy for Hyundai and in terms of SyncLink DRAM. And in terms of our strategy, as you can see, we said initially target high-end system application. That was the application that the Rambus could not satisfy, so we felt that there is room for SLDRAM to play into a high-end application. And it's also an open standard, so obviously we are permitted to.

MR. OLIVER: Your Honor, this might be a good place for a break.

JUDGE McGUIRE: Okay. Then let's take a ten-minute break.

Before we go, just so we get some idea of how we're going to head this afternoon, how much more time do you anticipate spending on your cross?

MR. OLIVER: One of the things I did want to do during the break is take a look at what I have remaining.

JUDGE McGUIRE: Okay. When we come back, we'll take that up then.

(Recess)

JUDGE McGUIRE: Mr. Oliver, you may proceed.

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked CX-2314A. It's an e-mail from I believe it's Sangjin, S-A-N-G-J-I-N, to you, copying a number of other individuals, dated August 2, 1998.

Mr. Tabrizi, do you recognize CX-2314?

A. Yes, I do.

Q. And what is this document?

A. This document, it talks about our internal product planning meeting issues that we had in second half of '98.

Q. Does this document relate to an upcoming meeting?

A. Yes. Usually when we have product planning meeting twice a year, first half and second half, sometimes in April and sometimes in August sometime, and then before we have executives all together we have an internal meeting among the working people and we make consensus and then we present to executive.

Q. If I could ask you to turn, please, to the third page of CX-2314-A. It's a document that up in the upper left-hand corner reads "Meeting Minute,

Technical Marketing-Product Planning Team," dated July 31, 1998.

Can you please explain what this page is?

A. Yes. This is basically that premeeting that I was talking about among the working people getting every product issues nailed down and making recommendation to our management.

Q. And on page 3, if I could direct your attention to the second heading, number 2, direct RDRAM. Do you see that heading?

A. Yes, sir.

Q. And then under that number 3, 128Mb/144Mb development without delay 0.18um technology. Do you see that?

A. I see that.

Q. Can you please explain your understanding at the time of what that referred to?

A. Yes. During the '98 time frame we had to decide, you know, do we need 72-meg, do we need 128-meg or do we need 256-meg, and we decided that because of Intel strategy, Intel doesn't support 64-meg, so we don't need it -- I'm sorry -- Intel doesn't support 32-meg, so we don't need it.

64-meg we have to pull in the schedule. That means our schedule needs to be improved.

And 128-meg development without delay, that means put the resources right away on it.

And 256-meg/288-meg development simultaneously means we have to develop both of these, need to drive this project by aggressive schedule, so we wanted to put a lot of emphasis on this project.

Q. Next to "development without delay" in parentheses it reads "0.18um technology."

Do you see that?

A. Yes, I see that.

Q. Can you please explain your understanding of what that referred to?

A. Yeah. In order for us to bring the cost down, we had certain number of die requirement that we wanted R&D to give us, so number of die per wafer, we wanted to show them how many net die we need per wafer.

Q. Well, did 0.18um refer to the size of the traces or the lines on the die?

A. .18 micron technology at the time of '98 was our most advanced technology that we wanted to -- and when you have the most advanced technology, as a result is the lowest cost, so we wanted to utilize the lowest-cost process with our Rambus technology to bring the cost down.

Q. In other words, was the decision at this premeeting to develop the 128Mb RDRAM product with the most advanced Hyundai technology?

A. Absolutely.

Q. Now, Mr. Tabrizi, was the SyncLink standard ever finalized?

A. No.

Q. Based on your understanding, why not?

A. The SLDRAM toward late '99, the consortium kind of fell apart after I resigned from it in late '99, and some of the result went to JEDEC, so SLDRAM by itself kind of died.

Q. You mentioned that you withdrew from the SyncLink Consortium. How did that come about?

A. Yes. My executives were continuously getting complaint from both Rambus and Intel that Farhad is pushing SLDRAM and they want us to -- they want Hyundai to ask Farhad to resign.

So I resisted on that for a while, but I had to finally give up to my management and resign from SLDRAM.

Q. You referred to your management. Who was your management at that time?

A. Dr. K.H. Oh.

Q. And did Dr. Oh instruct you to resign from

SyncLink?

A. Yes, he did.

Q. Now, did Hyundai ever produce SyncLink in commercial quantities?

A. Never.

Q. And do you have an understanding of why not?

A. Again, you know, at the time of '98-99, Intel decided to go Rambus, and JEDEC standard SDR and DDR was basically filling the gaps that were areas that Rambus could not play. So -- and frankly, without Intel's support, the industry could not continue developing this type of device, so it kind of died.

Q. Did Hyundai ever produce Rambus memory for -- excuse me -- Rambus RDRAMs for main memory?

A. We did.

Q. And when did that occur, approximately?

A. I think as early as '96 we had some concurrent Rambus and then early '98 we had the direct Rambus.

Q. Did Hyundai ever produce RDRAM with the volumes that it had anticipated in the 1997 and 1998 time frame?

A. No, we did not.

Q. Do you have an understanding as to why not?

A. Yes.

Q. Can you please explain your understanding as to

why not?

A. During '98, '99, 2000, Intel continuously had problem with the Camino chipset. They canceled the chips -- I'm sorry. They canceled their schedule of launch many times. At one time they introduced and then they had to pull back and recall all the boards.

So frankly, Intel forecast was continuously being reduced. Every time they see us, they will give us a revised forecast. So it never really materialized in terms of the technology.

JUDGE McGUIRE: And then tell me again what you mean by the Camino chipset.

THE WITNESS: Camino, it's the Intel 820 chipset that was the first chipset that Intel was going to launch in August and December of '98. In December of '98 they came to us and said we have to delay to February because there are some debugs.

JUDGE McGUIRE: Okay. Go ahead.

BY MR. OLIVER:

Q. And the Camino chipset was the chipset that Intel was developing to interface with RDRAM?

A. Yes. Exclusively RDRAM.

Q. When you say "exclusively," do you mean the Camino chipset would not interface at that time with any other type of memory?

