FEDERAL TRADE COMMISSION

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UNITED STATES OF AMERICA

FEDERAL TRADE COMMISSION

In the Matter of:	)	
Rambus, Inc.	)	Docket No. 9302
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APPEARANCES:

ON BEHALF OF THE FEDERAL TRADE COMMISSION:

M. SEAN ROYALL, Attorney
GEOFFREY OLIVER, Attorney
JOHN C. WEBER, Attorney
ROBERT DAVIS, Attorney
Federal Trade Commission
601 New Jersey Avenue, N.W.
Washington, D.C. 20580-0000
(202) 326-3663

ON BEHALF OF THE RESPONDENT:

GREGORY P. STONE, Attorney
STEVEN M. PERRY, Attorney
PETER A. DETRE, Attorney
SEAN GATES, Attorney
Munger, Tolles & Olson LLP
355 South Grand Avenue, 35th Floor
Los Angeles, California 90071-1560
(213) 683-9255

APPEARANCES:

ON BEHALF OF THE RESPONDENT:

A. DOUGLAS MELAMED, Attorney
Wilmer, Cutler & Pickering
2445 M Street, N.W.
Washington, D.C. 20037-1420
(202) 663-6090

ON BEHALF OF THE WITNESS:

LINDA LIU KORDZIEL, Attorney
Fish & Richardson, P.C.
1425 K Street, N.W., 11th Floor
Washington, D.C. 20005
(202) 626-6432

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. STONE: Good morning, Your Honor.

JUDGE McGUIRE: Any housekeeping items this morning before we begin?

MR. OLIVER: No, Your Honor.

JUDGE McGUIRE: If not, then at this time complaint counsel may call its next witness.

MR. DAVIS: Thank you, Your Honor. Complaint counsel call Joe Macri.

JUDGE McGUIRE: Mr. Macri, would you please approach the Bench and be sworn by the court reporter. Whereupon--

JOE MACRI

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

DIRECT EXAMINATION

BY MR. DAVIS:

Q. Please state your name for the record.

A. Joe Macri.

Q. And where are you currently employed?

A. ATI.

Q. And what's your title there?

A. Director of engineering.
Q. Before we get into the detail on your work at ATI, let's get a little more background. Where did you go to college?
A. Worcester Polytech.
Q. What degree did you receive?
A. Bachelor's in electrical engineering.
Q. When did you graduate?
A. In 1986.
Q. What was your first job after you graduated?
A. Working at Digital Equipment Corporation designing large ECL mainframe computers.
Q. I'm sorry, designing?
A. Large ECL mainframe computers.
Q. What is ECL?
A. Emitter coupled logic.
Q. And how long did you do that?
A. I worked in that group for about six years.
Q. And what did you do next?
A. Next, I worked on a research project dealing a gallium arsenide alpha microprocessor.
Q. What's gallium arsenide?
A. It's the material that you would make the substrate out of, the base material for the device, for the microprocessor device. Typically silicon is used,

but gallium is in some situations a faster material.

Q. And how long were you doing that?

A. Approximately one year.

Q. And what did you do next?

A. Next I worked in the Advanced Development Group in Huntington, Massachusetts designing CMOS alpha microprocessors.

Q. And how long were you doing that?

A. About two years, two and a half years.

Q. Okay. What were you doing -- you said you were designing CMOS --

A. Alpha microprocessors. I was in charge of doing architecture development, performance modeling, some logic design.

Q. And this is also at Digital?

A. Yes, this is also at Digital Equipment Corp.

Q. And what did you do next?

A. Next I helped start an office in Silicon Valley. It was the Palo Alto Design Center, and we were in charge of doing low-power alpha microprocessor designs.

Q. And what were you doing there yourself?

A. There I was in charge of the performance modeling and researching, you know, the base architecture of the microprocessors that we'd be

designing.

Q. Now, when did you leave Digital?

A. It was approximately 1994.

Q. Was this after moving to the Palo Alto Design Group?

A. Yes.

Q. Okay. And where did you go after leaving Digital?

A. Went to Silicon Graphics.

Q. And what were you doing there?

A. There I was working on a high-speed MIPS microprocessor. It's a different architecture than the alpha microprocessors.

Q. And when you say "working on," what were you doing?

A. Again, I was doing -- I was in charge of the external interfacing for the cache and memory subsystem.

Q. Okay. And when you were there, what was Silicon Graphics' line of business?

A. It was, you know, large graphics systems, visual processors, as well as microprocessor design and large service systems and workstations.

Q. And how long were you at Silicon Graphics?

A. Approximately three and a half to four years.

A. ATI's line of business is primarily graphics design for the PCs, personal computers, as well as set-top boxes, handheld PDAs, but mainly in the area of visual -- visualization.

Q. And when did ATI purchase ArtX?

A. It was 2000, first quarter of 2000.

Q. Okay. Now, what are your -- well, first of all, what were your main responsibilities at ATI when you started there?

A. I was in charge of the circuit -- circuit team at Silicon Valley. Their task is doing high-speed interfaces, both in the analog and digital area, and analyzing buses and timing of those buses.

I'm also in charge of the relationships with our -- with the DRAM vendors and a general resource for the company in terms of memory system design as well as, you know, providing design and -- circuit design.

Q. When you say you're in charge of the relationship with the DRAM vendors, what does that mean?

A. Well, memory is extremely important to a graphics system, so we work very closely with the memory vendors on understanding their current technologies, understanding their future plans and working with them to make sure that they line up with

our products. So, I'm in charge essentially of interfacing on a technical side and providing some insight on the business side.

Q. What kind of technical information do you discuss with the DRAM manufacturers?

A. Oh, it's pretty much all aspects of the memory interface, things that would affect the DRAM core, the interfaces to the DRAM, issues for our interface on our ASICs, the bus topologies, pretty much everything to do with the memory system.

Q. Do you talk about DRAM costs with the DRAM manufacturers?

A. Yes, yes, that's very critical.

Q. And could you describe the discussion that you had with the DRAM manufacturers about cost?

A. Cost, very often we're measuring the impact to the area of the silicon, you know, how much larger the die area would grow, the DRAM device would grow or our ASIC would grow in order to interface to a particular DRAM. So, very often we're doing trade-offs of particular concepts to see which would be more expensive, so price/performance analysis.

Also, the physical packaging of those devices impacts cost dramatically, and so we spent a lot of time studying, you know, what our decisions will do in

terms of impacting that package cost.

In addition, we take a look at the test methodology and test costs associated with new concepts and old concepts. We're always trying to simplify, reduce costs, you know, essentially get the most we can for any given dollar.

Q. Now, have you ever participated in the design of a DRAM?

A. Yes.

Q. And what have you -- when was the first time you were participating in that?

A. That would have been in the JEDEC committee on the DDR1 SDRAM.

Q. Could you give me some examples of DRAMs whose design you participated in?

A. The DDR1 SDRAM, the DDR2 SDRAM, GDDR2, GDDR2M, GDDR3.

Q. Now, when you say you participated in the design of the DRAM, what are you understanding that to mean?

A. The majority of the work is going on on the interface, so how you would actually talk to a DRAM. We do get into the core, but it's the major core attributes, like the number of banks that would be in a core, the random accessibility of the core, and some

major attributes in the core, but the majority of the work is by far on the interface.

Q. Now, you were talking about the core. What do you mean by the "core"?

A. The core is the array of cells that, you know, hold the actual bits of data. That's what we would call the core. The interface is what really talks to the outside world off the DRAM.

change on any given cycle, and that can also reduce power, because essentially if things don't change, they don't really use power.

Q. And I'm sorry, when you were saying "we," who were you referring to?

A. It was myself, engineers at ATI, and we partnered with a Japanese company called Elpida.

Q. How is the DRAM different from DDR2?

A. It's different in the area of termination, DDR2 uses a much higher power termination method. And it's different in the area of -- essentially a DDR2 device, every cycle, all of its data bits may change, and a DDR2M device, we use an encoding method to essentially only allow half those bits to change. So, we get a big power savings there.

We also did some minor modification -- you know, froze some core attributes, such as burst size and -- and let's see, we also froze the CAS, the CAS latency.

Q. When you say you froze, what does that mean?

A. They were fixed, fixed length.

Q. Okay. Now, in designing that DRAM, the GDDR2M, were you concerned about the cost of that DRAM?

A. Oh, yes, that was very critical in the design.

Q. And what did you understand to be the important

factors in determining DDR cost?

A. Well, the two areas we focus on are die size and package.

Q. Okay. And did the changes that you proposed for the DRAM make it more or less expensive to make than GDDR2?

A. It was less expensive from a die area point of view. Package was approximately the same.

Q. Now, does ATI use GDDR2 in its products today?

A. Yes.

Q. And does ATI use GDDR2M in its products today?

A. Yes.

Q. Now, you also mentioned GDDR3. What is GDDR3?

A. GDDR3 is a device that's evolved from GDDR2, so it's a natural evolution, you know, the next step from GDDR2.

Q. Okay. And what did you do with respect to the design of that DRAM?

A. We again focused on the interface, you know, the termination method. We wanted -- you know, GDDR2 was a device that was really for desktop computing only. We wanted to reduce the power of it so we could also target mobile computing but hit the same level or higher levels of performance, actually significantly higher levels of performance.

Q. And what was your involvement in that project?

A. My involvement was I was really the -- you know, the focal point to bring together, you know, largely the DRAM vendors to participate in the design of that DRAM.

Q. Okay. Did you have any design responsibilities with respect to that DRAM?

A. Yes, I was in charge of the majority of the interface changes. They were mostly ideas that came out of myself or my team.

Q. And when you were designing the DRAM, were there DRAM manufacturers involved in that project?

A. Yes.

Q. Was this the same as the GDDR2, there was only one DRAM manufacturer involved?

A. No, there were many. All the major companies participated, Samsung, Micron, Elpida, Hynix, as well as Taiwanese vendors, such as Nanya, Winbond, Etron.

Q. In designing that DRAM, were you concerned with the cost of that DRAM?

A. Yes, it was very critical.

Q. And what were the factors that you considered?

A. Again, it was in the areas of die area, that's always the dominant cost, and then, you know, the packaging of that DRAM.

Q. Okay. Now, when did you first hear of JEDEC?
A. That must have been 1997.
Q. And how did you come to hear of JEDEC?
A. I was working on an SRAM, call it the DDR SRAM, the DDR1 SRAM and a DDR2 SRAM, and I was visiting a company in Japan by the name of Fujitsu, and during -- at some point in the meeting, they disclosed the DDR DRAM that was being discussed in JEDEC, and that was the first time I had heard of it.
Q. And what was your involvement in JEDEC in '97-'98?
A. Well, I attended the first -- you know, basically as an engineer, when you hear of some concepts that you don't agree with, you always think you could do better, and so we decided to go to a JEDEC meeting and explain to them some of the ways we thought the device could be made better.
JUDGE McGUIRE: Who is "we"?
THE WITNESS: Myself and another engineer from Silicon Graphics.
BY MR. DAVIS:
Q. What was the name of the other engineer?
A. Marty Deneroff.
Q. Now, what's the ma8A wS8Iaphh somcJave been

A. I started at that first meeting in '97. It was the fall of '97.

Q. And you have been involved in JEDEC since that time?

A. Yes.

Q. What committees of JEDEC have you attended?

A. Predominantly the JC-42.3 committees, JC-42.5, JC-16.1 and .2, and I've attended one or two meetings in JC-40.

Q. Okay. Now, have you ever been a -- had a chairman or vice-chairman position at JEDEC?

A. Yes, I was chairman of the Future DRAM Task Group, and I am currently the chair of JC-42.3, which is the DRAM committee.

Q. Okay. Now, you mentioned the Future DRAM Task Group. What was the Future DRAM Task Group?

A. That was a group that was formed in 1998, I believe March of 1998, to focus on the next genera OkayOougoOou

Q. I'd like to show you what's been marked for identification as CX-398. So, Joe, if you look in that pile there, 398 should be in there.

