FEDERAL TRADE COMMISSION

I N D E X (PUBLIC RECORD)

UNITED STATES OF AMERICA

FEDERAL TRADE COMMISSION

In the Matter of:)

Rambus, Inc.) Docket No. 9302

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Monday, July 14, 2003

9:32 a.m.

TRIAL VOLUME 41

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.

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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. Counsel, good morning.

MR. PERRY: Good morning, Your Honor.

JUDGE McGUIRE: Mr. Perry, do you have something you want to say?

MR. PERRY: I just thought I'd take the opportunity before we started with the witness to give you a little update on what we're going to do this week.

JUDGE McGUIRE: Very good.

MR. PERRY: Today we have Mr. Craig Hampel, a Rambus employee. I anticipate that we'll be done by lunch break.

JUDGE McGUIRE: Okay.

MR. PERRY: This afternoon we're going to read in deposition testimony of Mr. Sam Chen, who was Mitsubishi's JEDEC representative. The parties have met and conferred and I believe there will be no objections to any of that testimony. It should come in fairly smoothly.

Tomorrow we will have one of Rambus' experts, Martin Fleisler, a patent attorney.

On Wednesday, we will start with

Dr. Betty Prince, a third party, and then whenever she's done, we'll go to Farhad Tabrizi, a Hynix executive. He may go over into Thursday morning.

On Thursday we have Jim McGrath, who is a JEDEC representative from a company called Molex, and then in the afternoon we'll have Dr. David Gustavson, on Thursday afternoon, who was involved with the SyncLink Consortium.

JUDGE McGUIRE: Okay.

MR. PERRY: We do have a witness for Friday and we'll give notice of that tomorrow.

JUDGE McGUIRE: Very good. Thank you, Mr. Perry.

Anything on the side of complaint counsel?

MR. OLIVER: Your Honor, just reacting to that, I have not had a chance to consult with opposing counsel on this. It sounds to us as though the schedule for Wednesday and Thursday could be very tight. I suggest that we do consult today with respect to the schedule for Mr. Tabrizi.

MR. PERRY: We'll be happy to consult. We think that the Prince and McGrath and Gustavson will be fairly short examinations.

JUDGE McGUIRE: Okay. You two can talk.

The only thing I want to take up while we're

doing housekeeping items is the pleading currently before me regarding the proposed testimony of Reese Brown. I received the answer from respondent.

Does that help you understand the issue any better, Mr. Oliver?

I know you're asking for clarification. They apparently have no opposition, if I understand the answer properly, to your pleading.

Does that help impart any clarification?

MR. OLIVER: Your Honor, we're still hoping to get clarification from you as to the basis of your ruling.

JUDGE McGUIRE: Well, what I am going to do then, when I issued that ruling, it was in essence on the grounds that there was no foundation for the inquiry based on the fact that there had been no presentation of the JEDEC manual, so that was the key point as to why I upheld their earlier objection.

Does that help clarify it for you?

MR. OLIVER: Yes, Your Honor, it does. And with that clarification, we can then go back and take a look at the designations.

JUDGE McGUIRE: Okay. Then at this time the respondent may call its next witness.

MR. PERRY: Thank you, Your Honor.

Rambus would call Mr. Craig Hampel to the stand.

JUDGE McGUIRE: Mr. Hampel, would you please just approach the bench and be sworn in by the court reporter.

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Whereupon --

CRAIG HAMPEL

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. Hampel.

A. Good morning.

Q. Could you tell us who your current employer is.

A. Rambus, Incorporated.

Q. What's your current position at Rambus?

A. Currently my position is entitled technical director.

Q. What are your responsibilities currently as technical director?

A. I'm responsible for setting kind of the direction at the corporate level for the areas of research and development and often problem-solving with

existing products as well.

Q. When did you join Rambus?

A. April of 1993.

Q. And what was your role then? What was your title and your responsibilities then?

A. Initially I was hired with the title that was called member of technical staff, which isn't very descriptive.

Q. Can I interrupt you? Could you move the mike just a little closer for the reporter's benefit.

Great.

A. So my title was member of technical staff. My responsibility was understanding and optimizing Rambus' solutions for the main memory market segment for DRAM.

We identified a lot of different applications for DRAM, and main memory was a very significant one, and so I was responsible for understanding that market, the customers that are active in it, and optimizing or improving our products for that market.

Q. Before joining Rambus in 1993, had you had any experience with memory systems or semiconductors?

A. Yes. Even as an intern in the early '80s and basically the 18 years I'd been active in engineering, I'd been doing memory systems, systems designs, at

companies like Acer, Altos, Olivetti, various -- many computer companies.

Q. And let's go back to the early time period when you were at Rambus. You talked a little about your responsibilities.

Did those responsibilities, looking at applications for main memory, did that involve contacts with any other companies other than Rambus people?

A. Yes. As part of that responsibility, I also assumed kind of general technical account management for key customers in that segment. Those would be Intel, Incorporated, is one. People like Cray, Silicon Graphics, Sun Microsystems, Compaq, Dell, those types of companies, I'd had kind of first-order account responsibility for those customers as well.

Q. And -- now, throughout your time at Rambus, have your responsibilities fallen on the technical side or on the marketing side? Can you make that choice?

A. A little bit of both, but primarily understanding the market and then optimizing or improving our technology for that market, so it probably evolved more from a marketing role to a technology role over time.

Q. And in the, let's say, '94 through '96 time period, can you describe your responsibilities?

A. In the 1994 through '96 we started working on a new generation of DRAM called the concurrent RDRAM. The first generation was named base. I was involved in its architecture and feature set, in defining it, so I -- the goal was for me to understand that market and then go back and try to improve our products for that market, so I worked on the concurrent RDRAM's definition.

Also, I kind of probably diversified from an applications standpoint as well. I worked with some of the graphics customers. I worked a little bit on the Nintendo 64 as well.

Q. And moving forward to '96 to '98, how did your responsibilities change in that time period?

A. After concurrent finished, we started working on the development for the direct RDRAM, which was initially called Rambus II. There was a group of people at Rambus of which I was one of that worked on its definition, and sometime early '96 through '96 we engaged with Intel to jointly develop what was originally called Rambus II.

So I was at that point kind of the key technical support person for Intel during those years

and the key technical support person for defining the DRAM and agreeing to the feature set of the DRAM with Intel.

Q. And in that time period did your responsibilities include visiting with customers, partners, potential customers?

A. Yes. As we went jointly into the development with Intel, we began to go meet with both their customers, which would be PC and OEMs, which are the original equipment manufacturers for personal computers, like Dell and Compaq, et cetera, and we also began to meet with the DRAM vendors to understand their facilities, capabilities, requirements and needs so that we could optimize the parts to meet the needs of Intel, Intel's customers and the DRAM vendors.

Q. Now, were you the only person at Rambus who was working with the OEMs and the manufacturers to help the direct RDRAM launch?

A. No. The vast majority if not all of the company in '96, '97 and '98 was working entirely on direct RDRAM in some capacity, not necessarily for PC, and we also worked with people like Sony on Playstation 2, a number of high-definition TV projects and graphics projects, so the whole company was working on direct RDRAM and the projects that related to it.

The majority was working on the portion related to Intel, though.

Q. And moving forward to '99 and 2000 -- I know we've moved quickly through the '90s, but moving forward to '99 and 2000, did you play any role in connection with analyzing DRAM manufacturing issues or costs?

A. When DRAM issues were important to Intel and their customers, price or availability or some feature set that Intel needed, then I got involved with solving that problem or doing our best, doing what Rambus could to solve that problem.

Q. In that time period did you have -- did you continue to have some role as a technical account manager for Intel?

A. Yes. We hired basically a business manager or account manager to manage the business side of our relationship with Intel and logistics. I still did most of the or a significant portion of the technical support for Intel's chipset development.