A. Exactly.

Q. Now, could OEMs use RDRAMs without chipsets that would interface with them?

A. No, they cannot.

Q. Other than Intel, were there any other companies that were designing chipsets to interface with RDRAM at that time?

A. No. I think at the time Intel had the exclusive attention from Rambus company, so they were not paying attention to other companies, so there was only one chipset that they were developing at the time.

MR. PERRY: Your Honor, I'll move to strike everything after "no" as being not responsive to the question and is speculation.

JUDGE McGUIRE: Sustained.

MR. OLIVER: Thank you, Your Honor.

May I approach, Your Honor?

JUDGE McGUIRE: Yes.

(Pause in the proceedings.)

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked RX-1425. It is an e-mail from T.C. Chou dated April 1, 1999, addressed to Mr. Desi Rhoden.

A. Yes.

Q. And if you look in the cc box at the very last -- next to last line, I believe you'll see your name there?

A. Yes, sir.

Q. Do you recognize this document?

A. Yes, I do.

Q. What is this document?

A. This is a copy of the Electronic Buyers' News article that T.C. Chou was referring to AMI members.

Q. And do you recall receiving this e-mail at the time?

A. Yes, I do.

Q. The e-mail attaches an article from Electronic Buyers' News; is that right?

A. That's correct.

Q. Did you read this article at that time?

A. Yes, I did.

Q. If I could direct your attention within the article to about two-thirds of the way down to a paragraph beginning "initially."

A. Yes.

Q. It reads: "'Initially, we had projected an industry demand for direct Rambus of more than 300 million units for 1999,' said" -- I'll skip the name -- "NEC Corporation's associate senior

vice president and the new head of the company's semiconductor group. 'Now that Intel has delayed the mass-market introduction of direct Rambus, customer demand this year will be much lower than we expected.'"

Do you see that?

A. Yes, I do.

Q. Now, that was a quote from an individual at NEC, but did that accurately reflect your experience at Hyundai as of approximately April of 1999?

A. Yes. The demand for RDRAM was continuously being reduced due to delay and delay.

Q. If I could then ask you to turn to page 2, please.

And if I could direct your attention about three-quarters of the way down the page to the paragraph beginning "However."

A. Right.

Q. That paragraph reads: "However, some DRAM suppliers, which asked to remain anonymous because of contractual obligations to Rambus, said privately that they are reluctant to commit additional funds to the ramp because of design changes that are still being made to the chip. Some of the modifications came as recently as a two months ago and have caused vendors

to push their production plans out further, they said."

Do you see that?

A. Yes, sir.

Q. Again, did that paragraph accurately reflect your experiences at Hyundai as of April of 1999?

MR. PERRY: Your Honor, I'll object to the form of the question. It incorporates anonymous people talking supposedly to a reporter in private. He should just ask him directly if he has personal knowledge of what are Hyundai's views as to whether they held back for whatever reason.

JUDGE McGUIRE: Restate your question, if you would, Mr. Oliver.

MR. OLIVER: Yes. Thank you, Your Honor.

BY MR. OLIVER:

Q. Mr. Tabrizi, I believe you said that you did read this article at the time that it was sent to you?

A. Yes.

Q. There's a reference in the paragraph that I just read to you of design changes that are still being made to the chip?

A. Yes, sir.

Q. At that time did you have an understanding of what design changes were being referred to?

A. Yes. The Rambus system, Intel was continuously modifying it to make it robust so it can work in the system, and every time they changed some of the specification, that means we have to change the complete mask set. Every wafer we had input, it had to be scrapped.

So as a result, since Intel would not tell us when would be the final one, we hesitant to invest a lot of wafer input and mask. Each mask set will cost about a million dollars, so every change you do, you have to invest another million dollars to get a new mask change.

Q. Can you please explain why Hyundai would have been reluctant at that time to invest in wafers?

A. Yes. Because we didn't know -- because it takes three months from wafer input to product output, so if we are inputting the wafer and three months later it comes out, but Intel meanwhile changed the spec, so all this product that are coming is not compliant and nobody want it, so we had to scrap it, and we did scrap a lot of product.

Q. If I could direct your attention towards the bottom of that page, beginning three lines from the bottom there's a sentence that begins, "Because the wholesale transition to Rambus requires vendors to

convert to their manufacturing lines, they must be sure there is a ready market for direct RDRAM before making the switch."

Do you see that?

A. Yes, sir.

Q. Now, based on your understanding at the time, did transition to Rambus require Hyundai to convert their manufacturing lines?

A. Yes. As I explained earlier, that Rambus required new packaging, new infrastructure, high-speed testers, so we had to abandon our investment and what we had for JEDEC product, convert the line, so unless we were sure that the customers are going to use this product, we were not willing to do that.

Q. Did Intel ever launch the Camino chipset to interface with RDRAM?

A. I think they eventually launched it toward late '99, early 2000 with a lot of modification.

MR. OLIVER: Your Honor, at this time I do plan to use an in camera document. It's a document that contains Hyundai information.

JUDGE McGUIRE: Okay. Very good. At this time let me advise the public in the audience that as a consequence of a prior court order entered in this case that the testimony we are about to hear is

considered confidential and is therefore closed to the public.

So at this time all those who have not been cleared access for this information, please vacate the courtroom, and you will be advised as to when we are back in public session.

MR. LYNCH: Your Honor, I'm counsel for Hynix. Am I allowed to stay? I'm not on the protective order.

MR. OLIVER: This is Hynix information, Your Honor.

JUDGE McGUIRE: Then I'm confident that you'll probably be all right.

MR. OLIVER: I think this will be about ten minutes, Your Honor.

JUDGE McGUIRE: Okay. We should have told them that.

Again, as always, I ask counsel to certify to the court everyone at their table and everyone behind them is cleared for access to this in camera testimony.

MR. PERRY: That's correct for Rambus.

JUDGE McGUIRE: Thank you.