A. They're not in order.

Q. The numbers are at the bottom of the document.

A. I see CX-128 is the top document. Would this be CX --

Q. No, no, it will say CX-398. It's --

A. 398, okay.

MR. OLIVER: Your Honor, could I approach the witness?

JUDGE McGUIRE: Sure, go ahead.

THE WITNESS: Oh, I see it, it's down here. Okay.

BY MR. DAVIS:

Q. Do you have CX-398?

A. Yes.

Q. Do you recognize this email?

A. Please give me one moment.

Q. Sure.

A. (Document review.) Yes, I recognize the document.

Q. Okay. I'd like you to turn to the second page of the document and particularly your email in the middle of that page.

JUDGE McGUIRE: All right, just so I'm clear on what we're talking about here, Mr. Davis, can you tell me what this is for the record before we go into the contents so I'll know when I go through this transcript what it is that this email purports to show?

MR. DAVIS: Okay. Well, my questions will relate to the email starting on the second page of the document. That's what I was going to ask him about.

JUDGE McGUIRE: Okay. Well, all I'm asking you to do is lay a foundation as to who this email is from, who it's to and the subject.

MR. DAVIS: Okay, okay.

BY MR. DAVIS:

Q. Mr. Macri, do you recognize the email in the middle of the page there?

A. Yes.

Q. And who is that email from?

A. It's from myself.

Q. And who were you sending that email to?

A. To Jim Townsend.

Q. And why were you sending that email?

A. I was sending that email due to some concerns I had concerning concepts that would be developed in the Future DRAM Task Group, and they were in the areas of ownership of patents, and you know, and Jim was someone

of a -- kind of a leader of -- you know, an original founder of JEDEC, and so he would be an ideal person to bounce these ideas off of.

Q. So, you sent that email to Jim Townsend because of his position at JEDEC?

A. Yes, to ask advice in this area.

Q. Okay.

JUDGE McGUIRE: What's the date of the email, for the record?

MR. DAVIS: I'm sorry.

BY MR. DAVIS:

Q. And could you tell me the date of the email, please?

A. May 25th, 1999.

JUDGE McGUIRE: Thank you.

BY MR. DAVIS:

Q. Now, in this email you state, "I am a bit unsure how to approach this whole patent issue. We will have a few concepts that could be patented but who will end up owning the patent and paying for the process? It would be best if JEDEC owned all the DDR2 patents and then gave them away to all the world for free. Could we do this?"

Why did you think it would be best if JEDEC owned all the DDR2 patents and gave them away to all

the world for free?

A. Well, we -- you know, our goal was to create an open standard, and it's very critical in an open standard that it becomes widely adapted. Obviously costs that would be related to IP in that standard could prevent the wide adoption of it. So, you know, one thought I had was if JEDEC would own all of the patents and they would be given Wo-

A. Yes.
Q. Could you describe what this document is?
A. This is a presentation I gave at the Platform '99 Conference.
Q. And did you write this document?
A. Yes.
Q. And when did you write this document?
A. Let's see, probably the night before I gave this talk.
Q. And about when did you give this talk?
A. It was in 1999.
Q. Okay. And what was this presentation about?
A. This presentation was, you know, kind of a description of where we were in defining the DDR2 device. I wanted to give -- you know, the Platform Conference was a public conference, and this was an opportunity to describe to the world, you know, what we were up to.
Q. Could you describe what a Platform Conference is?
A. This was a conference that was created by a man by the name of Burt McComis to provide an open forum that, you know, where companies could come and present concepts relating to personal computers.
Q. Okay. Could you turn to page 14 of the

document?

Did you make this figure?

A. Yes.

Q. What did you intend this figure to describe?

A. This figure was my personal view of what the standards process entailed.

Q. Could you describe how this describes the -- how the standards process works?

A. Well, basically we start out with what we call a task group, which is a collection of people that would get together within JEDEC to start a definition of a device. The goal of the task group is to create a standard. In order to create a standard in JEDEC, you must write ballots, and those ballots need to be voted on. And so that's what's labeled as the ballot process, the creation of those ballots and the actual voting procedures.

Now, it's not a closed-loop system. We actually have this, you know, large oval that's called system implementation, and that goes outside of that dotted box. The dotted box is intended to show what happens within JEDEC versus what appears outside of JEDEC. So, the -- you know, the -- we're taking feedback in from the outside world as well as from within JEDEC, constantly refining the ballots and the

concepts until eventually a standard is produced, and then people go off and build systems based on that standard.

Q. Okay. So, when you say the system implementation in that large oval, what does that refer to?

A. That refers to the actual use of the device, the DRAM device, in a larger system. A DRAM alone doesn't really do anything. It needs to talk to other things, and there's a vast array of, you know, system types, from like a personal computer to a digital television, they all use the DRAM a bit differently.

And so the system implementation process is essentially users of the DRAM using the device, finding issues with the standard, and then feeding that data back into JEDEC so we can refine the standard to satisfy, you know, a wide array of things for the DRAM.

MR. DAVIS: I would move RX-2234 into evidence.

MR. STONE: No objection.

JUDGE McGUIRE: So entered.

(RX Number 2234 was admitted into evidence.)

BY MR. DAVIS:

Q. I'd like to show you what's been marked for identification as CX-376A. Do you recognize this email?

A. Please give me one moment. (Document review.) Yes.

Q. And what's the -- who is this email from?

A. This email is from myself.

Q. And who were you sending this email to?

A. To the task group, the Future DRAM Task Group.

Q. So, this large list of people here next to the "To" line, that was the Future DRAM Task Group?

A. Yes, that was the email list.

Q. And the date of this email?

A. Is 3/18/1998.

Q. And what was this email about?

A. Well, it was -- the main subject matter of the email was to, you know, announce, you know, really the start of the task group and a set of goals, initial goals, mission statement, method outline, and also informing the group that, you know, I had left Silicon Graphics and had joined ArtX.

Q. So, that's in the first paragraph?

A. That's in the first paragraph, but the main -- the meat of this email was really the other stuff that I mentioned.

Q. If you turn to page 2 of CX-376A, there's that mission statement you were referring to, and it says, "Define and develop a long term roadmap detailing the

logical, physical and electrical interfaces for future DRAMs. In addition the group is tasked with providing the initial specification for each device specified on the roadmap."

Could you tell me what the differences between logical, physical and electrical interfaces are? What do those terms mean?

A. Okay, an electrical interface would be, for example, the number of volts that a signal would represent on a wire. So, it's literally the, you know, the voltage, the currents, you know, those electrical attributes of the signaling interface.

The logical interface is, for example, you know, that we would have a RAS signal to latch to a row address, so it's functional, very functional on how -- on the description of that interface. The encodings of a command, for example, would be part of the logical interface.

The physical interface is literally the number of pins, you know, how you would actually connect it down to a circuit board, so physically how you would interface to that -- to that DRAM.

Q. Now, in the last sentence of the mission statement, you refer to a written specification for each device. What is a specification?

A. A specification is a document -- you know, a very detailed document, goes into absolutely all of the details needed to understand the device and use the device in a real system. So, it's -- would include everything, all the electrical characteristics, as well as the physical and logical characteristics.

Q. Does the specification relate to other parts of the DRAM system as well besides the DRAM?

A. At times it does, but just as background information. I mean, the specification is really focusing on the device alone, not so much how you would go and use the device.

Q. Okay. Now, under Initial Goals in the middle of the page -- do you see that, where it says "Initial Goals"?

A. Yes.

Q. You list a presentation of initial roadmap at 6/98 and then a strawman specification in 9/98.

What is a strawman specification?

A. A strawman specification would be a first -- you know, a first attempt at a specification, you know, all of the detail wouldn't be outlined, but it would provide, you know, enough logical detail and some electrical detail so you can understand what the device would be.

Q. Okay. And next you describe an agenda for April 16th, 1998. What was this agenda for?

A. This was for the first meeting of the Future DRAM Task Group.

MR. DAVIS: I'd like to move CX-376A into evidence.

MR. STONE: Your Honor, Exhibit CX-376 is already in evidence, so I'm not sure whether this is meant to replace 376 or to be in addition to it. I believe they have the same production numbers on the pages between 376 and 376A.

My understanding of the difference is, but I could be incorrect, is that when Hynix originally produced the document, their email search engine, which was searching for words in email, resulted in whatever words they were searching for being blacked out in the one that was produced and that this has eliminated the black-outs. I could be wrong, but that's what I think.

So, I thought maybe it makes sense to simply move this into evidence in replacement of 376, which I don't know that we need two copies of the same document.

JUDGE McGUIRE: All right, Mr. Davis?

MR. DAVIS: I have no objection.

JUDGE McGUIRE: Then how is it going to be

entered? It's CX -- I'm sorry, it's CX-376?

MR. DAVIS: Yes.

JUDGE McGUIRE: And that's going to be entered in lieu of the previous exhibit?

MR. STONE: I think since this one is marked A, Your Honor, we should simply move in 376A to replace 376, which then we don't -- we won't need to refer to 376 hereafter.

JUDGE McGUIRE: Okay, Mr. Davis, is that all right with you?

MR. STONE: That's fine.

JUDGE McGUIRE: So entered.

(CX Exhibit Number 376A was admitted into evidence.)

JUDGE McGUIRE: Thank you, Mr. Stone.

BY MR. DAVIS:

Q. Now I'd like to show you what's been marked for identification as CX-378. Have you seen this email before?

A. Just give me one more moment to finish it. (Document review.) Yes, I've seen this.

Q. Now, who is the top email from?

A. The top email is from Desi Rhoden.

Q. And who is it to?

A. Myself as well as what could be described as

the JEDEC chairs and leadership at the time of this email.

Q. And what was the date of his email to you?

A. It was 4/8/1998.

Q. Okay. Do you have an understanding of why Desi Rhoden was sending you this email?

A. Yes.

Q. And what's your understanding?

A. He was informing me of the rules regarding inviting nonmembers to participate in the Future DRAM Task Group.

Q. And if you look right below his email, there's -- it looks like another email. Do you see that?

A. Yes.

Q. And who is that email from?

A. Myself.

Q. Was Mr. Rhoden responding to your email to him?

A. Yes.

Q. Now --

A. Not only to him, but to Jim as well as Ken.

Q. Jim being Jim Townsend?

A. Jim Townsend and Ken McGhee.

Q. Now, in your email to, among other people, Desi Rhoden, you state, "It is my opinion we should get as

many parties to come as possible."

What are you referring to there?

A. To come to the Future DRAM Task Group.

Q. And you say, "So I encourage you all to invite those that you deem appropriate. I am not fully aware of all the rules surrounding JEDEC but I hope that the rules would allow non-members to come as guests."

Why did you want as many members -- as many parties to come as possible?

A. Well, our goal was to create a broad enough standard to be used by as many people as possible in the world, so it made sense that if that was our goal, we would have as many people attend the meeting from as many different, you know, applications of DRAMs as well as builders of DRAMs, everything surrounding DRAM, so that the final standard would have, you know, the consensus of the world, so that it would become widely adopted and used throughout the world.

MR. DAVIS: I'd like to move 378 into evidence.

MR. STONE: No objection.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 378 was admitted into evidence.)

BY MR. DAVIS:

Q. Now, Mr. Macri, have you created a document

that describes the DDR2 history?

A. Yes.

Q. And do you have that in front of you?

A. Yes, I do.

Q. Okay, that is -- I think we notified --

Your Honor, may I approach?

JUDGE McGUIRE: Yes.

MR. DAVIS: Your Honor, I would like to use this as a demonstrative.

JUDGE McGUIRE: What is that, DX-46?

MR. STONE: I believe you're right, this will be 46.

JUDGE McGUIRE: It will be 47?

MR. STONE: I believe this will be 46, Your Honor.

JUDGE McGUIRE: Okay, 46. That's what I was thinking. If it's not, we will change it later. Okay, DX-46.

were creating DDR2, the DDR2 standard.