Q. At some point had Intel made an announcement that it was going to incorporate Rambus memory in connection with its own chipsets?

A. Yes.

Q. Approximately when was that?

A. I think that was sometime in 1996.

Q. And was there some process after that to try to launch that product into the marketplace?

A. It didn't really radically change our relationship with Intel or the way we worked, but it really formalized the program. There were more customers interested. We did increase kind of the workload, if you will, to support the effort, formalized it, if you will.

Q. I want to show you a document from December 1999 and talk about that a while.

If we could bring up CX-1355.

And I'll bring you a copy.

May I?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. Let's start with, do you recognize this lengthy document?

A. Yes, I do.

Q. Can you tell us generally what it is?

A. Throughout the relationship with Intel, we would have approximately quarterly technology or status updates where we'd get together and go through the formal overview of the project and its status.

This one was in sometime -- well, December 3,

1999. This particular one was perhaps a little more formal than most. Sometimes they would just be going through status and having a discussion. This one was a pretty exhaustive presentation, status and plans and what we called operations review of the project.

Q. Could you look on page 2 with the agenda, please.

A. Okay.

Q. And do you see that you're listed as -- that your name appears there next to a couple of items? Do you see that?

A. Yes.

Q. Did you make presentations at this December 1999 operations review?

A. Yes.

Q. Were you present for the entire meeting?

A. I don't believe so. I think there was kind of a business discussion at the end that I left for or was asked to leave for.

Q. Did you assist in preparing presentations other than the ones you actually gave?

A. This was a fairly technical presentation, so I did review and even prepare some of the slides that other people presented, yes.

Q. I want to start with, if we could, a

presentation that starts on page 45.

Do you see that's entitled DRAM Supplier Readiness Frank Fox?

A. Yes.

Q. What was Mr. Fox's position at the time with Rambus?

A. Frank was the vice president of engineering, responsible for DRAM partner support and DRAM development at Rambus.

Q. Would you look through the slides that follow his name -- I think it goes all the way up to about page 60 -- and just tell us if you had input or helped prepare any of those slides.

A. Yes, I did. I helped Frank prepare a significant number of these slides, yes.

Q. And were you present for the presentation?

A. Yes, I was.

Q. Let me ask you a few questions about this presentation by Mr. Fox in December 1999.

If you'll look on a couple of pages in to page 47.

A. Okay.

Q. Now, that's entitled Rambus Deliverables to DRAM Suppliers, and I'd like you to explain if you could what Rambus called deliverables in that time

period.

A. So enable -- in order to enable or provide the tools the DRAM vendors needed to develop RDRAM technology, this is kind of a list of all the things -- not even all the things -- this is a summary of the things we were providing to DRAM suppliers to help them implement and/or in many cases improve, improve yield or those kind of things for -- to enable -- tools to enable them to develop RDRAMs.

Q. And I see a box in the right corner that says "complete design collateral delivered." What was that referring to, "design collateral"?

A. So those tools and what we tried to provide as a set of tools that if a partner took them and used them effectively -- we also had a support group so that if they had questions on how to use those tools, there were assigned people to respond to those questions -- but the goal was if they took those tools, they could decrease their time to market.

For example, we gave them a schematic that was optimized, not necessarily completely implemented for their process but optimized for their process.

And also the other tools were test procedures, test boards, designed to make sure that their part was compatible with all the other DRAM vendors' parts and

compatible with the needs of the industry.

So time to market -- that's what TTM stands for -- and compatibility were related goals of this tool set.

Q. You mentioned support. Could you look at page 49 a couple of pages in.

That's entitled DRAM Partner Support Model. Could you explain what, at a very high level, just generally explain what this refers to.

A. We had set up sort of the goal was to give them tools. In some cases these tools were fairly complicated and even new to DRAM vendors, so we needed a group of people assigned to support their questions.

So the first level of support, we had a direct support team. We had an individual assigned to them who they could call at any time, who set up the weekly conference call, set up the quarterly updates, made sure that they had what they needed.

We also had a Web site where they could send questions to support@rambus.com which got internally queued and when they got to the top of the queue we answered them.

Behind the support-level team basically there was a group of experts that could be called on, for example, if a DRAM vendor had concerns about tester

enabling, the tester enabling team, which in this example the little "3" means there were three people assigned at that point to the tester enabling team. They would go meet with that DRAM vendor, answer any tester questions, in some cases go sit in the lab with them and help them walk through kind of a production test procedure.

Q. Do you know about how many employees total Rambus had in about the fall of 1999, roughly?

A. It's probably 150 or 160. I'm not actually completely sure, no.

Q. And the numbers that are in the balloons on this page 49, does that refer to the number of people assigned to each team?

A. I believe so, yes. And these numbers, if -- you know, at this point it doesn't look like tester enabling was a really, really critical issue, so there were only three people working on it. These numbers changed over time according to what we felt the DRAM vendors most needed.

And there's also complete engineering teams that sometimes got bigger or smaller and moved into support for critical issues as well.

Q. If you could look at page 52 a couple more pages in.

That one is entitled RDRAM HVM process. What does HVM refer to?

A. It's an acronym for high-volume manufacturing.

Q. High volume?

A. High-volume manufacturing.

Q. Can you explain what process is being described here on this slide on page 52?

A. Yes. What this is is our -- as it's titled, our high volume -- our process, which we tried to work with the DRAM vendors to get them into high-volume manufacturing.

And the first step of that process would be what's called a design review. Once they finished their design, there's kind of a very typical engineering process where you sit down and walk through all of the known critical issues and review their design basically item by item.

And Rambus had a fair bit of experience building these DRAMs, say, we had done the same process back in base and concurrent DRAMs, so we wanted to make sure we could communicate to them what we thought the critical issues in their design was.

The next step is the tape-out, which is kind of the formal launching of a piece of silicon and it's a formal release to manufacturing to manufacture

something.

After that, the silicon would come back out of fab and we would assist them in characterization.

So you had a bunch of assumptions back in the design review about the way the device would perform. During characterization, you'd try to confirm that it did all the things it was supposed to do.

Q. I'm sorry. The manufacturer would send you a piece of silicon?

A. Yes. We would both give them the characterization test factors and receive silicon from them typically. There are some exceptions. There are some vendors that chose not to give us silicon, but in most cases they'd give us silicon back, we'd characterize it, give them a report saying these are the 15 areas we think the part can be improved and then move on to, if -- so the report would say what's the root cause of or the cause of this inferiority or, you know, potential problem, and then we'd give them a fix and then go through the process again.

Typically, you know, after one or two iterations of this process, you'd go to -- if there was -- if a fix wasn't required, you'd go to manufacturing.

In this I think the high-volume aspect of this

is important. We weren't trying to enable them to build one device. We wanted to get them into a position where they had a high-volume yield and/or their cost, cost structure, was where they wanted it to be as well.

Q. If you could look at the next page. We're not going to go through every one, but let's look at the next page, page 53. And that's entitled Samsung and NEC RDRAM Status.

Had you worked with Samsung and NEC in this time period in connection with the direct RDRAM project?

A. I wasn't kind of the first-order support, but yeah. There were numerous meetings where we reviewed the status of Samsung and NEC components, yes.

Q. And again at a very general, high level, can you explain what this slide was intending to show?

A. This particular slide illustrates that Samsung and NEC both were well into validation and were production ready.

So these two devices were really ready for volume production, as far as we were concerned.

Q. Of the direct RDRAM device?

A. Yes, of the direct RDRAM.

Q. And if you'll look at page 57, which is

entitled Micron Silicon Status, I'll let you read that to yourself.

A. As I said earlier, it was our goal to get all of our partners into high-volume manufacturing.

Q. Let me ask a question, Mr. Hampel, first.

A. Sure.

JUDGE McGUIRE: Yes, ask the question; then you can answer it.