MR. OLIVER: Yes, Your Honor.

JUDGE McGUIRE: All right. At this time we are

now in in camera session.

(Per subsequent instruction from the court, the proceedings remain in public session.)

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked CX-2338. The first page reads "Rambus Review (2001), March 21, 2001, DRAM BU." This actually appears to be a collection of different documents prepared at different points in time, so I actually expect to ask you only about certain documents that make up portions of CX-2338.

A. Okay.

Q. If I could ask you to turn first, please, to page 77.

A. Yes.

Q. This is a document with a caption Rambus Market Status, Strategic Marketing Team, DRAM BU, October 20, 2000. Do you see that?

A. Yes, sir.

Q. Do you recognize this document?

A. Yes, I do.

Q. What is this document?

A. DRAM BU is the DRAM business unit where I was

in charge of the memory marketing. And this is a Rambus market status at the time of October 20, 2000.

Q. If I could ask you to turn, please, to page 79.

A. Yes.

Q. Can you please explain in general terms what is depicted on page 79?

A. Yes. The original file was colored, Your Honor. The Q1 2000, that tall shape, should be a different color.

So this is Intel Rambus forecast every time they visited us. When they visited us in Q1,99, they forecast that the TAM for 2000 -- TAM '00 is the first color, the left side -- when they visited us in Q1,99 they told us about 600 million pieces of 128-meg will be the Rambus demand for year 2000.

Then when they visit us in September, they said, well, we had to delay the chipset and our TAM is now dropping to 500.

Then again fourth quarter they came and said we have to delay our chipset again and now the TAM is only 300.

And so in the May of 2000, you know, the TAM dropped because they had to cancel and recall some motherboards.

So every time during this from 1Q99 to 4Q 2000,

every time Intel came to us, they had to reduce their forecast, but they also show a very big forecast for the future. That's why we couldn't really rely on Intel's forecast, because every time we make an investment or input the product we had to delay.

This is actual end of forecast.

Q. You referred to TAM, which also appears in the caption. What does TAM mean?

A. Total available market for Rambus DRAM for Intel requirement.

Q. And this chart is a bit confusing. Perhaps if we could just try to walk through it.

In other words, if you look at the bar on the far left of the table, that was Intel's estimate of the total available market for the year 2000, the estimate made as of the first quarter of 1999; is that right?

A. Right.

Q. And that showed approximately or slightly less than 600 million units?

A. That's correct. For 2000.

Q. And then if you look at the next bar, the second bar from the left, appearing above 3Q, that would reflect Intel's estimate of the total available market for the year 2000?

A. Yes, sir.

Q. That estimate being given in the third quarter of 1999?

A. That's correct.

Q. And then looking at the third bar, which appears above 4Q, that represented Intel's estimate of the total available market for the year 2000 given in the fourth quarter of 1999?

A. That's correct.

Q. And did that show the total available market estimate dropping to a little over 300 million or so?

A. That's correct.

Q. And then looking above 1Q00, there are two bars. Now, if I understood you correctly, that was Intel's estimate made as of the first quarter of 2000 of the total available market for the year 2000 and the total available market for the year 2001?

A. That's correct.

Q. And the darker bar to the left showing about 250 million units, that was Intel's estimate as of the first quarter of 2000 for the total available market in 2000?

A. That's correct.

Q. And the taller bar showing approximately 900 million units was Intel's estimate as of the first

quarter of 2000 for the total available market in the 2001?

A. That's correct.

Q. Okay. And then again for the 2Q that would show then the relative estimates for total available market for the year 2000 and 2001 provided in the second quarter of 2000?

A. Exactly.

Q. And then in the final two bars on the right-hand side above 3Q would be Intel's estimates of the total available market for the year 2000 and the year 2001 provided in the third quarter of 2000?

A. That's correct.

Q. If I could ask you to turn, please, to page 54.

A. Yes.

Q. This is a document with a caption Rambus Market Status and Strategy dated December 22, 2000?

A. Yes, sir.

Q. Do you recognize that document?

A. Yes, I do.

Q. And what is that document?

A. This is our market status and strategy for Rambus as of December 22, 2000. It was done by my group in Korea.

Q. If I could ask you to turn, please, to page 57.

A. Yes.

Q. It's a page with a caption Rambus' Rocky Road. Do you see that?

A. Yes, I do.

Q. Can you please explain in general terms what is depicted on this page?

A. Sure. We borrowed this document from Electronic Buyers' News that depicted the Rambus status from early announcement when they announced in '96 as a potential in the DRAM market, you know, at the earliest stages when Rambus signed an Intel development agreement the potential was very high. And then as the time goes on and as Intel saw many challenges with Rambus, many technical difficulties with the chipset, then they decided to reduce the potential.

MR. PERRY: Your Honor, if I could inquire, so far there has been no in camera information from Hyundai. It's been about something that was in the newspaper. If this kind of chart is going to be used, I would like to have my client here because this is all about Rambus' rocky road.

JUDGE McGUIRE: Mr. Oliver, how is this in camera evidence that's being discussed?

MR. OLIVER: Your Honor, CX-2338 in its

entirety was designated as in camera. I don't know which information within the document it was not. I would defer to counsel for Hynix in terms of whether there is any in camera information to be designated.

MR. PERRY: My only point is I'd like to be able to rely upon my client to respond, if there is a response to this through this witness, to something that is entitled Rambus' Rocky Road.

JUDGE McGUIRE: The problem is this whole thing is in camera. Your client hasn't been cleared and I can't allow him access.

MR. PERRY: If I could have just a minute.

JUDGE McGUIRE: Okay.

(Pause in the proceedings.)

MR. LYNCH: Your Honor --

JUDGE McGUIRE: Do you want to stand, sir, and identify yourself.

MR. LYNCH: My name is Patrick Lynch. Mr. Nissly was whispering in my ear that our motion was quite specific as to pages within this document. This page is not --

JUDGE McGUIRE: Okay. Then --

MR. LYNCH: I don't know where counsel is going, but nothing I've heard would require in camera treatment.