Q. Okay. Since we're talking about the history, would you turn to the fourth page into the document. Could you describe what that is?

A. Okay, this is a chart that's showing in the vertical axis essentially change. So, when there's -- when the line is -- you know, when the line is slanted, that means there's architectural change. There's actual changes to the DRAM going on.

The horizontal axis is time, so to the left is earlier in time and to the right is later in time. So, it's change in time. So -- yeah, that's essentially, you know --

list of attributes, major attributes, to create a, you know, a real standard which is in the end a specification, you must add an infinite amount of detail to those attributes. So, this was -- during June of 2000 to June of 2001, we were adding the meat, you know, the real description that an engineer would need to truly understand these -- these concepts.

Q. Now, between June of 2001 and September of 2001, as I'm reading this, it seems like there were some architectural changes that happened to the DDR2 standard as well?

DRAM, you know, systems using that DRAM.

Q. Now, the changes that occurred in -- the architectural changes between June of 2001 and September of 2001, did they affect the work that was going on inside of JEDEC at those companies?

A. No, not really, because the changes we put in were changes that could be turned on or off. So, designs that were already in flight, they didn't need to be started over or be, you know, changed in any significant way. So, these were really changes that were made -- they were made consciously not to cause damage to the development that had already started.

Q. And why was that important?

A. Well, you know, many -- some systems take a very long time to design, and it's really important that, you know, we provide stability to the designers. If we were to make a change that would cause them to go back and essentially tear up their design, we would be forcing companies to incur great expense, enormous expense, not only on the design period but also on their product lines.

Time to market is extremely critical in this world. You could really devastate a company, even a large company. You could cause such an economic impact to it that, you know, it's possible they may not

recover.

MR. STONE: Your Honor, I move to strike the last two sentences of the witness' answer on the grounds that he lacks foundation to express opinions about what causes companies to go out of business or not, at least if he has that personal experience in that area, it's not part of the foundation that has been laid.

MR. DAVIS: He has been working at a number of companies for a while, including a startup that -- that dealt with this sort of a risk.

JUDGE McGUIRE: I'll let it in and then I'll give it its due weight. Overruled.

MR. STONE: Thank you, Your Honor.

BY MR. DAVIS:

Q. Now, you explained that the new -- the architectural changes that occurred between June of 2001 and September of 2001 related to presentations made by I think you said Intel and ADT and AMD?

A. Yes.

Q. And why were those changes made to the standard?

A. They justified that with performance improvement, and the committee, you know, came up with a set of changes that would allow those performance

improvements to be realized but in a way that wouldn't, you know, destroy the development that was already started. So, that's how they got justified.

meeting, the April 16th, 1998 Future DRAM Task Group meeting, are they included in this document?

A. I do not see the actual meeting minutes. I see the meeting agenda, and I see all the presentations. I don't see a copy of -- you know, a detailed copy of the minutes.

Q. Okay, but the presentations are the presentations that were given at the Future DRAM Task Group meeting?

A. Yes. I'm not sure if this is all of them, but these are presentations that were given at the meeting.

Q. Okay.

I'd move to admit CX-128.

MR. STONE: Your Honor, I just -- I'm confused, because there's a part of the document dated May of '98, which is page 7 and maybe some of the pages following, so I'm just concerned whether the document is a complete set of materials as the witness described them, presentations in April. So, I just wonder if the description of the document is consistent with the contents.

I don't object to the admission of it, but I do think there might be a question as to whether the document has some --

JUDGE McGUIRE: Is complete?

MR. STONE: -- extraneous pages in it.

JUDGE McGUIRE: Do you want to comment on that, Mr. Davis?

MR. DAVIS: Well, I'll ask Mr. Macri about the presentations.

JUDGE McGUIRE: All right.

BY MR. DAVIS:

Q. If you turn to CX-128, page 7, this is a presentation that runs on for -- it looks like through page 13.

A. Yeah.

Q. Do you have an understanding of whether that presentation was given at the JEDEC Future DRAM Task Group or was given sometime later?

A. It was given at the JEDEC Future DRAM Task Group. It is stated quite clearly on the first page that it was, and I do remember discussing all these concepts, you know, not only -- you know, at a number of meetings. These were not concepts that were just discussed once.

Q. Do you have an understanding of why it says "5-98 Santa Clara Meeting" on that?

A. Well, the first meeting I know numbe Task

3Tip

at Silicon Graphics.

JUDGE McGUIRE: You know, it is what it is, Mr. Stone.

MR. STONE: It is what it is, Your Honor.

JUDGE McGUIRE: I will take note of your statement, but otherwise, entered.

MR. STONE: Thank you.

(CX Exhibit Number 128 was admitted into evidence.)

BY MR. DAVIS:

Q. Now, I'd like to show you what's been marked for identification as CX-379A.

This is a document that was already entered as CX-379, and it has the same black-out problem as the earlier document. I would propose that we treat it the same.

MR. STONE: I agree with that.

JUDGE McGUIRE: Is that to say, then, that it's being offered at this time, Mr. Davis?

MR. DAVIS: No, I'll --

JUDGE McGUIRE: You are just showing it at this time?

MR. DAVIS: Yes, sir.

JUDGE McGUIRE: Okay.

THE WITNESS: Yes, I have the document.

BY MR. DAVIS:

Q. I'm sorry?

A. I have it.

Q. Have you looked at it?

A. Yes.

Q. Now, is this -- who is this email from?

A. It's from myself.

Q. And when did you send it?

A. 4/28/1998.

Q. And who were you sending it to?

A. I was sending it to the Future DRAM Task Group.

Q. Okay. And why were you sending this email to the Future DRAM Task Group?

A. It was an email that, you know, outlined action items from our -- from our meeting, as well as having a copy of the meeting minutes, and at the beginning, I think I was prodding some of the companies to forward their presentations back to the JEDEC office.

Q. And when you were talking about a meeting, which meeting were you referring to?

A. That initial meeting of the Future DRAM Task Group.

Q. And that was the same meeting at which the

Q. Okay. Do you know who wrote these notes?

A. Some of the notes -- well, some of this is just from myself, and the meeting minutes are -- were taken by -- let's see, it looks like Jim Rogers actually took some notes, but I know Ken McGhee generally takes the -- you know, takes the meeting minutes.

Q. Do you remember reviewing these minutes before sending them out?

A. Yes.

Q. If you could turn to page 2 of CX-379A, now, in the middle of the page under Brief Meeting Summary, it says, "The first JEDEC DRAM Futures Taskgroup meeting was held on April 23rd. The purpose of the meeting was to start the definition of a high speed DRAM type which would follow DDR SDRAM."

Now, you stated earlier that the date of this email is April 1998. Do you know if DDR SDRAM at this point was being sold in volume at the time?

A. It was -- it was not being sold in large volume at the time.

Q. Well, why were you and other engineers getting involved in trying to define the DRAM that was going to come after DDR if DDR wasn't even being sold in volume at the time?

A. Well, the design process is long, and we needed

to be proactive. You know, the definition for DDR at that point was pretty much complete, and so we decided that we should start the -- the definition of the next DRAM so we could, one, have the luxury of some time, because these things -- you know, they're complicated, and to actually complete a full standard and have it cover a large number of markets takes quite a bit of time. So, we needed to start early.

We also wanted to, you know, provide, you know, a forum where we could bring in industry experts to educate the committee so that the standard we did produce would be a better standard at the end of the day. So, that, again, added time.

The design cycle was long, so we needed to do this very early so that systems could be started to be designed -- DRAMs could be designed such that when the DDR1 standard, you know, ended its life, the DDR2 standard and its systems would be ready to take over in a seamless fashion. So, we -- you know, we needed to be proactive purely because you can't build these things in a day. It takes quite a bit of time.

Q. You said the design cycle was long. What did you mean by the term "design cycle"?

A. Well, design cycle is the design cycle of the systems that use a DRAM, you know, the actual ASICs,

the full systems that surround those ASICs, as well as the DRAM itself. You know, DRAMs do take time to design, so the design cycle is -- refers to all -- you know, every component of the system.

Q. Okay. Next I'd like you to focus at the bottom of the same page at the list following this statement. "The following are some common themes/features of a future DRAM that were generally agreed upon during the meeting."

Do you see that?

A. Yes.

Q. What's the importance of this list?

A. I would say, you know, the goal is, you know, when you have a design task, you want to create a set of boundaries so you can start focusing on more specific issues. So, this would be in some ways a start of a consensus list so that we could then start focusing the group rather than having the group looking at a pure -- you know, an infinite number of options.

Q. Okay. If you look at the first item, it says, "Minimal to no system cost adder over PC100."

What does that mean?

A. It was a goal that we set forth to the group to, you know, not make it inherently more costly to use a DDR2 SDRAM than it was to use a PC-100 SDRAM. So,

minimal cost adder means, you know, you wouldn't have -- you know, from the system point of view, the system wouldn't take very much more or no more dollars to build.

Q. Next, the next bullet states, "Must have a lifetime of 3 DRAM density generations."

What does that mean?

A. A DRAM density is the number of bits in a DRAM; for example, a 256-megabit DRAM, a 512-megabit DRAM. DRAM density generations in some way map back to time, and so three generations is typically the minimum a standard would survive, and so we set that as, you know, as the -- as essentially the minimum lifetime goal.

Q. Now, you said that the DRAM density generations map back to time. How long is three generations approximately in calendar time?

A. It's approximately six years.

Q. And why was it important that the DRAM generation have a lifetime of three DRAM density generations or six years?

A. Well, you know, it's very costly to, you know, do a large-scale development of systems, of DRAMs, and so it's important that, you know, the manufacturers, regardless of where you are in the -- in the chain,

have the ability to amortize the development costs over a large number of years so there can be profit.

Q. Okay. Now, if you could turn to page 9 of CX-379A, and I'm referring to the statement, "Which architecture should the solution be based on?" That's followed by a list of it looks like three different DRAM types, Rambus, SLDRAM, DDR SDRAM.

Do you see that?

A. Yes.

Q. What does that refer to?

A. By architecture, these Rambus, SLDRAM and DDR were what we would call base architectures. They would be a -- you know, a different style of device. That's what base architecture means or architecture means in this case.

Q. And what is base architecture? Why were you -- why was the JEDEC DRAM Future Task Group deciding about a base architecture?

A. Well, we wanted to -- we didn't want to start with a clean sheet of paper. We wanted to evolve a current DRAM so we could take that user base and move them as seamlessly as possible into the future. So, we needed to pick the DRAM we would start with and then evolve it.

Q. Why was it important to evolve the DRAM?

A. One of the most critical really design attributes is backwards compatibility. What we do, we don't want to change everything such that when you would design a new system for this DDR2 SDRAM, that it would be absolutely incompatible with the past. So, we -- you know, we need backwards compatibility.

If you're looking from the back forward, it's kind of forward compatibility. This is probably one of the most important design attributes, you know, that we needed to keep focused on.

Q. Now, what actually is going on in this? It says that there's Rambus, zero votes, SLDRAM, 12 votes, DDR SDRAM, 22 votes.

A. Well, we're trying to -- you know, this was a straw poll. A straw poll is used in a JEDEC committee to identify a path, to identify, you know, which -- you know, for a question that's given to the committee, which way the committee should head. It's not the same as a ballot to go into a standard, but what it's used as is a way that during the group discussion to send us down a fork in the road, you know, decide which fork we should take, which path we should take.

MR. DAVIS: I think we're having a little bit of trouble with our --

MR. OLIVER: Could we go off the record for

just a moment, Your Honor, to fix our computer here?

JUDGE McGUIRE: Sure, we will go off the record so you can iron that out.

(Pause in the proceedings.)

JUDGE McGUIRE: All right, on the record.

Mr. Davis, you may proceed.

MR. DAVIS: Thank you, Your Honor.

BY MR. DAVIS:

Q. Now, before the break, you were referring to a vote on the architecture that the solution should be based on. Now, what was the importance of that vote to the development of the standard?