BY MR. PERRY:

Q. Had you had some interaction with Micron up to this point in connection with direct RDRAM?

A. Yeah. In some cases perhaps less than some of the other DRAM vendors me personally, but yes, I had been in numerous discussions with Micron.

Q. And what does this slide show?

A. As I started to say earlier, Micron was a key partner and a key supplier for DRAMs, so it was really kind of frustrating that we weren't able to get them into high-volume manufacturing.

This particular slide talks about they're having some core yield issues, the core was marginal, and also kind of illustrates that we didn't have as much kind of engagement or interaction with them. We had limited design reviews and technical meetings.

And part of the process includes getting

information back where we can try to help them, try to understand what issues they're having, and we weren't able to get the database or components from Micron in this particular case, is what the last bullet illustrated.

Q. Was it Rambus' choice that there were limited design review and technical meetings with Micron?

A. No. I mean, Micron is very important to RDRAM ramp and we felt it was really important, so we were pretty active in trying to get them into production.

Q. Now, leaving Mr. Fox's slides, let's look at page 64.

Do you have that? That says "Cost Reduction," got your name on it; is that right?

A. Yes.

Q. Were you involved in cost-reduction issues related to manufacturing at this point in time?

A. Yes.

Q. And this is December '99 again, this presentation?

A. Yes.

Q. Well, if you could just look through pages 64 to 81 just quickly to answer this question: Are these slides that you presented at this December 1999 presentation?

A. I haven't looked through all of them, but this is the presentation, yes.

Q. Okay. Well, if you come to one that you didn't present, let me know.

A. Okay.

Q. Now, was there -- can you take us back just a little bit. Had there been issues that had come up in 1999 with respect to manufacturing costs?

A. Price and availability were a critical issue kind of at this point in the ramp, and one of the kind of reasons that the price -- one of the issues that were standing in the way of price were the development costs or manufacturing costs of the device, so what Rambus could really take an active role in is trying to reduce the manufacturing costs of the device.

So this is an outline of the activities we were putting in place or we already put in place to reduce RDRAM cost.

Q. And you were presenting this to Intel?

A. Yes, I was.

Q. Look on page 65. That's entitled Agenda.

A. Okay.

Q. Is this the agenda that you used in that presentation?

A. Yes.

Q. The first item is RDRAM cost/performance background. Do you see that?

A. Yes.

Q. And I think if you'll turn to the next slide on page 66 we'll see something with that same title. Do you see that?

A. Yes.

Q. I want to ask you about the first bullet point, which says, "RDRAM provides three times the BW per device of any competitive DRAM."

Could you explain what you were presenting when you used that slide.

A. Yes. Bandwidth -- or BW stands for bandwidth, and at this point it was recognized as a critical performance metric for a memory system.

So what this kind of was was a little bit of bragging, I guess, that, you know, we were pretty proud that we achieved all of Intel's technical requirements. We had given them a high-volume manufacturable device that met all the requirements they gave us in 1996.

So the first two or three bullets are really summarizing we've given you a very high-performance memory device.

Q. Now, I'm not going to ask you about the slides

from page 67 to 75, but if you could just tell us very generally what those relate to.

A. So what we had done -- I guess if I could ask you to look at page 70.

Q. Okay.

A. Just for one example.

Q. That's entitled Breaking Down the Interface?

A. That's correct.

What we had done was taken a look at what the Rambus interface area overhead was with each of NEC, Toshiba and Hyundai -- there's also data from Samsung in here as well -- where we sat down with them and said what are the contributing factors to your die size.

And it's a little bit hard to read, but there's various pieces of the interface that contribute to their die size, so we went out and understood what the limiting factors were in a die size.

So that part of the presentation kind of sets the tone of what the big components are in die size, which is a critical or one of the determining factors in cost.

Q. Well, why don't we back up then and could you tell us -- and maybe you'd want to come to the board, but could you tell us what the major areas of cost are

that you were looking at that were involved in DRAM manufacturing.

Your Honor, could I approach the board?

JUDGE McGUIRE: Yes. And you can pull that up here, Mr. Perry.

THE WITNESS: So I actually went out and bought a RIMM yesterday, a Rambus in-line memory module, at CompUSA to kind of visually illustrate what these pieces are, so I've got one here (indicating).

MR. PERRY: And we've shown that to complaint counsel.

JUDGE McGUIRE: Yes.

THE WITNESS: So this is just a RIMM. You can buy it almost anywhere.

So basically there's two components, as you can see, two major opponents. There is the PCB or fiberglass that is called the module, and then there's the individual DRAMs, which you can see here on this particular module has four of them. And the silver thing on the top is the die. And the cost of that is a component. On this particular example there's four of those.

BY MR. PERRY:

Q. Could I ask you to speak up a little, Mr. Hampel.

A. So the first block is the die. And in order to determine kind of the cost of the die, its size is the first-order determinant or one of the determinants in the cost of the die. And that's because these little silver things get -- the wafer, which is kind of the unit that it's produced in, is a big, round piece of silicon and it's chopped up into little pieces that are the die. The smaller these are, the more of those you can get on the die, so size is a determinant.

And the second determinant is yield. You chop it up into little pieces and the good ones you can sell and the bad ones you can throw away.

We usually identified two aspects to yield and I think this presentation probably does something similar. There's the functional yield, does it even work, does it successfully store data, which is what a DRAM is supposed to do, and then the performance yield. This is basically how fast can it store and retrieve that data. And usually you can sell anything that's functional, but the performance determines how much more you can sell it for, so there's a value in its performance.

To determine -- the next kind of determinant of cost is has it been tested. You can't just ship it

blindly. You have to figure out if it's functional or what its performance is, so there's usually a test cost in here.

And then lastly, there's the package, which is -- there's actually two levels of packaging in a module solution. The first level is this black area that you can see here (indicating). That's the first-level package, so the die is placed on a package that then is placed on the module.

And in fact in some markets, for example, in the Sony Playstation 2, there is no module. In that case you would just buy piece DRAMs, which is the silver and black thing here, place it in a PS 2 and then ship it.

In other segments --

JUDGE McGUIRE: Now, what is a PS 2?

THE WITNESS: Playstation 2. I'm sorry.

JUDGE McGUIRE: Oh, okay. I don't have kids; that's why I wouldn't know that.

THE WITNESS: You know, additionally, other segments are the same way. Most high-definition TVs -- there's a bunch of them that use RDRAM. They would just buy the loose pieces.

There's other segments, digital video projectors, that would just buy the pieces of RDRAM.

In the main memory segment, the PC segment, which is the volume, you have to take this module, which is the piece of fiberglass, and place this kind of tested unit here and onto the module, and then that becomes the kind of the unit that you sell in this case at CompUSA.

So that's to first order kind of how we reviewed DRAM vendors' costs. And there are some other issues and clearly understanding that a test -- it's not just the piece test cost. You have to consider how quickly you amortize -- you have to buy equipment to do that testing. You have to understand what's selling to amortize that testing over.

So that's the model we used in this presentation and typically.

JUDGE McGUIRE: While you're up there, sir, would you mark that as DX-260 on the top or on the bottom.

(DX Exhibit Number 260 was marked for identification.)

MR. PERRY: And we would actually designate the model as DX-261.

JUDGE McGUIRE: Okay.

MR. PERRY: But we'll do that at a break. Thank you.

BY MR. PERRY:

Q. Well, if we could talk for a minute about the first one you mentioned, which was die size, I'll ask you to look at page 76 of that presentation and see if that refers to or relates to die size.

A. Yes.

Q. And can you give us some general explanation of what those numbers mean and what the chart refers to?

A. So the three columns are three DRAM vendors. The case studies we did jointly with three DRAM vendors. I don't actually know offhand which three vendors they are here. I can't read this slide.

And the top number is the current overhead.