JUDGE McGUIRE: Then if it's not in camera, then let's get the public back in here, but before we do so, are you done with your in camera examination?

MR. OLIVER: Well, Your Honor, I do have another question about this page, but so long as this page --

JUDGE McGUIRE: But if this page has not been deemed to be in camera evidence, then there's no need to be in in camera.

MR. OLIVER: Yes. In that case, this is the last page in this document that I intend to ask about.

JUDGE McGUIRE: Let me ask you this, Mr. Perry. Up to this point, has there been anything in in camera that you would like to inquire about before we go back in the public session?

MR. PERRY: No. Your Honor, I may cross on this page, but that would be in public.

JUDGE McGUIRE: Could I ask you, sir, to please ask the public to come back in, and then that ends the in camera portion of this proceeding and we'll go back into the public session.

(Pause in the proceedings.)

Okay. Then, Mr. Oliver, at this point you may proceed.

MR. OLIVER: Thank you, Your Honor.

BY MR. OLIVER:

Q. Mr. Tabrizi, if I could ask you a few specific questions about page 57 of CX-2338.

First, if you see above the date February '99 there's a bullet point and then next to that reads "Intel 820 chipset launch delayed."

Can you please explain your understanding at the time that you first saw this of what that referred to?

A. Yes. That was the first time Intel delayed the chipset due to whatever reason, technical reasons they had.

Q. Then moving then to the right, there's a bullet point above June 1999. Next to that it reads, "Intel says PC133 SDR w/P-III is possible."

Would you please explain your understanding at the time you saw this of what that referred to.

A. Initially Intel was going to support exclusively Rambus under 820 chipset. As they saw difficulties with that, they introduced the option that PC133, means the JEDEC standard 133 megahertz, can also be used as an option.

Q. And by the way, I notice that the line has gone from the first bullet point that I pointed out to you to the right and somewhat down. I'm interested in

the downward direction measured against the left-hand axis.

Can you please explain your understanding of what that depicted?

A. Right. When Rambus was not anymore exclusive, then if Intel offers an option, then the Rambus percentage as a penetration would drop because now people have a choice between PC133 and Rambus, so that as a result the penetration percentage will drop.

Q. Then the next bullet point appears above August '99 and the caption is to the left of that bullet point. It reads, "Intel confirms PC133 will be offered as alternative to D-RDRAM in P-III."

Can you please explain your understanding at the time of what that referred to?

A. Right. Initially --

MR. PERRY: Excuse me. I'd like just to state an objection that he told us that this chart came from a newspaper, Electronic Buyers' News, and now he's being asked to explain it. He didn't write it. He's not the newspaper reporter.

JUDGE McGUIRE: You can ask him about his understanding, but you can't ask him to interpret it.

MR. OLIVER: Thank you, Your Honor.

BY MR. OLIVER:

Q. Mr. Tabrizi, could you please explain your understanding of that statement.

A. Again, at that time Intel confirmed that they're going to use PC133 to use in P-III as an alternative to Rambus. As a result, the percentage of Rambus dropped again.

Q. By the way, the P-III there refers to what?

A. Pentium III.

Q. The next bullet point appears above September '99. The caption to the right of that reads, "Intel 820 chipset delayed again."

Again, what was your understanding at the time of what that referred to?

A. Intel, after delaying in February, they said the next launch date will be in September, so everybody was getting ready for September. When the September came, Intel says no, we're going to delay it again, because we have technical difficulties.

Q. The next bullet appears above November of '99. The caption that appears to the left of that reads, "Intel 820 chipset introduced."

Again, can you please explain your understanding at the time of what that referred to?

A. This is final date that Intel was able to

introduce the 820 chipset to the market and that was November of '99.

Q. Then I'll skip a bullet point.

The next bullet point over May '00, the caption that appears to the left reads, "Intel 820 M/Bs recalled due to defect in SDRAM-enabling MTH."

Let me break that down a bit.

First of all, what was your understanding at the time of -- well, I withdraw the question.

Let me just ask you generally, what was your understanding at the time of what that caption referred to?

A. Yes. If you look at that back in August Intel said that they will offer the P-III with the PC133, the reason they were -- I mean, the way they were offering this option was through a device called memory transfer hub, and that's the MTH.

So Intel was kind of -- the chipset was here and they were adding this MTH to interface with synchronous DRAM or to direct Rambus. So they were giving option through this MTH. And Intel had to cancel that and recall it because they had technical problems in the field.

Q. So if I understood your testimony correctly, the MTH is what permitted Intel's Camino or 820 chipset

to interface with SDRAM?

A. That's correct.

Q. And if there's a defect in the MTH, what effect, if any, did that have on the ability of the Camino chipset to interface with SDRAM?

A. It had a lot of technical errors and problems and they had to recall all of the boards in the field. It basically was a reliability mainframe.

Q. Now, at the time were there other chipsets that interfaced with SDRAM?

A. Yes. There were competing company to Intel that were offering the Pentium III chipset.

For example, VIA of Taiwan was one of the main companies offering PC133 chipset that works with Pentium III and they gained quite a bit of market share at that time.

Q. That is, gained market share at the expense of Intel?

A. Yes.

Q. If I could direct your attention to the next bullet point, it appears above June of 2000, and to the left of that reads, "Intel canceled MTH; delays launch of Timna integrated processor."

Do you see that?

A. Yes, sir.

Q. Can you please explain your understanding at the time of what that referred to?

A. Intel basically decided that they cannot have the Camino working both with Rambus and SDR through MTH, so they decided that they will cancel the MTH. That means there will be no option of SDR.

And Timna was going to be another chipset, that it was designed for Rambus interface, but it was for integrated graphic chipset.

So we have two chipset. One is for the main memory and one is for graphic. Intel decided to combine the two in one chipset and they called it Timna. For the low-end application and portable application.

And since Timna was also interfacing with Rambus, they had major problem and they delayed that.