A. Well, as I said, we need -- we wanted to pick the base architecture of the device, the previous -- you know, the DRAM we would start with, and then modify it to form the standard, the new standard, DDR2.

Q. Okay. Now, halfway down that page, you state

MR. STONE: No objection.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 379A was admitted into evidence.)

BY MR. DAVIS:

Q. Now, I'd like to show you what's been marked for identification as CX-132.

A. (Document review.)

Q. Okay, do you know what this is?

A. Yes.

Q. Could you describe what this document is?

A. This is the meeting minutes of the Future DRAM Task Group from July 23rd, 1998.

Q. And how is this -- how were these minutes compiled?

A. These minutes were compiled by most likely Ken McGhee from the JEDEC office or -- or it could have been another person, you know, taking these.

Q. But you have reviewed these minutes?

A. Yes.

Q. And why would you have reviewed these minutes?

A. It is a task of the JEDEC chairman to review the minutes.

Q. And why would the -- I'm sorry. Why would the JEDEC chairman review these minutes?

A. Well, the JEDEC chairman first reviews the minutes to ensure accuracy before they're presented to the entire committee, and then, you know, they're eventually accepted by the committee itself through a, you know, a process of, you know, someone makes a motion and a second and then a vote is taken.

Q. Now, if you could turn to page 4 of CX-132, item 6 is listed as Current Consensus. Now, there were items listed as current consensus in the previous meeting minutes. Is that something that you listed in every meeting minute, the current consensus?

A. Yes, at the beginning of every meeting, we would review the current consensus.

Q. And what was meant by the current consensus?

A. It is the attributes of the DRAM that were agreed upon by the task group, the committee.

Q. Okay. And then the first item in that current consensus says, "DDR Based."

A. Yes.

Q. And what does it mean that the future would be DDR based?

A. It means that we would use the DDR1 SDRAM as the basic architecture for the DDR2 SDRAM.

Q. Did you agree that DDR1 should be the basis for the future DRAM?

A. Yes, I did.
Q. Why?
A. It was my belief that the DDR SDRAM covered a broad range of markets and that it would be a success in the industry, and therefore, we should base our -- our new design on it.
MR. DAVIS: I'd like to move CX-132 into evidence.
MR. STONE: No objection.
JUDGE McGUIRE: Entered.
(CX Exhibit Number 132 was admitted into evidence.)
BY MR. DAVIS:
Q. Now, I'd like you to look at CX-2315. Do you have it?
A. Yes.
Q. Would you like to look at it before --
A. Yes, please give me one moment. (Document review.) Okay.
Q. Could you describe what this document is?
A. This is an email exchange, you know, talking about, you know, essentially the success of the DDR SDRAM and how it plays into, you know, the possible success of the DDR2 SDRAM.
Q. And who is this email exchange between?

A. The last "To" section -- the top section is from Jim Townsend, and in part he's responding to an email I sent to him and a number of other people, essentially the JEDEC leadership, and then after that, it's emails that I -- that were from Jim Townsend to myself as well as Desi Rhoden and Gordon Kelley, and at the absolute end was a -- some drafts of an email concerning the drafts of a JC-42 agenda and some discussion of attending the leadership meeting.

Q. I'd like to focus you on page 1 of 2315, CX-2315, and the line that starts, "At 02:36 p.m., 8/10/98, you wrote."

Are you there?

A. Yes.

Q. What follows that, that line?

A. "Hello, Jim."

Q. Yes. The first line or so -- you don't have to read it. I just wanted you to identify what that was.

A. This was an email from myself that, you know, talked through the way I would -- you know, the way -- my interpretation of the status of current DRAMs in the world and where, you know, the world may go and describes, you know, essentially a chicken and egg problem concerning the DDR SDRAM.

Q. Why don't we go to that.

Now, first of all, you described who Jim Townsend was earlier. You start the email with, "A lot of what we are doing in the Future DRAM Task group relies on the success of DDR SDRAM."

Why did the work on the DDR2 SDRAM rely on the success of the DDR SDRAM?

A. Well, firstly, we based the DDR2 SDRAM on the DDR SDRAM, and you know, that was very -- you know, that was very important for backwards compatibility, you know, to make it easy to transition from one DRAM to the next, and that was true of the SDRAM to the DDR SDRAM.

So, if the DDR SDRAM wasn't successful, it would only make sense to me that any device based on it also wouldn't be successful, because there wouldn't be a large number of designers in the world that would be designing to the previous generation, the DDR, so why would a large number of people then start designing to the DDR2 SDRAM?

Q. Okay. Next you say, "With the info I have to date it is starting to look like the world may stay SDR until Rambus is available."

By "SDR," what were you referring to?

A. SDRAM.

Q. So, single data rate --

A. The JEDEC single data rate SDRAM.

Q. Then you say, "This is mainly due to a supplier commitment to SDR and Rambus."

What information did you have that indicated that the DDR manufacturers were going to produce SDRAM and then move to Rambus?

A. It was information widely available in the public domain, as well as information from DRAM vendors on their road maps.

Q. You referred to information from DRAM vendors on the road maps. What road maps are you referring to?

A. These are road maps that are made available to me both under NDA and non-NDA. I'd say no details were shown here, so there was no violation of the NDAs.

Q. Then you say, "This includes the memory suppliers as well as the companies that support the underlying infrastructure. It is a chicken and an egg problem... The vendors won't line up to produce the device unless there are users... But the users won't consider the part unless the suppliers/infrastructure is in place."

Could you describe what you meant by this problem is a chicken and egg problem?

A. Well, the user of a DRAM can't commit to a DRAM unless they are sure that the DRAM suppliers are

actually going to build it. As I said earlier, there's a long design cycle, so you're committing to something years in advance. And this includes also the infrastructure surrounding it, so beyond just the DRAM. The support components as well as DIMMs, et cetera.

Now, the DRAM suppliers, they don't want to build the device unless the users are committed to it, because again, it takes a long time to design a device, and if the users aren't there, then you have a dead device. There's no market for it. So, it's -- you know, someone has to go first. It's a classic chicken and egg problem.

Q. And how does the industry usually resolve that problem?

A. Well, usually in the DRAM world, there is only one choice. You know, it's not a matter of what; it's a matter of when. So, users, they can plan their transition based on their own -- you know, their own internal decision-making process, plan their transition to meet their own business needs.

The suppliers, they know making the investment up front is going to be realized, because they know the users will eventually move over. It may not all be at once, but over a period of time, they can count on the market slowly building up.

In this particular case, there were two choices, and it was very unclear which way the world would go.

Q. And is that what you are referring to when you state next, "I understand that when the world transitioned from EDO to SDR, it was slow and unclear when the PC world would move over... However, since there was only one alternative, then it was only a matter of when not if"?

A. Yes.

Q. Okay, I'd like to have you look at RX-1306, please.

JUDGE McGUIRE: Mr. Davis, did you offer CX-2315?

MR. DAVIS: No, my understanding is it's already in evidence.

JUDGE McGUIRE: It's already in? Okay, good enough.

BY MR. DAVIS:

Q. Do you recognize this document?

A. Yes.

Q. Could you describe what it is?

A. These are meeting minutes for two Future DRAM Task Group meetings, one on 9/18/1998 and one on 10/12/1998.

Q. So, to be clear, this is an email from you to a number of people --

A. Yes, distributing the meeting minutes.

Q. And when was this email sent?

A. Let's see, it looks like it was sent Thursday, November 5th, 1998.

Q. And who were you sending it to?

A. The task group, the Future DRAM Task Group.

Q. And why were you sending the -- this email to the Future DRAM Task Group?

A. It is a matter of JEDEC policy that the meeting minutes are distributed to the task -- to the task group members.

Q. Okay. I'd like to turn to page 8 of RX-1306, okay, and on page 8 is a list of action items.

Do you see that?

A. Yes.

Q. What does that mean, "action items"?

A. Action items are essentially work tasks that are assigned to either an individual or a company or multiple individuals or multiple companies to be completed by the next meeting.

Q. Okay. If you look at item number -- I'm sorry, action item number 3, it says, "Removing DLL and impact on turn around time HP."

Could you describe what that means?

A. Okay, first I need to define "turnaround time." Turnaround time is, you know, a DRAM really has two basic functions. You send data to it on writes; you receive data from it on reads. And the turnaround time is when you do the transition from a write to a read or a read to a write, essentially some time that is left dead on the bus to allow the bus to change direction.

So, this task was to investigate what would -- you know, what would be the impact of the turnaround time if the DLL was removed from the DDR2 SDRAM.

Q. Okay. And why was this action item being considered?

A. You know, one of the overriding goals of the D -- of the task group, the Future DRAM Task Group, was simplification, and so any time you remove something from a DRAM device, you're going to make it simpler. So, we were obviously looking at this for simplicity.

DLLs, their nature, you know, they're complicated little circuits, and so if we could eliminate the circuit, you know, we would simplify the DRAM significantly.

Q. Okay. And was the DLL or has the DLL been removed from the DDR2 standard?

A. No.

Q. And why not?

A. Well, we were DDR-based, and you know, the DLL is a part of the clock system of the DDR SDRAM standard, and the clock system is -- it's, you know, one of the most fundamental aspects of the standard, and it was decided since we were DDR-based that we should preserve the clock system to keep the backwards compatibility, that overriding issue of backwards compatibility, you know, keep that easy, and that's why the DLL was left in.

Q. Okay.

I believe that also is already in.

JUDGE McGUIRE: Thank you.

BY MR. DAVIS:

Q. I'd like to show you what has been marked for identification as CX-392. I think you've passed it.

A. Is it CX-390?

Q. 392.

A. Oh, 392, sorry.

Q. Who is Paul Coteus?

A. Paul Coteus was the vice-chair of the Future DRAM Task Group.

Q. And why would he be sending out a Future DRAM Task Group -- or it says task force, sorry, status report?

A. I mean, as vice-chair, he may have -- you know, he probably was sending out a status of the group. He may have also been sending it out just through his position in IBM.

Q. And if you look at the date, it's January of 1999. Is that close in time to another Future DRAM Task Group meeting?

A. Yes, we had a meeting in December of '98, and we typically -- and we also had a meeting scheduled that -- in March of '99. Typically we did a meeting in between those two dates. We typically met eight times a year, at every JEDEC meeting and then in between every JEDEC meeting.

Q. Okay. If you would turn to the bottom of page 3 of CX-392, there's the bullet that states, "DDR Based."

A. Um-hum.

standard and the DDR2 standard in a way that, you know, wouldn't be unduly costly. You know, you could do it in a way that would be, you know, easy.

Q. And why was that important to the Future DRAM Task Group?

A. Well, it's important because when you

unfortunately, sometimes things don't work, you know,

A. This means that a DRAM manufacturer would design their DRAM such that it would have both the DDR functionality and the DDR2 functionality on the same piece of silicon, on the same die. There could then be, you know, a metal change, you know, a piece of metal on the die, configure that piece of silicon to either be a DDR1 or a DDR2, and that could be done very late in the manufacturing process.

You could also use a fuse to do it. There's a number of ways to do that, that late bonding, and this is, again -- well, that's what it is.

Q. Okay. You said metal -- a piece of metal. What were you referring to there, that would be able to set between the DDR and DDR2 device?

A. Well, there would be a piece of metal just like, you know, a wire from a microphone to the speaker. There's metal on silicon to allow the electronics to flow from one place to another. It's quite possible with a piece of metal that you could configure the DRAM device to have the DDR1 attributes or the DDR2 attributes by connecting things slightly differently.

Q. And why was that important to the -- to the Future DRAM Task Grouplibouplllld b0ijTqu.n22 d1,t or tfi G

it's important to the DRAM manufacturers.