Q. What does "overhead" mean?

A. It's how much the Rambus interface adds over in this case an SDRAM interface, so they compared the interface overhead versus an -- so some size that was kind of the reference for an SDRAM interface and then how much did the Rambus interface add to that.

So that's what the very first designation is. That's kind of a snapshot of where we are today.

And then down the column beneath that is for each vendor, if we -- if you take a look at layout improvements, we were developing our interface with

dual-pitch standard cells and it's a different way to lay out the individual cells. Some of these we were developing the interface to support a certain I/O shift pipe, meaning we had integrated the interface to reduce the number of shifters inside the interface.

So these are all the activities we were undertaking, but some of the -- not all of them, but some of the activities we were undertaking for each vendor -- well, for each of the three vendors, how much that would decrease their die size.

So in the first column their current die size was 14 percent. If they took advantage of and if we implemented the optimizations talked about, it would get them down to 7.2 percent in a totally optimized design.

On the last entry -- there was some discussion on eliminating the feature set, saying the DRAM doesn't have to do X or Y. The last entry is if we eliminated a couple of not really critical features, that's what the die size reduction result -- resulting die size overhead would be with the elimination of those features.

Q. And at this point in time was the direct RDRAM performance equal to or greater than the SDRAM performance?

A. This was when -- at this point the RDRAM performance was really starting to shine. This was right in the middle or the beginning of the Pentium 4 launch. And from early 2000 to even till today, if you look at all the PC benchmarks, RDRAM systems outperform any of the memory solution for the Pentium 4.

Q. Outperform in what way?

A. In any -- in most of the critical industry benchmarks. And specifically ones that require high bandwidth.

Typically there's some applications that -- well, most applications that you do a lot of video or work with a lot of pictures, a picture literally is worth a thousand words, so there's lots of data when you read and write pictures or work with pictures, say, in Photoshop, so for those applications RDRAM systems continue to outperform really any alternative in the PC space.

Q. We talked about die size. Let's talk about yield just briefly. And you explained what that was, but if you'll go back to page 59, I think there's a chart in this series of presentations.

And this is one where I did manage to find a better copy of that particular page, Mr. Oliver, if I

could show that to you so you can see the heading (indicating).

If I could approach the witness?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. That's a better, readable copy for the headings.

Do you see where it says "partner" on the left side above Samsung?

A. Yes, I do.

Q. Could you explain -- this is entitled RDRAM Estimated Interface Yield.

Could you explain what this generally is meant to show.

A. So quarterly or sometimes even monthly we would go out to the DRAM vendors and ask them what they projected their yield was.

Q. Could you explain what yield is, just for my benefit.

A. Again, there's really two notions of yield. A functional yield would be how many devices you can sell that are functional. And then this particular slide mostly illustrates the performance yield, so the columns there are the speed bins or performance grades of an RDRAM with 600, 700 and 800 megahertz.

So that the idea is that a DRAM vendor can make more money by selling an 800 megahertz part because it's faster and higher performance than 600, so our goal was clearly first to get everyone at a hundred megahertz -- hundred percent yield at 600 megahertz and then over time work with them to provide more yield at higher frequencies so that both the consumer or the PC would have more performance and so the DRAM vendor could sell that part for more money.

Q. And what does this chart show in terms of yield?

A. So in -- I think there's three sets of columns. The first three columns are indicated "now" -- I can read it on the handout here -- so that's a current snapshot of where the DRAM vendors told us their yield curve was.

The little bullets at the bottom actually say specifically what date they told us this, they gave us this information. So you can see Samsung's yield data came from 11-18 conference call.

Q. What's the 600, 700, 800 refer to?

A. So that again is the speed grades, so if you'll look at the "now" group of subcolumns, currently Samsung told us they were at a hundred percent yield or approximately a

hundred percent yield at 600 megahertz, 80 percent yield at 700 and 30 percent yield at 800.

And it's a little bit weird, the math, because it's cumulative. You can always sell a 600 megahertz -- an 800 megahertz part at 600 because you can always allow it to run slower, so that's why it doesn't necessarily add up to a hundred.

And so what we were communicating with this slide is that with these improvements we were making in yield and by working hard on our own as well, somebody like Samsung was able to take their current yield at 800 megahertz from 30 percent to 50 percent at the end of '99 to their forecast was 70 percent in the first half of 2000.

Q. Why are there blank spaces on your 600 in the first half of 2000?

A. Well, that's because they had a hundred percent yield at 700, so there really would be no parts left or no reason to sell parts at 600 since it's a slower, less valuable speed bin.

MR. PERRY: Your Honor, if there's no objection, I'd like to mark this more legible page as CX-1355A.

MR. OLIVER: No objection, Your Honor.

JUDGE McGUIRE: All right. Entered at this

time.

(CX Exhibit Number 1355A was admitted into evidence.)

MR. OLIVER: And I'd like to move in the document itself as CX-1355.

MR. OLIVER: No objection, Your Honor.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 1355 was admitted into evidence.)

BY MR. PERRY:

Q. You also talked on this board -- you wrote on this board the word "test," and I think that somewhere in here there's a graphic on testers. Let's see. Maybe page 80. Let's go to page 80.

Does that refer to test costs?

A. Yes, it does.

Q. It says "ATE Test Cost Summary."

What is ATE?

A. I believe it stands for automated test equipment.

Q. Was this one of the slides you were presenting at this meeting?

A. Yes.

Q. Again, can you give us a general overview of what messages you were communicating with this slide?

A. Well, one of the things -- one of the contributions to cost, as I mentioned earlier, was test costs, and one of the concerns the DRAM vendors, some of them, had was that the capital equipment per test site for RDRAM was higher than an SDRAM.

And that's what's indicated on the right there, so the SDRAM had a 30 to 40 thousand dollar -- our estimate was a 30 to 40-thousand-dollar-per-site test cost. And the one -- the kind of illustration on the bottom titled RDRAM on the left had 120K, $120,000-per-site test cost.

And what we were illustrating in this presentation and what we were actively working on and actually achieved was by using the interface to test the device faster, because you can move more data through it more quickly, you can test it in less time, so in this example our estimate was you could spend test time Y on that $120,000 tester and test time six Y or six times that on the less expensive tester.

So based on these estimates, if we were able to successfully drive down the test time of RDRAM, we felt that we could get the SDRAM test cost down to approximately -- I'm sorry -- we could get RDRAM test cost down to less than an SDRAM test cost. And this assumes you use the same amortization schedule for both

of these products.

Q. You said amortization?

A. Amortization.

If you assume you were going to actually use the RDRAM tester on enough units to cover its capital equipment cost.

Q. To amortize it over time?

A. Exactly.

Q. And the last thing you wrote inside that first bubble on this board is "package," and if you'd look at page 78, I think there's a slide from this December 1999 meeting about --

A. I'm sorry. What word did you say?

Q. 78 I believe. Did I get that wrong? Is that about packaging?

A. No. That's correct.

Q. It says "Package Cost Reduction Plans" on page 78. And just again generally give us an overview of what you were intending to communicate with this slide.

A. Basically, it was a status update. Samsung's estimates at this point were that the RDRAM package was a 60-cent cost. At this point I'm guessing TSOP, which was the SDRAM equivalent, was in the 40 to 45-cent range. But I don't know exactly what it was at this

point.

Q. You said TSOP?

A. Which is the -- there's only two package alternatives at this point in the industry. There's the whole class called CSP, which is called chip board -- it stands for chip-scale package. There were a lot of minor derivatives from CSP, other -- micro BGA. You'll hear FBGA. They're all the same solution with very minor modifications.

And then the second class was TSOP, which is how the SDRAMs are currently produced.

The last part of this illustrates our plans to work with the industry to enable a lower-cost CSP package. We went out and met with a lot of the manufacturers of the tape, which is what's used to bond the die to the package. And we're going to enable those low-cost suppliers to sell -- to provide tape for RDRAM solutions, and also we went to a smaller piece of tape, which additionally would reduce the cost.