Q. Then the next bullet point appears above July 2000. The caption to the left reads, "Intel confirms P-IV will support PC133 in addition to D-RDRAM."

Can you please explain your understanding at the time of what that referred to?

A. So at this time Intel decided that their Pentium IV not only will support Rambus, will support PC133 with two different chipsets.

Q. And then the final bullet point appears above November 2000. The caption reads, "The launch of P-IV."

Can you please explain your understanding at the time of what that bullet point referred to?

A. Yeah. In November 2000 Intel launched their Pentium IV.

Q. Now, in general terms, the line connecting those various dots falls from the upper left towards the lower right before turning up very slightly at the right-hand edge of the chart.

What was your understanding at the time of what was depicted by that line?

A. Again, the Pentium IV was introduced and in the high end. Initially the Pentium IV when it's introduced at the beginning it's for the high-end application and high end was using Rambus, you know, because the price was high so that they could use it, so that's why it shows the Rambus penetration went up a little bit, because Pentium IV was meant to be a high-end processor.

Q. So does that answer refer to the very tail end, the very right-hand portion of that line?

A. Yes. When it reduced at the beginning, that brought some momentum to Rambus based on high-end

performance PC.

Q. Can you describe your understanding at that time of the line as a whole starting from December 1996 through November of 2000?

MR. PERRY: Your Honor, I would object if this is being offered for the truth. If we're just getting his understanding, it's fine, but --

JUDGE McGUIRE: Sustained.

MR. PERRY: Thank you.

MR. OLIVER: Your Honor, could I have an answer to that question for his understanding?

JUDGE McGUIRE: Well, I'll let him have his understanding, but then let's get off.

MR. OLIVER: Thank you, Your Honor.

THE WITNESS: Again, at the beginning when Intel introduced they're going to use Rambus, the expectation was Rambus will be almost 80 percent of the market. With all the problems that Intel had and when Intel optioned the alternative, the Rambus penetration came down to maybe around 10 percent or lower than that.

Currently, Rambus' total market is about 4 percent of the total DRAM market, so it's very much down from 80 percent that we were forecasting.

MR. OLIVER: Your Honor, if I could have just a

moment, I'd like to see if there's any material I could skip here.

JUDGE McGUIRE: Go ahead.

(Pause in the proceedings.)

MR. OLIVER: Thank you, Your Honor.

May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Tabrizi, I've handed you a document marked CX-2334. The first page has a caption Hyundai Electronics, Taiwan/Korea/Japan/China, April 1999, above that PC100/133 to PC266 Migration Path, the date in the upper right-hand corner April 1999.

Mr. Tabrizi, do you recognize this document?

A. Yes, I do.

Q. What is the document?

A. This document was prepared for our Asia Pacific technology forum that we had for our salespeople.

Q. Do you recall seeing this document in about the April of 1999 time frame?

A. Yes, I did.

Q. By the way, what was your understanding of what was meant by "PC100/133 to PC266 migration path"?

A. PC100/133 is SDR. PC2666 is basically double the 133, so it's the double data rate of 133.

Q. If I could ask you to turn, please, to page 4.
A. Yes.
Q. At page 4 is the caption in the middle of the page DDR Can Share Existing SDRAM Investment and Infrastructure. And then under that there are eight boxes.
Can you please explain your understanding of what is depicted there?
A. Yes. One of the main advantage of DDR was that the DRAM companies did not need to make additional investment. They could use the same factory and the same infrastructure to build SDR and in terms of DDR and in terms of the technology was similar enough that we could learn it in a very quick time period so we could ramp up very quickly.
Q. If I could direct your attention to the lower right-hand box in particular, it reads "SDRAM yield learning curve." Do you see that?
A. Yes, sir.
Q. Can you please explain your understanding of what that referred to?
A. Yes. Every time we introduce a new product, at the beginning the yield is very low, and by the time the product becomes mature, the yield reaches 90-95 percent. Since SDR and DDR are very similar, we

expected we can achieve high yield in a very quick time.

Q. If I could ask you to turn, please, to page 22.

A. Yes.

Q. Towards the top of the page the bullet point reads "Hyundai 64M DDR SDRAM Has," under that, "Finished Successful Customer Feedback in Actual System."

Do you see that?

A. Yes, sir.

Q. Can you please explain your understanding at the time of what that referred to?

A. Yes. It meant that DDR, it actually has been evaluated and validated by our customer, so it is not a technology that we don't have enough experience.

Q. If I could ask you to turn, please, to page 23. It has a caption Hyundai nDRAM Development Plan.

And let me ask first, what was your understanding of the term "nDRAM"?

A. Yes. "nDRAM" was a term that was used by Intel before they decided which technology they want to use for the next-generation DRAM. And since they didn't know what it is, they called it nDRAM, so it could be Rambus, DDR or SyncLink.

Q. And if I could direct your attention to the

first line here, PC at the left-hand side, begins with SDRAM and then in the middle RDRAM and underneath that BDDR SDRAM and then to the right RDRAM and SLDRAM.

Can you please explain your understanding at the time of what that row depicted?

A. Sure. For personal computer, currently there was a 100 megahertz PC100 being used. The next-generation Rambus was already decided that will be used by the Intel in a PC.

BDDR was question mark. That's the bidirectional DDR that was being discussed at JEDEC. We didn't know if there is a chance or not. That's why it's question mark.

And for the generation after that we had still three chances, either RDRAM or SLDRAM or something totally different, a new architecture of DRAM. So still the options were open.

Q. If I could ask you to turn, please, to page 27.

A. Yes.

Q. The page with the caption Hyundai Rambus DRAM Strategy. In the upper left-hand corner is a box with cons, D-RDRAM still not fully proven, have no solution for migration beyond direct RDRAM, and cost (royalty/test/yield).

Do you see that?