Q. Okay. And why was it important to the DRAM manufacturers that they be able to support DDR and DDR2 at the same time?

A. Well, again, it's risk mitigation. They're doing a design, believing the user community will be there ready to accept it, but they, too, don't have control of their destiny. They're dependent on the users and other people to build the infrastructure. So, they want to make sure that the design they do still has a market, and this allows them to more seam -- you know, to manage that transition from the previous technology to the new technology with a minimum amount of risk.

Q. Okay. Now, if you'd turn to page 5 of the document, and I'm referring to the very bottom header, it says, "No read or write burst interrupt commands," and then it states that, "At high data writes, burst interrupt commands are of less value, and are more difficult to engineer. The perceived engineering and test costs were higher than the perceived value of the commands."

At the time, what was your perception of the engineering and test costs for burst interrupt at that time?

A. Well, it was burst interrupt in the JEDEC SDRAM standard, the single data rate standard, as well as the DDR1 standard. The way the burst interrupt was standardized provided the most flexibility to the user, and all that flexibility had a cost to the DRAM designer. It was -- it proved to be difficult to implement that flexibility and implement it in a way that did not affect the speed of the DRAM. So, that's where, you know, it was difficult to engineer.

Q. And what was your perception of the value of the burst interrupt colefity anin a ardIe?, it was difficult dif depended on the use of the DRAM. In some cases, there would be absolutely no benefit to the burst interrupt, and in other cases, the benefit was extremely small, and there were very, very few cases where, you know, this very general purpose burst interrupt provided, you know, a significant boost.

Q. Okay. Was it part of your perception of the value of the burst interrupt colefityin a it would potentially avoid Rambus patentsIe?, it was difficu2t difu 9e2 actually, CX-392 has been already moved into evidence. ?, it was

Q. I'd like you to look at what's been marked for identification as CX-397. Mr. Macri, it looks like this (indicating).

A. Okay. 397?

Q. CX-397.

A. Did we already discuss it once or -- no?

MR. DAVIS: Your Honor, may I approach?

JUDGE McGUIRE: Go ahead.

THE WITNESS: Thank you.

BY MR. DAVIS:

Q. Could you identify the cover page for me before

0/et ioMcGbssVro a.?

.bn MRGy e ioMcyn1 g 2jT(12 coe1iwoolentteushat'myselfMr.

A. Yes, it seems like it's the information.

Q. Okay. Now, if you look at the first page of that package, it's page 2 of the document, there's a figure at the top with a line above it stating, "Evolutionary design, building on tradition of SDR and DDR SDRAM."

Now, what does "evolutionary design" mean in that sentence?

A. Evolutionary design is when you start with something and you modify it to get something else, so it evolves, just like monkeys to humans.

MR. STONE: That was a long trial, too, Your Honor.

JUDGE McGUIRE: Noted.

THE WITNESS: I guess it depends on how you look at it.

BY MR. DAVIS:

Q. Now, in the figure below, there are arrows going from boxes with the terms PC-100, PC-133, DDR and DDR-II, and those boxes represent the DDR -- I'm sorry, the JEDEC standards. Is that accurate?

A. Yes.

Q. And what do the arrows represent?

A. They represent the change from one standard to the next.

Q. Okay. Now, is programmable CAS latency using the mode register part of the proposed DDR2 standard?

A. Yes.

Q. And how did programmable CAS latency become part of the proposed DDR2 standard?

A. Well, it was inherited from the PC-100, the PC-133 and the DDR standard.

Q. So, it's in the DDR2 standard because it was in the previous standards?

A. Yes.

Q. Is programmable burst length using the mode register part of the proposed DDR2 standard?

A. Yes.

Q. And how did programmable burst length become part of the DDR2 standard?

A. It was used in the PC-100, the PC-133 and in the DDR SDRAM standard.

Q. Okay. Now, is dual edge clocking part of the proposed DDR2 standard?

A. Yes.

Q. And how did that develop --

A. Well, clocking -- we call it dual edge strobing instead of clocking, because it's the strobe that is -- the data is associated with on dual edge.

Q. Okay, thank you.

Could you describe what you mean by a strobe so we understand?

A. Well, the strobe is a signal that is timed with the data, but it's not the same as the clock that goes to the SDRAM. The data is not tightly coupled to the DDR SDRAM clock. It's tightly coupled to the DDR SDRAM strobe.

Q. And so the difference between a clock and a strobe, could you describe the difference between --

A. A clock is a free-running signal that forms kind of the watch of the system, whereas strobe can be loosely related to the clock, may or may not be free running -- in the case of DDR SDRAM it's not free running, it's not always moving -- and it is very tightly coupled to the data.

Q. And by "free running," you mean running all the time?

A. Running all the time, like a wrist watch.

Q. Now, how did dual edge strobing become part of the proposed DDR2 standard?

A. It was in the DDR SDRAM standard.

Q. Now, finally, is the use of DLL on a DRAM part of the proposed DDR2 standard?

A. Yes.

Q. And how did the use of DLL on a DRAM become

part of the DDR2 standard?

A. It was in the DDR SDRAM standard.

Q. Now, below that on the same page, there's a statement, "Designed by users and suppliers in JEDEC Future DRAM Task Group," and the third bullet below that lists a number of organizations, M14, SL-DRAM consortium, PC/Graphics/Server companies.

Do you see that?

A. Yes.

Q. What's the value, if there is any, of having all these different types of firms involved with the standards-setting activity?

A. Well, we were, you know, designing a DRAM that we wanted to be an open standard and an open standard that covered a vast array of markets, so it would be used by, you know, essentially the entire world. By having all of the, you know, major and minor companies -- for example, ArtX, the company I worked at, was just a little 25-person startup. So, to have as many possible companies working on it, you have consensus, and so when the device is eventually produced, you have a -- you already have people that agree with it and agree to use it, so it becomes widely, widely used.

Q. Okay. If you could turn to page 12 of the

document, now there's a page that's titled Command Encoding. What does "command encoding" mean?

A. Command encoding is, you know, when you have a number of bits of signals that are encoded to specify a specific command, such as a read or a write.

Q. So, the encoding tells the DRAM that, hey, this is a write or tells the DRAM this is a write?

A. Yes.

Q. And on page 13, it says, "Command Encoding -- Another Option."

Do you see that?

A. Yes.

Q. What's the difference between the command encoding schemes on page 12 and page 13?

A. On page 13, it's essentially the historical standard command encoding for a DRAM that's been adopted by JEDEC for -- you know, and DRAM designers for, you know, many, many, many years, going back -- you know, even prior to synchronous DRAM, going back to fast page DRAM, EDO, you know, it's been essentially the way everybody has talked to a DRAM.

Page 12 was the actual future DRAM the task group considered in breaking that historical trend, so instead of having the traditional encodings, we wanted to explore to see if there was a better way.

Q. Now, what were the benefits of sort of the new scheme that's described on page 12?

A. Well, page 12, because of its -- you know, the historical nature of it, you know, was very restrictive, and -- I'm sorry, page 13, correct myself, due to the historical nature of the way we used the bits, it was very restrictive, and so on page 12, we kind of broke history. We said, well, let's see if we broke history, if we could come up with something that could be compelling.

So, you know, when you start with a cleaner sheet of paper, you can, you know, do things that are maybe more compact, maybe save pins, provide additional encodings for future options, for example.

Q. Now, do you know if the command encoding scheme that's being proposed here saved any pins in relation to the command codes on page 13?

A. Yes, it did save one or two pins, if I recall correctly.

Q. So, if you look on page 13, in the -- sort of the paragraph right before the table, it says -- the very last sentence, it says, "This is like DDR today, and requires 2 more pins," and it says that's a consensus proposal, but --

A. Two pins.

Q. -- when that says it was a consensus proposal, was that referring to the proposal on page 12?

A. Yes.

Q. Now, which proposal ended up being used in DDR2?

A. The one on page 13.

Q. Okay. The one on page 13, the one that used two additional pins?

A. Yes.

Q. And it had a less efficient -- well, why was the -- why was the page -- why was the scheme described on page 13 chosen above the scheme that was described on page 12?

A. Primarily for backwards compatibility. In order to support -- you know, if we went with the scheme on page 12, it would have forced the designers to put into the command path, which is the critical path in getting a command off the controller to the DRAM, additional circuitry to deal with both the old scheme, the DDR1 scheme, and then the new scheme if you wanted to design a compatible controller, and instead of creating this natural critical path, this timing path, the committee decided that backwards compatibility was far more important than any potential pin savings.

Q. Okay.

I'm trying to determine whether CX-397 is admitted or not.

MR. STONE: It is.

BY MR. DAVIS:

Q. Now, I'd like you to look at CX-426, please.

A. (Document review.)

Q. Okay, could you describe what 426 -- first of all, have you seen 426 before?

A. Yes, I did.

Q. And what is 426?

A. This seems like a set of emails and meeting notes on it looks like a task group or a sub-task group in this case of the Future DRAM Task Group to look at clocking schemes for DDR2.

Q. And when was this email sent?

A. November 29th, 2000.

Q. And -- I'm sorry?

A. That was the top email.

Q. And who was that from?

A. That was from Terry Lee.

Q. And who was he sending that to?

A. The sub-task group.

Q. And were you one of the members of that sub-task group?

A. Yes.
Q. Now, were you involved in this conference call?
A. Yes, I was.
Q. And what was the reason for the conference call?
A. It was to discuss DDR2 clocking schemes.
Q. Was one of the topics relating to whether there was going to be a single data rate or double data rate clock being used for DDR2?
A. That was one of the alternatives discussed.
Q. And why was that being discussed?
A. During one of the task group meetings, the Future DRAM Task Group meetings, a presentation was made on clocking alternatives, and you know, it was decided that, you know, we needed to form a sub-task group to kind of open the door to all alternatives if we were going to take a look at any alternative at that point in time, and so that's why we formed this group.
Q. Okay. Now, on page 2 of CX-426, it looks like the first entry below that dotted line, where it says, "Survey on elimination of strobes," and then it mentions ATI, was that where you were working at that time?
A. Yes.
Q. Does this refer to you?

A. Yes.

Q. Okay. It says after that, "Likes to keep strobe for compatibility between DDR I and DDR II. Acknowledges unidirectional idea and likes pin count saving by removing strobes. Prefers single data rate. Prefers common C/A and write clock."

So, first of all, what does that first sentence mean where it says, "Likes to keep strobe for compatibility between DDR I and DDR2 II"?

A. Basically I wanted to keep the same clocking scheme that DDR1 had for compatibility reasons.

Q. Okay, but below that you say in the first bullet, "Prefers Single data rate."

What was that referring to?

A. Well, this -- you know, it was kind of the sub-bullet under the "acknowledges" part. Single data rate -- if we were going to make a change, I thought going with a single data rate, you know, a higher speed single data rate clock was the way to go.

Q. Okay. Now, do you remember what happened to this proposal, the idea of going to a single data rate?

A. It -- after, you know, some discussion, I mean, this conference call, it was the majority of discussion, you know, the committee decided to not consider the alternative -- you know, to keep the DDR

style of clocking for the compatibility reasons.

Q. I'm sorry, for the which reasons?

A. For backwards compatibility.

Q. So, it was your -- I'm sorry?

A. To state that clearly, the committee decided that DDR2 would keep the DDR1 style of clocking for backwards compatibility.

Q. Okay. So, in order for the DDR2 standard to be backward compatible with DDR1, you wanted to maintain the dual edge clocking aspect of the standard?

A. Yeah, the same DDR1 style of clocking, correct.

Q. Dual edge strobe?

A. Dual edge strobe, correct.

Q. Okay. Now, you testified that you joined ATI in 2000. Is that right?

A. Yes.

(The in camera testimony continued in Volume 25, Part 2, Pages 4749 through 4782, then resumed as follows.)

JUDGE McGUIRE: Thank you, Mr. Davis. You may proceed.

MR. DAVIS: Thank you, Your Honor.

BY MR. DAVIS:

Q. Could you describe what this presentation was about?

A. Well, we -- we at Silicon Graphics, we looked through the existing DDR proposals that were being presented. We created a presentation to give at JEDEC to give some other options, some ideas that we thought may be better than the existing proposals.