So it's just an illustration of the things we were trying to do to reduce package cost.

Q. Why did you reference the Samsung estimate?

A. I don't really remember. I think that was the -- one of the higher-volume manufacturers at the time who had gotten costs down, but I don't remember

exactly why I referenced Samsung specifically.

Q. And the last thing you mentioned on the board is module, and I think if you go to the next page, page 79, I believe there's a reference to a RIMM, R-I-M-M.

A. Yes.

Q. Is that a module?

A. Yes. That's the piece of fiberglass that I showed earlier.

Q. On DX-261?

A. Yes.

Q. And if you could tell us what you were intending to communicate with this slide, please.

A. The overall status was that the piece of fiberglass or the RIMM module was going to be within 5 percent of the PC100 by end of 2000. And the things that we had done to make that true -- you'll see that module has no components on the back side (indicating). That's what's called single-sided.

There was some concern early that all the modules would have to be double-sided. That module has no active components on the back side, so one of the things we did in addition to this list was re-laid out the Gerbers so that they were single-sided.

Additionally, there's some minor things we did

to be kind of better to use the PC100 infrastructure.

So for example, we modified it to use the same drill size as PC100. That's what that next bullet refers to.

Q. And PC100, was that an SDRAM?

A. That was the SDRAM, kind of the high-volume SDRAM at this point.

Then there's a little bit of testing done in the -- it's a small portion of the module cost, but we're doing some, a couple of minor things to improve the testability of the module.

Q. That's all I have on this document.

This is December 1999. Were you personally involved in any efforts in the spring of 2000 in connection with these cost-reduction proposals and projects?

A. As is kind of indicated by this -- the answer is yes.

As is indicated by this presentation, it was a pretty important issue to Intel to really try to solve the availability and price issue, and one of the reasons for the high price of RDRAM that was being used was cost and we really wanted to remove that as much as we possibly could as an issue.

So in early 2000, it was probably the most

significant issue inside of Rambus, is do everything we can to work with DRAM vendors to reduce cost.

In some cases it was a little frustrating because at this point, you know, price was pretty high, sometimes three or four times the SDRAM price, and our cost estimates were showing it was 20-25 percent higher, but we still needed to get rid of that -- something we could contribute is to get rid of that as much as we possibly could, so we worked really hard at reducing costs.

Q. Let me ask you to look at another document, CX-1368.

May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. Thank you.

Now, this is entitled WW12 Micron Meeting March 13, 2000. It was produced by Micron to us.

Is this a set of Rambus slides?

A. I believe so, yes.

Q. Do you know what WW12 refers to?

A. At this point we were -- Rambus was using Intel workweek calendars, so it stands for workweek 12, and I'm guessing March 13 was in workweek 12.

Q. Would you look at page 2 and the agenda.

Do you see a reference in the fifth bullet to a cost/yield tour?

A. Yes, I do.

Q. Now, can you explain what the cost/yield tour was in the spring of 2000?

A. As kind of indicated in our status update to Intel, it was our intention to go up and enable all those die size reductions and yield enhancements, basically cost reductions and yield enhancements, at all the DRAM vendors, so when we would go off kind of on a visit to all the DRAM vendors with a specific mission, a specific goal, we'd call it a tour, where we'd go off and work with them.

So I believe at this time we were in the middle of a cost/yield tour to numerous DRAM vendors to try to provide information, help them reduce costs and improve yield.

Q. Were you involved in providing any input or in preparing the slides that are in this document?

A. Some of them, yeah. I was pretty active in the cost/yield tour, providing data to DRAM vendors and interpreting the data we got back from them, to try to figure out where we could improve things.

Q. Now, were you present at this particular cost/yield tour meeting and the rest of the issues at

Micron?

A. I don't believe I was present at this particular meeting, no.

Q. Well, let me ask you to look at the cost/yield tour, stick with that, CX-1368-30, page 30 of the document.

And this section is only I believe three slides, so let's go through them if we could.

The page 31 is entitled Yield Improvement and Cost Reduction. Do you see that?

A. Yes.

Q. Is this something you provided input on?

A. Yes.

Q. Can you explain generally what messages were being communicated here?

A. We're explaining to Micron in this particular case that we were really hoping we could help them improve their yield and cost. That's what the first bullet is.

And basically the last two are effectively we were kind of pleading with Micron to let us try to help them. They were -- they're a pretty important DRAM partner to us, and I think the next three slides are basically us asking them to give us information so that we can help them improve their yield and cost.

Q. Well, if you look at the next page then, page 32, have you already described what this thing is and described generally what the first one was, or is there anything new to add?

A. Well, normally we were well into the cost and yield improvement tour and well into the process, so normally what we would have had is, you know, 30, 40, 50 slides giving the DRAM vendor an update of what measurements we had taken and the circuits or solutions or tools that we had for them to try to improve their cost and yield.

In this particular case we didn't have any data to present back to them, so there wasn't -- there's not much here.

Q. Well, look on the last page in this section then.

Is that something which you provided input to?

A. I'm sorry. The last page?

Q. I'm sorry. Page 33, the last page of the cost/yield tour section.

A. Generally, this was our strategy. I don't know if I specifically worked on this slide, but this was a summary of our strategy to work with the DRAM vendors.

Q. Did you participate personally in some of the

cost/yield tour meetings with other manufacturers?

A. Yes.

MR. PERRY: Your Honor, I'd like to move in CX-1368 at this time.

MR. OLIVER: No objection, Your Honor.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 1368 was admitted into evidence.)

BY MR. PERRY:

Q. I'd like to move forward now from the year 2000 to early 2001 and show you a new document if I could.

Let's bring up RX-1762.

May I?

JUDGE McGUIRE: Yes.

BY MR. PERRY:

Q. Now, this is entitled Memory Road Map Update and Industry Status and there's a little logo up in the top right corner that says "Intel Developer Forum Spring 2001." Do you see that?

A. Yes, I do.

Q. And then there are four names on the front cover and it's dated February 27, 2001.

Can you tell from the slides whether you provided any input, advice or review in the preparation

process for these slides?

A. I believe I attended this presentation, but I'm confident I met with Pete MacWilliams and kind of reviewed his slides and I also had some discussion with John Kang as well. I think he kind of came to Rambus and we reviewed his presentation as well.

Q. Mr. Kang was at Samsung?

A. That's correct.

Q. Well, let me talk with you about some of the slides. First, let's back up.

What was the Intel Developer Forum?

A. The kind of community that uses Intel products or develops products around Intel products is pretty big, so what Intel -- it originally started as a very technical engineering conference where Intel would present their plans to the industry and often bring in critical partners in assisting in their development plans.

Over time it did become more of a marketing presentation, but it's really intended for the technology community to help Intel communicate the development, their development plans.

Q. And why did you work with Mr. MacWilliams on the slides that he was presenting about the memory road map?

A. RDRAMs was still a significant portion of -- well, a big portion of Intel's plans, so some of the slides were related to RDRAM and RDRAM vendor plans, so I consulted with Pete, based on that, on that portion of the presentation.

Q. Would you look on page 2, please.

Do you see that Mr. MacWilliams, who has testified here, is listed as an Intel fellow in the desktop product group?

A. Yes.

Q. And let's start with page 5 if we could of his presentation.

Now, did you have an understanding when you reviewed this slide of the messages in it?

A. Well, I think so, yes.

Q. And do you think this is one of the ones that you at least reviewed in advance of this presentation?

A. Probably.

Q. Can you give us your understanding at the time of what the messages were that you took away from this slide on page 5?

A. I guess the highest message that I came away with was Intel or at least Pete was convinced that RDRAM was the best solution, and I think what I was most interested in is the memory pricing was at least

indicating that it was coming down, and I actually was probably kind of proud that we had worked with the DRAM industry. And Intel was interested that the cost was competitive with alternatives. As kind of indicated by some of the previous presentations, that was a pretty important goal.