A. Yes, sir.

Q. Can you please explain your understanding at the time of what that box referred to?

A. Yes. These are the disadvantages of the Rambus product, that the technology was not yet fully proven. We still had a lot of technical difficulty, both us and the Intel and the enabler. We had no road map beyond RDRAM. We didn't know what's next, so it was just a one-generation thing. And also the cost was high due to royalty, test and yield.

Q. Down at the bottom of the page, the box Hyundai Strategy. The first two bullet points read: "High priority due to customer requirement. Put the resources to solve retaining problems."

Do you see that?

A. Yes.

Q. And can you please explain your understanding at the time of what those two bullet points referred to?

A. Sure. I think the "retaining" should be changed to "remaining." Sorry. That's Kenglish, Korean English. They made a mistake.

But high priority due to customer requirement, put highest priority to Rambus because customer needs it. Intel wants us to develop it.

Put the resources to solve the remaining problem. You know, if there is a problem with cost or technology, put the best resources to solve it, so we were really focused on Rambus.

MR. PERRY: Excuse me just a second. Could I speak to counsel?

(Pause in the proceedings.)

BY MR. OLIVER:

Q. By the way, Mr. Tabrizi, if I could ask you to turn back to page 23.

A. Yes.

Q. In the upper right-hand corner there is a date that appears to be September 1997?

A. That's correct.

Q. Do you have an understanding as to whether this document was dated as of April 1999 in its entirety or whether it consisted of different portions with different dates?

A. No. It entirely was April '99. We borrowed that foil from the earlier version and insert it in this presentation, so our strategy was still the same.

Q. Now, Mr. Tabrizi, a couple moments ago you described the declining line in the Rambus Rocky Road page, and I believe you said that the projections for the RDRAM total available market declined over time.

As of the 1999 and 2000 time frame, did you have an understanding as to where that market share shifted to?

A. Yes. Rambus Intel focused on the high end and high end means PCs over $2,000. And there for the low-end PC they adopted the industry standard SDR and DDR.

Q. So in other words, as the projections for market share of Rambus declined, that was taken up by SDRAM and DDR SDRAM?

A. Yes, sir.

Q. And there you're referring to JEDEC-compliant products?

A. Yes, sir.

Q. Now, Mr. Tabrizi, based on your understanding, has Hyundai had any involvement in the JEDEC DDR-II standard?

A. Yes, we have.

Q. Have you personally had any involvement?

A. Yes, I have.

Q. What is the nature of your involvement in the DDR-II standard?

MR. PERRY: Your Honor, this is entirely beyond the scope. There was no testimony this morning about DDR-II.

JUDGE McGUIRE: Sustained.

MR. OLIVER: Your Honor, I have nothing further at this time.

JUDGE McGUIRE: Okay. Thank you, Mr. Oliver.

Mr. Perry, do you have further redirect?

REDIRECT EXAMINATION

BY MR. PERRY:

Q. Mr. Tabrizi, if you could pick up the April '99 document that's CX-2334 that Mr. Oliver was asking you about.

Do you have that in front of you?

A. CX-2334, right.

Q. And he pointed out to you that although the cover says April '99, if you see on page 23, there's something that was created back in September '97. Do you see that on page 23?

A. Yes, sir.

Q. And do you see that page 25 is also from back in some earlier time frame? Do you see references in there to products that will be available in '98?

A. Pardon me?

Q. Look under Hyundai Strategy. Do you see where it says ES will be available at 3Q98? Do you see that?

A. Yes.

Q. Doesn't that tell you that this chart was created prior to the third quarter of '98?

A. Again, I'm sorry about the English, but this is prepared by a Korean staff and this meant that ES was available from 3Q98.

Q. So you think this particular chart was prepared in '99? Is that what you think?

A. This presentation was given in '99 to our own internal sales, in Asia Pacific, people, so it was a combination of the foils that they felt they needed to have. A combination of the slides. Sorry.

Q. Isn't it true that the last page of this exhibit was prepared in 1997?

A. No. Again -- maybe the original was prepared in '97, but it still was valid at the time and we were still just trying to show what's our strategy in each product.

Q. Is it your testimony that you have personal knowledge that this document was deliberately -- that the last page of this document was deliberately attached to this April 1999 presentation because everything on it was still then true?

A. Yes.

Q. So it was still then true in April 1999, if you'll look in the column -- we're on the last page of

the exhibit -- if you'll look on the column entitled Pros, the box entitled Pros, was it still true as of April 1999 that the Rambus DRAM provided the highest -- higher performance ever even in existing technology?

A. Of course. Yes, sir.

Q. Yes?

A. Of course.

Q. Was it widely licensed at the time?

A. Yes.

Q. And was it field proven?

A. Yes, sir.

Q. Now, I'll ask you to go back to the Rambus Rocky Road document that you said was taken from the newspaper. It's CX-2338-57.

A. Yes.

Q. Do you see that on the screen?

A. Yes, sir.

Q. And you don't have personal knowledge as to Intel's motivations in deciding to offer a PC133 SDRAM alternative on its Pentium III chipsets?

A. I do.

Q. You have personal knowledge as to why Intel did that?

A. Yes. We worked with Intel very closely.

Q. And do you have access to their internal

memoranda that describe their reasoning?

A. Not internally, but they give us an update every quarter. We meet with them.

Q. And do you have personal knowledge as to why they delayed the launch of Timna?

A. Yeah. Because of the difficulties they had --

Q. Just yes or no, Mr. Tabrizi.

A. Yes.

Q. And is that based upon looking at internal Intel documentation?

A. Not in internal, just external.

Q. Just what they told you?

A. Just what they told us.

Q. And over this time period that's reflected on this chart from the newspaper, is it correct that throughout that time period -- well, let me ask you to do this. Let's leave the chart up and I'm going to ask you to pull out a document that we looked at this morning that was RX-1280A, and it's on the very bottom of the stack in front of you.

A. 1280?

Q. A.

A. A.

Q. And that's your September 25, 1998 memoranda to the folks in Korea about your pricing forecast. Do you

see that?