Q. This was the presentation you were talking about earlier regarding -- with Mr. Deneroff?

A. Yes.

Q. Okay. What was the focus of these -- of this presentation?

A. Well, we focused on clocking, how the data move relative to strobes and clocks was occurring between the controllers and the DRAM.

Q. Was part of the presentation in relation to having the DLL on the DRAM?

A. Part of it was concerning the DLL, yes.

Q. And what was that -- what was that part about?

A. Well, we were concerned with the DLL -- the ability of the DRAM designers to put the DLL onto the DRAM and have it function as predicted. So, we really wanted to ensure that if the DLL was there, that it could be turned off for at least the initial DDR, that we could operate our system with the DLL disabled.

Q. Now, actually, what was the purpose of having the DLL on the DDR SDRAM?

A. The purpose is that it aligns the -- loosely aligns the read data strobes, the output strobes, to the dual edge clock, and by realigning that, it gives you a better idea of where the data is on the data bus. So, earlier I described this concept of turning around the data bus. Well, that can aid in minimizing that turnaround time.

In addition, the strobe architecture had this concept called preamble pulse, and by loosely aligning the strobe to the input clock, it made it easier to find this preamble pulse, so then the controller knew when to look for the strobe edges that were going to be tightly coupled to the data.

Q. Now, did you have an understanding at the time of whether the DLL was necessary?

A. Well, for the data rates that we were looking at initially with DDR, we at Silicon Graphics determined that the system would work fine with the current strobe methodology and the defined preamble pulse -- preamble size at speeds of 200 megahertz data rates, 200 mbps.

Q. Okay. So, did you think at the time that if the DRAM was going to go faster than 200 megahertz, that a DLL was going to be required?

A. You know, we felt that the 266 mbps rate, the

DLL might be needed. It was more probable than at the 200 mbps rate. At above that, we started to believe, with the architectural definition of the preamble pulse, you know, as it was, that, you know, you would probably, you know, strongly consider having the DLL there.

Q. Now, you said with the architectural definition as it was. What were you referring to?

A. Well, I mean, the preamble pulse was approximately one DRAM cycle as defined at that point by JEDEC. Now, obviously you can design systems without the DLL being there at all, but with the DLL there, it led to certain conclusions, certain architectural decisions.

If we didn't want to have the DLL there at all, we could easily come up with methods that -- a different set of architectural solutions to solve that. This was just, you know, we were coming in not at the beginning of the discussions but kind of two-thirds of the way through the discussions. It's how much disruption on the standards-making process did we want to cause?

We wanted to minimize that disruption so that we would have the devices to meet our schedule or our systems. So, we didn't want to go and cause everything

to start over. We really wanted to cause people to pause and think. You can kind of tell by that first set of words on the slide, you know, they're pretty strong words, "Existing DDR proposals do not work." Well, the goal there was to get people to pause and think, and I believe we were successful in that.

A. Ah, for all intents and purposes, yes. It's not as simple as a yes or no question, because standards -- they're living. We are constantly updating them to include faster end points, taking feedback from real world experiences to clarify the specification, but you know, for all intents and purposes, the specification is finished.

Q. Okay. Now, did you propose to change the DDR2 standard to remove the DLL or the DRAM standard?

A. No.

Q. Why not?

A. Well, it was already in the DDR1 JEDEC standard. Backwards compatibility was extremely important to our products, and we would have then forced ourselves to make a fundamental change in the clocking methodology, which is the most important -- it's the thing we focus on first, because it is the most important feature of any system.

So, an incompatibility at the clock level, the architectural clocking level, is a huge incompatibility. It's not a minor incompatibility.

Q. Now -- and what would have been the effect on the industry had you changed that?

A. Well, it would have forced us to -- you know, in order to keep compatibility, we would have had to

have created circuits to talk both ways. This may have, you know, may have caused increases in die areas, possibly increases in pin count, would have complicated things in an area where you're striving towards simplicity.

I mean, in clocking, you know, elegant simplicity is elegant

designs around them so we would meet up in time to have a product that we could both ship.

Q. Did you have an understanding at the time of the effect a change to the DDR2 standard to remove the DLL, what effect that would have on these companies that were designing to the standard?

A. I mean, it was a -- you know, basically the earliest adopters would have had to go back to the design stage. Clocking is not something they can change in a trivial manner. You know, I'm sure it would have ranged from medium to large impacts. You know, depending on the size of the company, you know, the impact could have, you know, been much, much greater.

Small companies would have been impacted far more than large companies. Resources are just less in small companies. So, I mean, it's not something you want to go change at that point in time. You really need a gun to your head.

Q. Did you propose to change the DDR2 standard in order to remove dual edge clocking from the standard?

A. No.

Q. And why not?

A. Forward and backward compatibility reasons. As I said, clocking is extremely important. We always

strive to keep the clock system simple. You know, we would only make a change to clocking when we had to, when the physics of the situation, you know, literally the physics, you know, the physics we live in drive us to make that change. We don't make that change for trivial reasons.

Q. Now, would changing the DDR2 standard to remove dual edge clocking have had any effect on those companies that were designing to the DDR2 standard in September of 2000?

A. Yes.

Q. And what is that?

A. Well, it would have caused them to go back to a redesign, both from the DRAM side and the user side, you know, the support component side would have probably been affected, and it would have -- you know, it -- again, you're shaking the foundations of the -- of the standard and not changing a minor piece of the standard. It's one of the foundations.

Q. And you said support components, what were you referring to?

A. Like, for example, a POLL on a register, you know, they're designed to produce, you know, certain frequency ranges of clocks with certain attributes. Those attributes most likely would have had to have

changed.

Q. Okay. Would that have affected the companies manufacturing those components?

A. Of course.

MR. DAVIS: Thank you, Your Honor. I don't have any more questions.

JUDGE McGUIRE: Okay, thank you very much. I think this is a pretty good time to take a break for lunch. It's almost 12:30. What if we convene back at 1:45?

MR. STONE: That's fine, Your Honor.

JUDGE McGUIRE: At that time, we will begin the cross examination. Hearing in recess.

(Whereupon, at 12:27 p.m., a lunch recess was taken.)

AFTERNOON SESSION

(1:45 p.m.)

JUDGE McGUIRE: This hearing is now in order.

At this time, you may begin your cross examination, Mr. Stone.

MR. STONE: Mr. Macri, would you like to take the stand?

CROSS EXAMINATION

BY MR. STONE:

Q. Good afternoon, Mr. Macri.

A. Hello.

Q. Who do you work for?

A. ATI.

Q. And when you say ATI, is there a corporate name, a correct, proper name?

A. Yeah, AT Cy ss 7 the 16 S And, prop

A. No.
Q. You have documents at your office in Santa Clara that relate to the things you've testified to today, don't you?
A. Can you be more specific? I have a subpoena of some sort?
Q. Well, you were shown some emails today that you were copied on.
A. Oh, yes, of course.
Q. You have those emails in Santa Clara?
A. Yes.
Q. And you generated documents in connection with your work on the Future DRAM Task Group, did you not?
A. Correct.
Q. And those documents would be at your office in Santa Clara?
A. Yes.
Q. And mailings that you would receive from the JEDEC office would be in your files in Santa Clara?
A. Yes, in my computer actually.
Q. You told us earlier today about a meeting you attended in September of 2000. Do you recall that?
A. Yes.
Q. And then after that meeting, you told us you thought about alternative ways to do things. Do you

recall that?

A. Yes.

Q. Did you write down --

MS. KORDZIEL: I'm sorry, if you are going to go into that meeting and the discussions, could we have the Court be in camera again?

MR. STONE: Your Honor, all I was asking is what he did after the meeting. I thought what he did afterwards was not subject to the in camera order.

JUDGE McGUIRE: You are not going to get into the merits of the discussion, right?

MR. STONE: Not at this time.

MS. KORDZIEL: The activities were still part of the --

JUDGE McGUIRE: You know, I can't hear you, ma'am, if you would please step forward.

MS. KORDZIEL: What he did afterwards, the activities, that was actually all part of the in camera portion of his testimony from this morning.

MR. STONE: That's fine. I don't want to go into in camera, Your Honor, and in fact, if that's the position, that what he did is -- should not be considered public, I'll just defer that and come back to it.

JUDGE McGUIRE: Okay, very good.

Ma'am, what's your name again for the record?

MS. KORDZIEL: Linda Kordziel, K O R D Z I E L.

JUDGE McGUIRE: Okay, thank you.

MS. KORDZIEL: I also wanted to raise one thing, because I wasn't sure, but to the extent that -- the documents 1383 and 1384, can I have those deemed confidential? I'm not sure if they are marked that or not.

JUDGE McGUIRE: It would have been also easier if you would have brought that up when they were introduced.

MS. KORDZIEL: I didn't realize that -- I didn't have the documents.

JUDGE McGUIRE: Have these already been introduced in the record previously or were they offered and accepted this morning?

MR. STONE: Those documents were produced by Rambus, but -- they were produced by Rambus, not by your client.

MS. KORDZIEL: Right.

MR. STONE: So, they are Rambus' documents, but they are already subject to the in camera order.

JUDGE McGUIRE: All right, if they are already treated in camera, then they are already protected.

MS. KORDZIEL: I just wasn't sure.

that you just asked the question, yes.

Q. Okay. And are each of the products along this line, then, backward compatible, as you use the phrase, with the term that just -- with the product that just precedes it to the left?

A. Yes, it's the product that precedes it to the left you could call to be in some ways the basis for the following generation.

Q. Okay. And your testimony today is that DDR2 is backward compatible with DDR, correct?

A. Yes.

Q. Now, am I correct that DDR2 requires the use of a different motherboard than DDR?

A. Ah, well, I wouldn't say that it's impossible to design a motherboard that would be compatible with both DDR2 and DDR1.

Q. No, sir.

A. Okay, then I don't understand your question.

Q. There are motherboards that were designed for use with DDR, correct?

A. Yes.

Q. Those motherboards cannot be used with DDR2, can they?

A. Not if they were designed before DDR2 was understood.

Q. And are there any motherboards in the market today that are designed for both DDR and DDR2 so far as you know?

A. I am not aware of any motherboards where -- let me make sure I understand your definition of "motherboard." Is that the -- would that be the main board that would form the basis of a personal computer?

Q. Yes.

A. Okay, I do not know of any DDR2 motherboards available today.

Q. And the modules that were designed for use with DDR won't work with DDR2, will they?

A. The modules that were designed before DDR2 was known will not work with DDR2.

Q. And are there any modules in the market today that will work with both DDR and DDR2?

A. As I already stated, I do not know of any

different?

A. By "receptacle," do you mean a socket?

Q. Yes.

A. I do not know of any situation where we are plugging DDR1 DRAMs directly into a socket, nor do I know of a situation where we are plugging DDR2 DRAMs directly into a socket.

Q. Instead, you're connecting them in modules in your experience?

A. Generally, they are soldered down to some type of a module.

Q. Okay. And is it also correct that the controller designed to work with DDR will not work with DDR2?

A. Are you saying that controllers that were

15 7 Q. Yes.

Q. Well, what I mean is you'd have to design a controller that is different than the controller that was designed to work with DDR1 if you wanted it to work with DDR2. Isn't that a true statement?

A. I would start with my DDR1 controller and modify it to work with DDR2, and then I would have a controller that would work with both.

Q. And that would be different than what you started with, would it not?

A. If I had to add -- if I had to add the design elements to support both DRAMs, it would have to be different, yes.

Q. Yes. And in order to make it work with DDR2, you would have to add design elements, would you not?

A. Yes.

Q. Okay. When did you prepare Exhibit 2234, Mr. Macri?

A. Let's see, it was done the night before I gave the talk.

Q. And when was that?

A. Let's see, this was -- I know it was during the Platform '99 Conference. I don't recall the exact date, but that is --

JUDGE McGUIRE: Can you help him out there, Mr. Stone?