So that's what it means to me.

The kind of last two bullets are kind of the barrier to entry news, if you will. PC133 was still a lower price than RDRAM solution, so Intel was still I think needing to support that, and then they were announcing a discussion that additionally DDR might be another price/performance option.

Q. Okay. Let's talk more about cost, and if you'll look on page 9 of this presentation, do you see a reference to platform costs?

A. Yes. I'm sorry. You said page 9; right?

Q. Page 9. Do you have that?

A. Yes.

Q. And that talks about platform costs?

A. Yes.

Q. Can you explain, did you have an understanding at the time of the chart that compares PC133 and DDR and RDRAM in the middle of the page?

A. I think so.

Q. Well, for example, how about the estimated board layer count? Do you know what that refers to?

A. One of the concerns about the system, the platform for RDRAM was -- early systems were routed in six layers. That RIMM I gave you is assembled by layers of fiberglass and then copper that's used for interconnect and then fiberglass and copper.

There was a concern early in RDRAM that the board layer count would always be six layers. This -- and that would have been a significant cost adder over a DDR solution or a PC133 solution because you can see in this they're both in four layers.

At this point in time we had worked closely with -- by working closely with Intel and PC OEMs we were able to reduce the RDRAM board layer count to four layers.

Q. Okay.

A. That was a pretty important goal at this time for us, so...

Q. So at this point that had been achieved, as you understood?

A. I think at this point it was beginning to go into production. I doubt at this point all systems were already at four layers. It hadn't been completely issued again.

Q. At the bottom it says, "RDRAM provides approximately two times bandwidth at comparable platform cost to DDR."

Do you see that?

A. Right.

Q. Did you have an understanding at the time of what that meant?

A. Yes. If you take the peak memory bandwidth column, RDRAM was at 3.2 and DDR is at 1.6. And then look at the platform cost. DDR in this example added $6.00 and RDRAM added $7.00, so it was -- at this point it was two X the bandwidth at comparable, you know, six versus seven dollars platform costs.

I mean, this was a pretty important accomplishment for the direct RDRAM program, so it was kind of a big moment.

Q. Also in here -- it's not just Mr. MacWilliams. I believe there's some presentations by companies in here. If you could look at page 25.

Now, at the Intel Developer Forums I think you mentioned it was common to have Intel partners, vendors give presentations?

A. Yes, it was.

Q. This one refers to a gentleman named Inukai, I-N-U-K-A-I, at Elpida.

At this time what was Elpida? Do you know?

A. Elpida was a merger between I believe NEC and Hyundai. No. NEC and Hitachi, was it?

Q. Yeah.

A. I'm sorry. It was a merger between NEC and Hitachi.

Q. In the memory area?

A. Of their DRAM divisions, that's correct.

Q. And had you worked with Mr. Inukai before this?

A. Not on a day-to-day basis, but I had met him and knew him from his previous experience.

Q. And he was at NEC?

A. I believe he was at NEC prior to that, yeah.

Q. And let me ask you to look at page 39 from his presentation. And I'll ask you to tell us if you can describe your understanding of this chart at the time back in February of 2001.

A. My understanding was that it's indicating the die size adder Rambus versus SDRAM die overhead, so it would be effectively one plus this number would be the die size of a Rambus DRAM, was at this -- in 2000 was at about 25 percent of the die size adder and through die size reduction would be at a 15 percent die size adder in 2001 and in 2002 would be at slightly less

than a 10 percent die size adder.

So I think this was an indication of Elpida's die size or cost-reduction plan.

Q. If you'll look at page 43 of this presentation by Elpida, and I've got the same question for you, if you can give us your understanding at the time of this particular slide entitled Calendar Year 2001-Calendar Year 2003 Outlook RDRAM Future?

A. So there were a number of cost, potential cost contributors, as illustrated here, to the RDRAM outlook. Die overhead was one of them. I think in this presentation they addressed that in the slide we showed earlier.

Output and speed yields were improving. Back-end costs -- usually packaging is referred to as the back-end portion of the process because they take the die and package it well after kind of the -- well, after it leaves the fab.

The module -- the module costs had improved, and it was also good that Elpida was using their leading process to develop RDRAM on it. Some of these metrics change a lot if the two pieces of silicon currently aren't on the same process, so they -- it was important they were moving to a more competitive process or their most competitive process.

Q. Okay. Let's look if we could at the next page, page 44, where Mr. Kang's name appears from Samsung. Page 44 (indicating).

Do you have that?

A. Yes, I do.

Q. And I think you mentioned before that you had provided some input or feedback to his slides for this presentation; is that correct?

A. Yes. I believe he came in to Rambus and presented these slides and we had discussion about some of the content.

Q. I want to talk about just a few of them.

Look at page 53. And that's entitled Samsung RDRAM Status, and again this is February 2001.

Take a look at that if you would and tell us your understanding at the time of the messages imparted by this slide.

A. Similar to my kind of understanding of what the Elpida slide said. It's a summary of the cost-reduction activities at Samsung that resulted in yield that approached SDRAM, which was a very mature product, so it was as close to a hundred percent yield as you can get, so that was a good thing.

The fact that they were in pretty high-volume production was good. They were also active in

supporting the cost-reduced core architectures and higher-density parts.

So basically it was just a summary of Samsung's RDRAM status and effectively were in the position of going to high volume -- continuing high-volume manufacturing production.

Q. And I see that this particular module has a Samsung name on it. That's DX-261.

What does that tell you?

A. Those particular devices are manufactured by Samsung.

Q. I'm sorry. Could you -- I just didn't hear that.

A. Those devices are manufactured by Samsung.

Q. Do they still manufacture RDRAM today?

A. They still do, yes.

Q. Let's move forward if we could to the last company presentation in here. It's Toshiba. That's on page 64.

And that's -- on page 64.

Do you see that's entitled Toshiba DRAM Strategy?

A. I do.

Q. There's a gentleman named Saito, S-A-I-T-O. Do you see that?

A. Yes.
Q. Were you familiar with him at the time?
A. I've met him, yes.
Q. I'll just ask you to look at a couple of his slides. Look at page 78.
That's entitled PC 800 Yield Improvement. Do you see that?
A. Yes.
Q. And can you explain your understanding at the time of what this chart referred to, including what the X and Y refer to there?
A. It was probably in color originally, so it might be a little -- I'm actually not a hundred percent sure what it was trying to communicate, but in general, the left-hand column is indicative of yield between zero and a hundred percent, and I believe the right-hand column or the right-hand axis along the bottom is an indication of over time what they projected their PC800 yield to be.
Q. Okay. Well, we'll just pass that.
Did you want to say something, Mr. Oliver?
MR. OLIVER: No. I was just going to object if you went any further, but that's fine.
BY MR. PERRY:
Q. Let's pass on that.

And let's finish up this document if we could by looking at another Toshiba slide, on page 80.

Let me start with this. Did you have an understanding back in February 2001 what this one referred to?

A. In general. I'm not sure where the specific numbers came from necessarily.

Q. Well, let me pass on Toshiba for now then and let me ask you a general question if I could.

After working with -- we're done with that document.

After working with Mr. MacWilliams and Mr. Kang and reviewing these presentations in connection with that February 2001 Intel Developer Forum, did you draw any conclusions about the cost-reduction efforts that Rambus had undertaken in the past two years?

A. Yes, I did.

With the partners that were kind of active in that program, in this case specifically Elpida, Samsung and Toshiba, they communicated to the industry and to Intel here that that program had begun to show significant signs of success. Yields were substantially up from where they were when this project began back in that original Intel presentation. All of them were approaching a hundred

percent yield at 800 megahertz. And also their die size were reducing.

So I felt like the efforts were beginning to come to fruition at least for these three vendors.

MR. PERRY: Your Honor, I have nothing further for the witness.