A. Yes, sir.

Q. And you say in the second sentence that you think we can use this opportunity to adjust the overall DRAM pricing in the market and to increase the DRAM percentage of the overall PC cost to about 10 percent when PC was using RDRAM.

Do you see that?

A. That's correct.

Q. You wanted to use the opportunity that was presented by the introduction of the RDRAM to increase the overall percentage of the price of a PC that was attributable to the DRAM chip; right?

A. That's correct.

Q. And do you have personal knowledge as to whether other DRAM manufacturers had the same strategy?

A. I have no idea what other companies' strategy, but since the Rambus was high price to manufacture, I thought this is a good chance to increase the percentage of the total memory cost in the PC.

Q. And that's because once the -- if you were able to do that, once you had experience manufacturing and the costs came down, then you would have higher profit margin; right?

A. Yes.

Q. And do you have an understanding as to what percentage of the developments on this rocky road are due at least in part to the desire of DRAM manufacturers to increase their profit margin on the chips used in PC?

A. I think the failure of Rambus was exclusively the Rambus difficulty in design and Intel failure to deliver Camino in time.

Q. And that's what you referred to earlier when you were explaining what you meant by Rambus --

A. All the technical difficulties they had and the not readiness of the market and Intel chipset caused Rambus to lose momentum and collapse.

Q. You testified this morning in response to Mr. Oliver's questions about SyncLink, that your understanding was that the SyncLink patents were intended to be licensed to everybody royalty-free. Do you remember that?

A. Yes, I did.

Q. And you said that your understanding was that everybody will be able to develop products without anybody's patents blocking them; right?

A. Yes. That's correct.

Q. When you gave that testimony, were you aware

that the SyncLink patents are now held by AMI-2?

A. That's correct.

Q. And when you gave that testimony, were you aware that the SyncLink patents that AMI-2 holds are only available to members of AMI-2 and not available to everybody?

A. It is available to the members and the AMI position is defensive. They will not -- everybody can use it.

And if you want, you can get a statement from AMI. Everybody can use their patent.

Q. So when you gave that testimony this afternoon in response to Mr. Oliver, you understood that AMI-2 would make its patents available to anybody even if they weren't an AMI member?

MR. OLIVER: Objection, Your Honor. Mischaracterizes the testimony. The questions earlier were with respect to the SyncLink patents long before AMI-2 was formed.

JUDGE McGUIRE: Sustained.

BY MR. PERRY:

Q. So when you gave your testimony, were you making any assumption about whether or not today those SyncLink patents are available to everybody?

A. Even today, SyncLink is open standard and the

patents are available without charge to everybody.

Q. Well, back in 1998, was it your understanding that if SyncLink obtained patents based upon its technical advancements and somebody wanted to use those patents to make non-SyncLink products that they could do that?

A. Can you repeat the question?

Q. Yes.

Was it your understanding back in 1998 that if SyncLink obtained patents and somebody wanted to use the intellectual property protected by those patents to make devices that were not SyncLink devices, could they do that for free?

A. From the beginning, my understanding was to use within SLDRAM. I never thought about it if somebody wants to use it outside SLDRAM, if they have to pay or not. The intention was for the SLDRAM spec, so I have no knowledge of if they would charge royalty for nonusage or not, so -- but the intention was open, royalty-free and the patent holder positions was defensive only, not offensive.

Q. Well, let me show you a document from that time period that you received, CX-2722.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. And the portion of this e-mail that I'm going to be asking you about is in the very middle, but it's from Kevin Ryan to someone at Cisco.

Do you see where it says "Thanks, Kevin"?

A. Yes.

Q. And above that he says, "I've included Farhad in case he wants to clarify this."

A. That's right.

JUDGE McGUIRE: Who again is, for the record, Kevin Ryan?

MR. PERRY: Mr. Ryan -- I believe it's undisputed he was at Micron at the time.

JUDGE McGUIRE: Very good.

BY MR. PERRY:

Q. He's an engineer at Micron.

Mr. Ryan was involved in SyncLink, wasn't he?

A. Yes, he was.

Q. Thank you.

And do you see that he talks about the IP in this portion?

A. Yes.

Q. Do you see where he says: "SLDRAM must have complete control over the use of the core. Not to make money from licensing fees, but to make sure that the IP

is only used in SLDRAM or DDR SDRAM-based systems. We would not want to allow a situation where an outside developer of the core could use the IP in non-SLDRAM/non-DDR systems"?

Do you see that?

A. I see that.

Q. Was it your understanding that the only people who could use the SLDRAM patents, was it your understanding as of '98, were people who wanted to build SLDRAM devices?

A. Frankly, I never thought about it. I mean, this e-mail, even though I know I was copied on this, kind of for me the first time I'm looking at it. The intention was I frankly thought everybody will use SLDRAM. The chances of them using it outside, if it didn't interfere with SLDRAM, probably we didn't mind.

I mean, SLDRAM again was defensive purposes. We were not going to litigate. We were not going after anybody. So we just wanted to protect the members from others filing patents and charging us.

Q. And you testified that the SLDRAM device development of that simply died in '99; right?

A. Yes, sir.

Q. Do you have any idea why AMI-2 continued to pursue and prosecute those patents?

A. They are not -- what do you mean, "prosecute?" Are they going after anybody?

Q. Pursue the issuance of the patents for long after '99.

A. Yeah. The member felt these are good technology, we may want to continue it and at least get the patent. Still we are protecting the members. So nobody else can go file a patent.

So again, it's a holder to show that this technology was developed and come and use it, it's free of charge.

Q. And you testified that SyncLink died after you left, after you were no longer chairman; right?

A. Yes.

Q. I want you to look at RX-1361. It's just one page. Let's pull it up on the screen.

Can you read that? Is that an e-mail that you prepared in December of 1998?

A. That's correct.

Q. And you sent it to Dr. Oh in Korea. Was he above you in the management chain at Hyundai?

A. That's correct.

Q. And the subject is an Intel meeting?

A. That's correct.

Q. Let's pull up the top half of the document.

And what Intel had requested in that phone call to you is that they'd like to start working on the next-generation memory solution beyond RDRAM; right?