MR. STONE: I can't, Your Honor.

JUDGE McGUIRE: You don't have it in front of you?

MR. STONE: I have the document in front of me. It does not have a date on it.

JUDGE McGUIRE: Very good.

THE WITNESS: Publicly available.

BY MR. STONE:

Q. Okay, sometime in '99?

A. Sometime in '99.

Q. Turn to page 2, if you would, of 2234.

Was it your intention to invite non-JEDEC members to participate in the JEDEC Future DRAM Task Group?

A. Yes, I believe I've already testified to that.

Q. And did you, in fact, do that?

A. Yes, I have.

Q. And did you explain to them that they were or were not subject to any JEDEC rules as a result of participating?

A. At the beginning of every task group meeting, we always say that the full JEDEC rules are in effect, and during discussions with these companies, I said, of course, you would have to abide by the JEDEC rules.

Q. And did you explain to them what they were?

A. In generalities, yes. I don't recall the exact words I used or -- or the details of those conversations.

Q. Did you hand out copies of the rules to them?

A. I did not hand out written copies of the rules to them.

Q. Did you give them a presentation on the JEDEC patent policy?

A. That's always -- always disclosed at the beginning of every JEDEC meeting by standard practice. We state that the -- you know, what -- that there is a patent policy, there's information given out, and we ask if there's any questions generally, you know, at least in all the meetings I attend.

Q. And that was done at the Future DRAM Task Group meetings that you chaired?

A. Yes, to the best of my knowledge.

Q. Now, none of the minutes that we saw today of meetings of the Future DRAM Task Group make any reference to that, do they?

A. I did not read the minutes in absolute detail, so I would have to go back and review all those minutes.

Q. Okay.

A. But I believe you -- can you just tell me?

Q. Can I tell you what, sir?
A. If they are in those minutes.
Q. I didn't see them.
A. Okay.
Q. Let me ask you about page 2 of Exhibit 2234, if I can. Down at the bottom it says, "Goals: Open Standard - It's Free."
Do you see that?
A. Yes.
Q. Was it your goal to make sure that no royalties would be owed to any company as a result of the design that came out of your Future DRAM Task Group?
A. As a goal, I wanted it to be an open standard. As a goal, I wanted it to be free. Achieving goals can only be known after the fact, and I still do not believe if that goal -- if we know if we have achieved that goal or not.
Q. My question just, Mr. Macri, is very simple. Was it your goal to ensure that no royalties would be owed on whatever design came out of the Future DRAM Task Group?
A. My goal was that it would be an open standard and it would be free. I do not know if we achieved that goal.
Q. And again, let's see if we can just try to

focus. I just want you to confirm or not whatever the case is, that your goal -- not what you achieved, but your goal -- was to ensure that no royalties would be owed with respect to a product manufactured in accordance with the design that came out of the Future DRAM Task Group.

A. I'd say it was a general goal.

Q. Okay. And in order to do that, one of the things you wanted to do was make sure that you avoided including in the standard anything that was the subject of patents, correct?

A. As part of the goal, did we -- I just don't know if we have been able to achieve that.

Q. And again, sir, I'm not asking what you

8 Q.

Q. Well, let me take you away from the words for a moment and just ask you about what was in your mind in 1998 and 1999 as you started chairing the Future DRAM Task Group. Can we put yourself back in that same time?

A. Yes.

Q. Were you trying to develop a design that would not infringe upon the patents of companies that might feel that they were entitled to royalties?

A. That wasn't in my mind. My mind was to develop a standard that would be widely adopted throughout the world, and in my mind, that meant that this needed to be an open standard, and based on my knowledge, the previous open standards were free, and so I was just carrying on with the tradition of the open standard.

I didn't put thought into patents or what was happening in the world surrounding patents or the issues of third-party companies with patents.

Q. Well, when was the first Future DRAM Task Group meeting where patents were discussed?

A. You mean where someone brought up a patent issue?

Q. No, where any patents were discussed at the meeting.

A. I just don't recall that date. I don't know --

I mean, I know there were -- you know, as in any JEDEC meeting, sometimes there are people -- you know, people that are required to disclose their patents and their pending patents and, you know, and any knowledge of anybody else's patents. So, I am sure during the course of the Future DRAM Task Group, those situations came up, and people did make those statements.

Q. Well, patents of third parties were discussed at the Future DRAM Task Group meetings, were they not?

A. It was -- there have been -- I don't recall if it was third parties or if it was the companies that owned the patents themselves. There could have been both. I just don't remember.

Q. Well, more specifically, weren't Rambus patents discussed at meetings of the Future DRAM Task Group?

A. The only time Rambus was discussed was at the initial meetings where we were trying to identify the basic -- you know, the basis that we should start with for the DDR2 standard. I don't recall discussions on Rambus intellectual property at the meetings.

Q. Don't you recall discussions at meetings of

to understand that issue and examine alternatives.

Q. And wasn't it true that among the IP problems that were brought up at these meetings were discussions of Rambus patents?

A. I don't recall direct discussions on the Rambus patents.

Q. When did you, Mr. Macri -,a,a,a,a,a,a,a,a,a,a,ae8 A.

Rambus patent, but more in a conversation of what was going on in the public space. I mean, it was -- you know, in the engineering community, it was a -- you know, the lawsuits surrounding Rambus and the litigation and stuff was, you know, discussed, but not in the context of, you know, DDR2 specifically.

Q. Before there was any litigation, before you knew of the litigation, did DRAM manufacturers come to you and say, you know, we're aware of Rambus patents, and we're looking at whether we should modify our designs to avoid any possible infringement of those patents?

A. I don't recall direct conversations with -- I'm just trying to think. I can't remember if there were conversations before or after that date, if it happened before or after the litigation. I just don't remember.

Q. You did learn at some point that among the claims that Rambus had were claims that might cover programmable CAS latency, programmable burst length, the use of dual edge clocking and the use of DLL on chip, correct?

A. I did become aware of those, yes.

Q. Okay.

A. Are you -- did you ask in this particular time frame or just ever?

Q. I did not ask you a particular time.

A. At some point, I did become aware of those.

Q. And you first became aware of the Rambus design in the early nineties, did you not?

A. Yes, when I was at Digital Equipment Corporation.

Q. You had a meeting, am I not correct, with Dr.

Q. And in the time frame when you had your meeting with Dr. Farmwald and Mr. Hampel, they left you with some documents about Rambus and its technology, didn't they?

A. They may have, yes. I just don't remember.

Q. And didn't you know at that time that one of the features of the Rambus design was the use of dual edge clock?

A. Oh, I wasn't interested in -- I don't recall being interested in that particular feature at all. I was interested in the higher level architecture of the DRAM, not the low-level architecture of the DRAM.

Q. And not to be derogatory with the use of "high" and "low" in terms of levels, but let me ask you one more question which may be on a low level.

Didn't you also become aware in the early nineties that Rambus' technology included the use of a DLL?

A. Again, that would be a low-level issue. I was concerned with more the serial packet nature. That's what I was more interested -- that's what I was interested in. How the DRAM was clocked in the early nineties was what I would call a nit, a very low-level thing that would be interesting if we wanted to go down that path, but at the beginning, we always work at a

high-level architectural phase, which doesn't really care about any of those issues. It's more the performance modeling phase.

So, we're -- we're looking at the big picture, not at, you know, really the nits of the design. I mean, that's almost irrelevant at that stage.

Q. Didn't you ultimately become involved in the -- helping the design of the alpha servers at DEC?

A. No, I wasn't at DEC at the time they did the alpha servers. The -- well, I guess the alpha microprocessors I did, but not -- you know, in these -- the alpha servers I guess indirectly, by working on the microprocessors, I did participate in the alpha servers.

Q. And did you have any involvement while you were at DEC in introducing RDRAM products into your design?

A. No, the only thing I did was do some initial research in how to emulate a different DRAM using a combination of RDRAM and some on-chip features. That was only done at the research stage, and that work went nowhere. All of the use of RDRAM at DEC, I believe, took place after I left.

Q. And then when you arrived at Silicon Graphics, did you find that they were working on designs that utilized RDRAM?

A. Not in the part of the company that I worked in.

Q. Did you --

A. I worked --

Q. -- did you know that they were in other parts of the company?

A. Yes, but I wasn't aware of the details of what they were doing.

Q. And then when you -- when you went to ArtX, were you involved with any RDRAM products there?

A. Ah, we -- we had no RDRAM products.

Q. Did you work at all on the Nintendo product when you were at SGI?

A. No.

Q. Earlier, when there was some testimony about Nintendo, that's a product that you were not involved with at SGI?

A. I was not involved with the Nintendo product at SGI.

Q. The -- look, if you would, still at 2234, and go, if you would, to page 10. In 1999 when you prepared Exhibit RX-2234 for the presentation you gave at the Platform Conference, did you present at that time a list of features that you were contemplating would be in DDR2 that would have enhanced the cost or

improve the cost of the product?

A. Yes.

Q. Was one of those improvements the elimination of a burst interrupt command?

A. Yes.

Q. And was that something you were recommending in 1999?

A. I myself, yes, did recommend that we remove that command.

Q. Okay. And in 1999, was it one of the contemplated cost improvements that you would use a fixed burst length of four?

A. It wasn't due to costing that we did that. There was an overriding goal of DDR2 to be simple. A DRAM specification is quite thick, and as an engineer, I didn't like that, and so the goal was to remove all unneeded features unless someone could justify them.

And at the time, this is where we -- you know, we thought we could remove this feature because no one could come up with a compelling justification.

Q. And if you removed the programmable burst length, was it expected that that would reduce testing costs?

A. Whenever you make something simpler, you remove something to test, you always remove some costs from

the test perspective.

Q. So, the answer to my question is yes?

A. But it's because of simpler is simpler. I can't put it any simpler than that.

100 percent sure that would be true of every design in our product line, but I would say for the most part, that is true.

Q. Let me ask you, you have also right on the right-hand side, you have your demonstrative, DX-46, if we could bring that up and go to the fourth page of it, if you wouldn't mind.

Between June of 2001 and September of 2001, there were certain changes made in the specifications for DDR2, right?

A. Yes.

Q. That's why we see the upper sloping line?

A. Correct.

Q. And did one of those changes relate to burst length?

A. Yes.

Q. What was the change that related to burst length that occurred during the time period June through September 2001?

A. The committee had received a presentation by both Intel and AMD that showed there were performance gains for adding back burst eight and also showing performance gains by adding a very simple burst interrupt so that you could interrupt a burst eight and turn it into a burst four. Those presentations were

justified on performance, but they were also justified on the fact that they would be nondisruptive changes to the design.

Q. But it hadn't been disruptive to have in the design a fixed burst length up until that point, had it?

A. Our goal was simplicity, and since previously no one was able to come up with a performance justification, that's why we simplified it.

Q. Okay, and my question asked you about disruptive. My question was, was it disruptive to have had a fixed burst length of four in the specifications prior to September of 2001?

A. I guess I -- I don't understand why -- how you -- what you mean by "disruptive." It was the consensus of the group, so I guess by definition -- you know, I don't know. I just --

JUDGE McGUIRE: Well, restate, Mr. Stone, so he understands your question.

THE WITNESS: I don't understand.

BY MR. STONE:

Q. Let me ask it this way, Mr. Macri: You told us a little earlier that certain changes would be disruptive if you had to make them.

A. Yes.

Q. Do you remember that?

It wasn't thought to be disruptive to designing products that there be a fixed burst length of four, was it?

A. Well, the burst length of four issue was decided early on, and when you do stuff early on, there's never a disruption. When the change was made between June and September of 2001, it was critical at that point that the addition of this functionality not be disruptive, because that was later in time, but burst -- going to the burst four only was decided very early on, so there -- just by definition, there could be no disruption, because it was done early in time before any designs were started.

Q. So, if in April of 1998 a decision was made to have burst length four -- which it was made to go with it at that time, right?