JUDGE McGUIRE: Okay. Why don't we take a short ten-minute break, and when we return, we'll go into the cross-examination.

MR. PERRY: Thank you.

(Recess)

(DX Exhibit Number 261 was marked for identification.)

JUDGE McGUIRE: At this time we'll proceed with cross-examination, Mr. Oliver.

MR. OLIVER: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. OLIVER:

Q. Good morning, Mr. Hampel.

A. Good morning.

Q. Mr. Hampel, Mr. Perry asked you a number of questions this morning with respect to cost information. Do you recall that?

A. (Witness nodding.)

Q. As well as questions with respect to your

interactions with DRAM manufacturers concerning cost? Do you recall that?

A. Yes.

Q. Now, it would be fair to say that most of your understanding about costs came from information provided by DRAM manufacturers; isn't that right?

A. In general, that's true, yeah. We did go off to industry standard sources. There's a number of publications on fabrication costs and we consulted those as well.

Q. But Rambus did not produce DRAMs; is that right?

A. That's correct.

Q. So the information you had you were being provided from other sources; is that correct?

A. That's correct.

MR. OLIVER: May I approach, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. OLIVER:

Q. Mr. Hampel, I've handed you a document marked RX-1525, titled Rambus Cost Reduction Update 11-99. And I'd like to ask you to turn in particular to page 19 of this document.

And I'd like to direct your attention towards the bottom of this page. Certain of the lines are

difficult to read because there's some writing obscuring some of the numbers, but do you see that this sets forth six columns running from third quarter of 1999 through the fourth quarter of 2000?

A. Yes.

Q. And do you see that the bottom three lines set forth three different scenarios for cost gap scenarios? Do you see that?

A. I see the bottom three lines. I don't know that they're cost gap scenarios, but okay.

Q. Do you see the caption at the top of the page reads "Cost Gap Scenarios"?

A. Yes.

Q. And basically this shows three different progressions of the cost gap from third quarter of 1999 through the end of 2000?

A. Right.

Q. And the industry baseline runs from 55 percent in the third quarter of 1999 to 40 percent in the fourth quarter of 2000?

A. Right.

Q. And do you see that the bottom line, the most optimistic scenario, still runs from 55 percent to 18 percent? Is that right?

A. I see that, yes.

Q. And these, by the way, these are not actual numbers, these were projections; right?

A. That's correct.

Q. Rambus internal projections?

A. Actually this particular data, my recollection is that it came from an Intel analysis.

Can I comment on that context or...

Q. If your attorney wishes you to do so, he can follow up with you.

The cost gap that's being measured here, it's a gap between SDRAM and RDRAM; is that right?

A. The cost gap that's being projected is between I believe up here at the top it says 128-megabyte module cost gap RDRAM to PC100, so it's the module cost -- in fact, that module right there is 128 megabytes, so it's that module cost versus a PC100 module (indicating).

MR. OLIVER: Your Honor, the next document that I wish to discuss is an in camera document.

JUDGE McGUIRE: Okay. Then at this time I will ask the audience to please excuse themselves. We are about to go into testimony that by prior order of the court is deemed confidential and therefore closed to the public. And you will be advised when we go back into the public portion of this proceeding.

So everyone that's not been cleared for access to in camera I'll ask at this time to please excuse themselves.

MR. OLIVER: Your Honor, I can estimate that it will probably take about five, at most ten minutes.

JUDGE McGUIRE: It's only going to take about five to ten minutes.

While we're here, I'll again ask counsel to certify that everyone at their table and everyone behind them is cleared for access to in camera.

MR. PERRY: I understand it's going to be Rambus information, so yes, Your Honor, they are.

MR. OLIVER: Yes, Your Honor, I can so certify.

JUDGE McGUIRE: I'll advise the court reporter we are now in the in camera session.

(The in camera testimony continued in Volume 41, Part 2, Pages 8752 through 8755, then resumed as follows.)

JUDGE McGUIRE: We're back to the cross-examination.

CROSS-EXAMINATION (continued)

BY MR. OLIVER:

Q. Mr. Hampel, Mr. Perry asked you some questions this morning with respect to your communications with

customers. Do you recall that?

A. Yes, he did.

Q. And he also asked you some questions with respect to your communications with partners?

A. Yes.

Q. And he explored some of that during the earlier years that you were at Rambus, finally moving on to some of your later years?

A. Some, yes.

MR. PERRY: I'm sorry, Your Honor.

MR. OLIVER: I'll withdraw that question.

MR. PERRY: It misstates the testimony and misstates my questioning actually.

MR. OLIVER: I'll withdraw that question, Your Honor.

JUDGE McGUIRE: Okay.

BY MR. OLIVER:

Q. Mr. Hampel, I'd like to explore your responsibilities at Rambus and your customer contacts in a bit more detail if I could, please.

You started at Rambus in 1993; is that right?

A. That's correct.

Q. And from the time that you started at Rambus, you had contacts with Rambus partners; right?

A. Yes.

Q. And Rambus partners would include DRAM manufacturers?

A. Usually, yeah, that's what "partner" means usually.

Q. And you probably had meetings or other contacts with DRAM partners 15 or 20 times a year?

A. Probably on average. A couple -- during intervals especially during cost reduction it might have been slightly more than that, but that was the ballpark of our direct meetings, yes.

Q. And that was from the time you started in 1993 through at least 2000?

A. It was probably substantially less in the early '90s and through '96 and increased later than that.

Q. Now, beginning of 1993 you also had contacts with so-called customers or potential customers; right?

A. I'm not exactly sure what you mean by "customers," but I also did have contact with Intel and all the companies I mentioned, yes.

Q. Would you understand the term "customers" to include companies such as Dell and Compaq?

A. I've used it that way, yes. I probably used it in other contexts as well, but yeah.

Q. I'll tell you what, do you have an understanding of Rambus customers?

A. Yes.

Q. Okay. Perhaps you could explain your understanding of Rambus customers in terms of who you had contacts with.

A. Frequently I've used "customers" in the context of the purchasers of DRAMs, which would be somebody like Sony or someone like Compaq or Dell. That's a frequent use of -- to differentiate between customers and partners, so if -- I think that's what you're referring to.

Q. And it would be fair to say that you had contacts with Rambus customers anywhere from, say, 15 to 40 times a month?

A. That's probably correct, if you included Intel in that, it's probably approximately there.

Q. Okay. Now, with respect to the various contacts that you had with DRAM manufacturers, you're not aware of any instance in which Rambus representatives told DRAM manufacturers which features of RDRAM were protected by Rambus patents or patent applications; is that right?

MR. PERRY: Your Honor, it's beyond the scope. This gentleman came here to testify about manufacturing

costs. He's a technical director at Rambus.

JUDGE McGUIRE: Mr. Oliver?

MR. OLIVER: Your Honor, this -- first of all, this goes to his contacts with customers and his responsibilities at Rambus.

JUDGE McGUIRE: Overruled.

MR. PERRY: Your Honor, I only asked him about contacts with customers about manufacturing costs.

JUDGE McGUIRE: So noted, but overruled.

THE WITNESS: I'm sorry. Could you repeat the question.

BY MR. OLIVER:

Q. Yes.

With respect to Rambus and various presentations to DRAM manufacturers, you're not aware of any instance in which Rambus representatives told the DRAM manufacturers which features of RDRAM were protected by Rambus patents or patent applications; isn't that right?

MR. PERRY: Objection. Lacks foundation as to all of the presentations. If it's limited to ones he was present for, I have --

JUDGE McGUIRE: Sustained.

BY MR. OLIVER:

Q. Mr. Hampel, with respect to Rambus'

presentations at which you were present or otherwise participated in, you're not aware of any instance in which Rambus representatives told the DRAM manufacturers which features of RDRAM were protected by Rambus patents or patent applications, are you?