A. That's correct.

Q. And they were coming to the DRAM manufacturers to work with them on that next-generation memory device; right?

A. That's correct.

Q. And then you say at the very bottom on your PS: "I am no longer the head of SLDRAM Inc. as of 12-17-98 and I believe the organization will die slowly from here on. Job accomplished"; right?

A. That's correct.

Q. And you said "job accomplished" because the job of the SyncLink Consortium as you understood it was to convince Intel to come back to the DRAM manufacturers for the next-generation memory architecture; right?

A. No.

Q. You said, "Job accomplished." You thought you'd done your job, didn't you?

A. He asked me to quit, I quit, and I told him, Hey, you asked me and I did it, job accomplished.

Q. So when you refer to job -- in your saying "job

accomplished" you meant the job of quitting; is that your testimony?

A. That's me leaving the SLDRAM -- he asked me to resign, and I resigned, so this was the first time I sent an e-mail after he asked me, so I just wanted to contact him telling him that job was accomplished.

Q. When you say "job accomplished," you meant the job of quitting SLDRAM?

A. That's correct.

JUDGE McGUIRE: I don't understand what that means, "the job of quitting."

THE WITNESS: He asked me to resign from SLDRAM. He's our president at the time. And then this was the first chance I had, Your Honor, to contact him, and I couldn't say in the e-mail, Because you asked me to resign, you know, I resigned and all that.

JUDGE McGUIRE: I'm not -- I'm not questioning that. I'm just not quite sure what context you're talking about, and you've explained it and that's your testimony.

MR. PERRY: If I could, Your Honor.

BY MR. PERRY:

Q. You made that statement in the e-mail where you told Dr. Oh that Intel had come to you to pursue the

development of the next-generation memory device with the DRAM manufacturers; right? Right?

A. That's correct.

Q. And you thought that was very positive news; right?

A. That's correct.

Q. And that's why you said "job accomplished," wasn't it?

A. I wrote the e-mail, and believe me, these two nothing had to do, Intel meeting with my job accomplished at SLDRAM, was totally separate. It was just the same e-mail. It was the first time after he asked me to resign I was responding to him, really nothing to do with each other.

Q. And the phrase "job accomplished" had nothing to do with the Rambus killing that you told your superior about in 2000 that you thought you'd been very close to doing; correct?

A. That's my testimony.

MR. PERRY: I have nothing further.

JUDGE McGUIRE: Mr. Oliver, anything?

MR. OLIVER: Nothing further, Your Honor.

JUDGE McGUIRE: Okay. Sir, you're excused from this proceeding. Thank you for your testimony.

THE WITNESS: Thank you, Your Honor.

JUDGE McGUIRE: Counsel, if that concludes the presentation for today, we'll convene tomorrow morning at 9:30.

Mr. Oliver?

MR. OLIVER: Before we finish for the day, there are two exhibits that I'd like to move in, if I could.

JUDGE McGUIRE: Go ahead.

MR. OLIVER: First is CX-2314A. Unfortunately I've misplaced my copy.

MR. PERRY: No objection.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 2314A was admitted into evidence.)

MR. OLIVER: Thank you.

The second, from CX-2338 -- this is the document we looked at that consisted of a number of different documents placed together. I would propose to admit CX-2338 pages 54 through 76.

MR. PERRY: Are those not in camera? Have you checked?

MR. OLIVER: We've only checked the one page. We'd have to check the remaining pages.

MR. PERRY: I'm just raising that for the court reporter and for the record.

JUDGE McGUIRE: Right. Is any aspect of those pages to be treated as in camera, Mr. Oliver?

MR. OLIVER: I can't answer that now, Your Honor. I can get back to you.

JUDGE McGUIRE: Would you get back to me on that.

Otherwise, you have no objection?

MR. PERRY: I have no objection.

JUDGE McGUIRE: It will be entered and then it we'll determined tomorrow if any portion should be treated in camera.

(CX Exhibit Number 2338-54 through 2338-76 was admitted into evidence.)

MR. OLIVER: Thank you, Your Honor.

In addition, also from CX-2338 pages 77 through 82.

MR. PERRY: Again, the same issue, the only objection or the only question I would have is --

JUDGE McGUIRE: All right. Entered on that basis.

(CX Exhibit Number 2338-77 through 2338-82 was admitted into evidence.)

MR. PERRY: And we would also propose that the testimony that was in camera before there was an agreement that there was no need to be in camera --

JUDGE McGUIRE: Is that the entirety of that testimony or was it just a certain portion?

MR. OLIVER: Is it the entirety of the testimony that at this point we've determined, you know, did not need to be in camera?

MR. LYNCH: Your Honor, I do not believe that any of the testimony that Mr. Tabrizi gave about that exhibit needs to be in camera.

JUDGE McGUIRE: Then I'm going to go back on that and then we'll instruct the court reporter to go back to the portion that I determined was in in camera and change that to being in the public session, and that's how it shall be treated for this record.

MR. PERRY: Thank you.

JUDGE McGUIRE: Anything else?

MR. OLIVER: No. That's it, Your Honor.

JUDGE McGUIRE: If not, then we'll adjourn and convene tomorrow morning at 9:30.

(Time noted: 5:19 p.m.)

C E R T I F I C A T I O N O F R E P O R T E R

DOCKET NUMBER: 9302

CASE TITLE: RAMBUS, INC.

DATE: JULY 16, 2003

I HEREBY CERTIFY that the transcript contained herein is a full and accurate transcript of the notes taken by me at the hearing on the above cause before the FEDERAL TRADE COMMISSION to the best of my knowledge and belief.

DATED: July 17, 2003

JOSETT F. HALL, RMR-CRR

C E R T I F I C A T I O N O F P R O O F R E A D E R

I HEREBY CERTIFY that I proofread the transcript for accuracy in spelling, hyphenation, punctuation and format.

DIANE QUADE