A. No, I'm not.

Q. And again with respect to the various presentations in which you participated or were otherwise present, you're not aware of any instance in which Rambus representatives told the DRAM manufacturers which aspects of RDRAM were Rambus' own inventions; right?

A. No, I'm not. I -- no.

MR. OLIVER: Nothing further, Your Honor.

JUDGE McGUIRE: Okay. Thank you, Mr. Oliver.

Mr. Perry, any further questions on redirect?

REDIRECT EXAMINATION

BY MR. PERRY:

Q. Yes.

I just had one question about RX-1525, if you can find that. It's the one entitled Rambus Cost Reduction Update 11-99.

A. Yes.

Q. If you could just look at page 19, which is the page that Mr. Oliver pointed you to.

A. Yes.

Q. On this chart there were some numbers down at the bottom, and you wanted to clarify something, and Mr. Oliver suggested I ask you about it, so that's my question.

What was it you wanted to clarify about the numbers at the bottom of page 19 of Exhibit RX-1525?

A. This was basically this particular meeting was the launch of the cost-reduction effort. I mean, this was just the beginning, so this was kind of the starting-point forecast.

And specifically, I'd also point out that this was initially Intel's, an Intel-generated forecast, so this was Intel's kind of estimate going into the cost-reduction effort. You can see from this presentation there's a lot of activities were undertaken to even improve this projection.

So I just wanted to put it in context of in time that this was at the beginning of our cost-reduction effort this was the projection.

Q. And by year-end 2001 what had the efforts resulted in?

A. Basically all the vendors were at high yield. And you saw from the Toshiba presentation that -- the Toshiba, Samsung and Elpida presentations that they had

pretty much achieved costs lower than even at the most aggressive projections here, so those kinds of -- the program had worked perhaps even better than the initial forecast and we found opportunities to cost-reduce outside of what we saw in 1999.

MR. PERRY: Thank you. Nothing further.

JUDGE McGUIRE: Any further recross?

MR. OLIVER: Nothing further, Your Honor.

JUDGE McGUIRE: Thanks very much, sir. Your testimony is now completed. You're excused from this proceeding.

THE WITNESS: Thank you, Your Honor.

JUDGE McGUIRE: Thanks very much.

Mr. Perry, how would you like to proceed at this point?

MR. OLIVER: Before we go any further, I would like to introduce two exhibits that we used.

JUDGE McGUIRE: Go ahead, Mr. Oliver.

MR. OLIVER: First is CX-617.

MR. PERRY: No objection.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 617 was admitted into evidence.)

MR. OLIVER: The second was RX-1525.

MR. PERRY: No objection.

JUDGE McGUIRE: So entered.

(RX Exhibit Number 1525 was admitted into evidence.)

MR. PERRY: Your Honor, it's really up to you. I think the reading of the deposition would take about an hour and a half, maybe less. And we could certainly do it now.

JUDGE McGUIRE: I think we should do it now. It's too early to break for lunch.

Now, after you've completed that, then is that going to be it for your case today?

MR. PERRY: That is it for the day.

JUDGE McGUIRE: Then let's go ahead now. It doesn't make sense to come back and do that.

MR. PERRY: We anticipate that we are going to wrap up, as they say in this industry, and you'll see some long, busy days coming up.

JUDGE McGUIRE: Okay.

MR. PERRY: If we could take a minute to set up.

JUDGE McGUIRE: Okay. Let's go off the record. We'll take another short break.

(Recess)

JUDGE McGUIRE: Mr. Perry?

MR. PERRY: Yes, Your Honor. We're going to

read some limited excerpts from the deposition taken in this matter on January 16, 2003 of an individual named Samuel Chen. Mr. Chen, as you'll learn, was at the time a JEDEC representative on behalf of Mitsubishi.

JUDGE McGUIRE: And perhaps you could introduce your colleague here.

MR. PERRY: Mr. Jim Berry, a valued member of our team, is going to read the portions -- the answers of Mr. Chen, who the parties have agreed is unavailable for this proceeding.

We also will be showing on screen the documents that are referenced by using their CX and RX numbers. And there will be a couple that we'll move in at the end of the reading.

And this is the first time we've done this, but I think that the way we've been doing this is that I read for the reporter the page and line.

JUDGE McGUIRE: Yes. Right.

MR. PERRY: And I'm going to be omitting objections that are in the transcript itself, and as I understood it from my conversations with Mr. Catt, there shouldn't be any objections that come up.

JUDGE McGUIRE: Right.

MR. PERRY: We're going to start with page 5,

lines 4 to 21.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now I'm going to read page 7, line 9 to page 8, line 6.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 8, lines 13 through 18.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read page 9, lines 15 to 20.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 10, lines 14 through 17.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 11, line 10 to page 12, line 6.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now page 12, lines 19 to 22.

(Whereupon, the transcript cites were read into

the record in open court.)

MR. PERRY: And now page 15, line 2 to page 16, line 3.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read page 16, line 5.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 16, lines 6 through 11.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read page 16, line 16 -- I'm sorry.

We'll read page 16, line 12 through page 17, line 5.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read page 17, lines 22 to 24.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now page 18, lines 10 to 16.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read page 18, line 25 to page 19, line 8.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 20, lines 6 through 8.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And this is Exhibit RX-562. We'll read page 20, line 22 through page 21, line 5.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now page 21, lines 17 through 21.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 23, line 1 to page 4, line 17.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Just to make sure that we have the -- we're going to read from 24, line 8 through 25, line 1.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll go to page 35, line 9

to page 37, line 24.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll go to page 42, line 8 to line 18.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll go to page 43, line 10 to page 44, line 7.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 53, line 22 to page 54, line 3.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read page 54, line 13 to line 24.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 55, line 4 to page 56, line 17.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 56, line 18 through page 59, line 1.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 59, lines 16 through 21.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read page 60, line 7, and with objections omitted we'll go all the way to page 62, line 20.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read page 63, lines 2 through 17.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 66, lines 9 through 12.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And we'll read page 70, lines 6 through 12.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 70, line 24 through page 71 -- I'm sorry -- through page 73,

line 20.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we're going to read from page 81, line 9 to line 23.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 82, line 2 through 5.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll go to page 85, lines 20 to 22.

It's actually page 85, line 20 to page 86, line 18. And we'll pull up Exhibit RX-1188.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we will read 86, line 21 to 87, line 8.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Now we'll read from page 90, line 3 to page 90, line 11.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we will read page 92, lines 6 to 8.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Page 93, lines 3 through 8.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll go to 98, line 19 through 99, line 21.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: We're now reading 99, line 22 through 101, line 5.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we will read from page 102 from the examination by Mr. Catt for complaint counsel, omitting objections, page 102, lines 10 through 18.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we will read page 103, lines 2 through 10.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read from page 103, line 21 through 24.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we'll read page 104, omitting objections, line 3 through page 106, line 17.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: Page 107, lines 10 through 20.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now from my further examination of the witness we will read from page 109, line 13 to page 110, line 2.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: I'm reading now from page 110, line 3 through page 111, line 4.

(Whereupon, the transcript cites were read into the record in open court.)

MR. PERRY: And now we have some additional examination by Mr. Catt for complaint counsel and we will read page 111, line 9 and, omitting objections, to page 111, line 25.

(Whereupon, the transcript cites were read into

the record in open court.)

MR. PERRY: We're done, Your Honor.

JUDGE McGUIRE: Then does that complete your presentation for today, Mr. Perry?

MR. PERRY: It does, Your Honor. And if I could, I'll wait until tomorrow morning to move in the exhibits that -- there's only two, but I don't have my list in front of me.

JUDGE McGUIRE: Okay. Very good then. This hearing is adjourned until 9:30 a.m. on Tuesday morning.

MR. PERRY: Thank you.

JUDGE McGUIRE: Thank you.

(Time noted: 12:06 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 14, 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 14, 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