A. I'm not sure. It was early in that time frame, sometime after that I imagine.

Q. Okay, so -- I didn't mean to interrupt you. I apologize.

So, if an early decision was made to go with burst length four and you had stayed with a fixed burst length throughout, that would not have been disruptive?

A. Yeah, with no change, by definition, how can

group obviously thought keeping the same general clocking scheme, where clocking scheme means using strobes to move data and having the strobes be loosely coupled to clock, changing that would have been disruptive.

Q. And it was considered by you to have been disruptive to consider removing the DLL from the chip, even if you had considered that early in the DDR2 process?

A. Because it would have affected that fundamental clocking scheme.

Q. Yes.

A. That's my belief. I can't speak for other people's belief.

Q. Okay. And when you decided as a group to introduce programmable burst length sometime between June and September of 2001, you knew that including programmable burst length might result in infringing Rambus patents, did you not?

A. We knew -- we knew that it was in DDR1 --

Q. I'm sorry, you knew it was --

A. We knew it was in the DDR1 standard, and it was unclear to me if that would infringe on a Rambus patent.

Q. Well, you knew that Rambus thought it would

infringe.

A. Yes, but that's different than infringing on a Rambus patent.

Q. Yes. You knew that Rambus thought it would infringe, correct?

A. Rambus -- I -- you know, I think they would have thought it would have infringed. I don't know if it would have infringed their patent. That's different.

Q. And did you make any effort to find out?

A. No. I did not make any personal effort to, you know, read through the piles of documents or whatever to determine on the DDR2 standard if this decision process would -- I'm not in a position to make that call. I don't -- I'm an engineer. That's a legal issue.

JUDGE McGUIRE: All right, Ms. Kordziel?

NEW SPEAKER: I just want to object to -- he's a fact witness, to the extent this his questions are calling for a legal conclusion, and I just wanted to object and caution the witness not to reveal any attorney-client privilege.

JUDGE McGUIRE: So noted.

Proceed.

BY MR. STONE:

Q. Mr. Macri, did you -- after a proposal was made to introduce programmable burst length into the DDR2 standard, did you make any effort before you went down that path to determine whether or not doing so might result in the infringement of a Rambus patent?

A. I am not in a position to make that decision.

Q. And sir, let me just --

A. I don't understand how I could go --

Q. Mr. Macri, let me interrupt you. I'm not asking you what you were in a position to do. I'm just asking you whether you did something or didn't do something. I'm trying to make it as simple as I can, if that helps.

A. Well, it's -- you're asking me --

JUDGE McGUIRE: All right, he hasn't asked you a question now, Mr. Macri. Let him just take a second, and Mr. Stone, you can state your next question.

BY MR. STONE:

Q. Let me try to put it as simply as I can, Mr. Macri, because I don't want to get into areas that concern your lawyer.

After a proposal was made to introduce programmable burst length to the Future DRAM Task Group, did you, as the chair of that task group, do

change might result in the infringement of Rambus patents?

A. I just don't know -- I don't know how to answer that question, because I don't have -- at the time, I didn't have the ability to determine these things, and I never waste my time doing something I don't have the ability to determine. I'm a busy person. I apply my time very conservatively, and that would have been -- other people are in a position to make that call, not myself.

Q. Did you ask anyone to report to the Future DRAM Task Group on that issue?

A. I do not recall assigning anyone a task to do that.

Q. Did anyone talk at the Future DRAM Task Group committee about whether introducing programmable burst length might result in the infringement of Rambus patents?

A. I don't recall that.

Q. Okay. But you knew at the time that Rambus contended that programmable burst length was subject to their patents and that that feature would infringe, correct?

A. At that time, I did have knowledge that Rambus may have believed that statement. Whether that

statement is true was not for me to determine. They could have believed anything they wanted about anything in the universe.

Q. You knew that was an issue in the litigation that was then pending.

A. Well, I wasn't aware of pending litigation, but in America, you can sue over anything. I don't believe every lawsuit has -- you know, a lawsuit does not mean the reason for the lawsuit has merit. I believe there has to be a judgment.

Q. Did you say I wasn't aware of any pending litigation or I was?

A. No, I said I was aware. All I said was the fact of a lawsuit does not mean it's true.

Q. Let me ask you about a couple of documents you were shown earlier today. If you would, look at CX-370.

A. 378 or --

Q. 3-7-0. It's the "Existing DDR proposals do not work" chart.

A. Okay, I've got it.

Q. Do you have that?

A. Yes.

Q. When was it that you made this presentation?

A. I believe Marty and I did it a couple of days

DDR1 proposal?

A. Yes, this was the only DDR proposal being considered.

Q. And what changes were made in the DDR1 proposal after your presentation that resulted from issues you raised in your presentation?

A. Let me review this for a moment.

Q. Certainly.

A. I need to review this presentation to remember what we... (Document review.)

Now, this presentation, I believe that nothing was adopted.

Q. Oh, so you came in, you slapped them in the face, you got noticed, you said there's these things wrong with your proposal, and they rejected everything you said?

A. Ah, at the -- through discussion, essentially -- I believe they already had planned for a DLL disable mode at the time. We wanted to ensure that that was there. We didn't know it was there at the time. I don't believe this proposal had anything to do with it ending up in the final specification.

As I said, you know, you always believe you're right as an engineer, but sometimes you're wrong. I think, you know, we had a lot of good ideas here, but

they were too disruptive to the standard, where it was, and they weren't adopted, just like many of the proposals I have made over the years.

A. I didn't write this information. I reviewed it and forwarded it to the group.

Q. Do you know who wrote it?

A. Let me double-check. I think it might actually be -- I believe it was Jim Rogers and possibly Ken McGhee also had something to do with this, but I just reviewed it.

Q. Okay, let me focus you to the bottom part of page 8, if we can, where it says, "Paul Coteus," from there to the end of the page.

A. Yes.

Q. Is what follows after the name Paul Coteus a reference to -- the next two lines to what he said? Is that how you understand this document?

A. That would make sense, yes.

Q. And was there a discussion on the possible use of verniers at this particular meeting to which Exhibit-379A relates?

A. Yes, this would be verniers on the memory controller, not on the DRAM.

Q. And then did you at the same meeting where it says "Joe Macri," it says, "Do we need only one DRAM device type," is that a reference to something you said at the meeting?

A. I don't recall saying it, but it could be

something I said, yes.

Q. Then turn, if you would, to just the last page.

A. That would be page 10?

Q. That would be page 10.

There's a reference three lines down that says, "Joe Macri: Should we force the issue with SDF? Should we merge the SDF into this task group? Everybody said yes."

Do you see that?

A. Yes.

Q. And is SDF a reference to the Server Development Forum?

A. Yes, I believe so.

Q. Okay. Let me ask you, if you would, to look at CX-132, which is the minutes of the Future DRAM Task Group dated July 23rd, 1998 that we looked at earlier.

A. Okay.

Is that right?

A. Correct.

Q. And were you still at ArtX at the time?

A. Yes.

Q. And on these particular minutes, you'll notice it starts off with an introduction, and then it goes to guest speaker, and you'll see there's no reference to any discussion of any patent policy at this meeting.

Do you see that?

A. Yes, I don't see the meeting -- the reference.

Q. And then if you would look at the sign-in sheet for this meeting, which begins on page 6 and continues on through page 8, was this the normal way a sign-in sheet was done at your Future DRAM Task Group meetings? That is, a piece of paper would be passed around and people would sign in on it?

A. Yes.

Q. Okay. There wasn't any formalized sign-in sheet that had certain language on it where you signed in?

A. Ah, I think it was -- I'm just not sure. I mean, I don't know if this was a notebook sheet or if

Q. As you look at this sign-in sheet, it appears, does it not, not to have any preprinted language on it?

A. All I see is name --

JUDGE McGUIRE: The Court takes notice; it speaks for itself.

MR. STONE: Thank you, Your Honor.

BY MR. STONE:

Q. Let me ask you now, if you would, to look at CX-426. This was the minutes of a conference call you had to discuss certain clock timing issues with a subgroup of the Future DRAM Task Group, correct?

A. Yes.

Q. At the conclusion of this call, was there a consensus that you would not go with single data rate?

A. I'm not sure if it was at the conclusion of this call or if it was when we reviewed this during the larger committee meeting. I just don't recall when we made that -- that exact decision.

Q. Look, if you would, at page 4 of this document. Down at the bottom, under Overall Summary, item number 3, doesn't that read, "Single data rate clock is preferred provided that we can make it work"?

A. Yes, and in the context of this, that would mean if we were to go and do large -- you know, this large-scale change.

Q. So, if you made a large change, the preference was for single data rate?

A. That's what that statement says, yes.

Q. And that was the consensus of this call, wasn't it?

A. Ah, I would assume so, yes. There was -- the word "preferred" also used in the previous two -- two statements. I think the real -- the overriding question during these calls were, one, we decided to have a call where we can think out of the box, so, I mean, I think the overriding question was always do we make a wholesale change, but this is free thinking. This was a free thinking call to see if we could come up with something cool, better.

Q. And the summary of the conclusion of the free thinking call was that single data rate clock was preferred?

A. If it -- if it -- I believe so, based on this statement.

Q. Okay. Was it a part of your proposal for the Future DRAM Task Group to borrow features from other designs to use in what you were putting together?

A. Well, we started with the DDR1 SDRAM as the basis for the design, so the fact of -- we, of course, borrowed everything from the DDR1 design.

Q. That was one we did earlier. It was the first document we looked at when I started my examination. It's your presentation to the 1999 Platform Conference.

A. Okay.

Q. Do you need some help in finding it?

A. No, there it is. I've got it.

Q. Look, if you would, at page 3 of RX-2234. In the presentation you gave in 1999 about Future DRAM Task Group, did you say in the last line on page 3 that one of the things the group was going to do was borrow from the design of SRAMs, SLDRAMs and others?

A. Those were examples I used.

Q. Okay. Before the Future DRAM Task Group was formed, there were discussions of removing the DLL from the design of DDR1, correct?

A. Yes, I believe so.

Q. And in fact, at a JEDEC meeting, you suggested to Toshiba that the DLL be removed from the design.

A. I don't recall who I suggested it to, but I know I -- at one point, I had a belief that the DLL should be removed.

Q. Let me ask you to take a look at RX-927.

May I approach, Your Honor?

JUDGE McGUIRE: Yes.

THE WITNESS: Thank you.

BY MR. STONE:

Q. Do you recognize Exhibit RX-927 as a copy of an email that you received on or about May 21st of 1997?

A. Yes, it was sent to me. Just give me a moment to review it so I can see if I can remember it. (Document review.) Okay, I don't remember this exact email, but I do remember -- distinctly remember, you know, questioning the DLL part.

Q. Okay. And is this a -- this document, RX-927, a report of a meeting that you attended with representatives from Toshiba?

A. Yes.

Q. Okay. And on the second page of the document, as I think you just referred to, item number 7 says that Joe Macri suggested that Toshiba remove the DLL or that they at least include a bypass around the DLL.

Do you see that nrreme 7 se DLL.8 12 A.

Q. And what position did he have in 1997?

A. He worked at the HP labs. I'm not sure of his position.

Q. Let me show you, if I can, what's previously been marked as RX-1060.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. STONE:

Q. Mr. Macri, you will notice that Exhibit RX-1060 is an email from Mr. Wiggers to you dated November 18, 1997.

A. Give me a moment to refresh myself. (Document review.) Okay, I've familiarized myself with it.

Q. Do you recognize this to be an email that you received from Mr. Wiggers in November of 1997?

A. Yes.

Q. Okay. And this was in response to an email you had sent to him, correct?

A. Yes, I think I asked him if he wanted to get together to just have a chat. I think it says right here, draw some pictures.

wasn't -- it was maybe Hans and Bill were maybe the two people I was trying to get together.

Q. And in his email back to you, he says -- and this is a discussion, is it not, about DLL?

A. This was a discussion -- the top section or the bottom section?

Q. The top section includes a discussion about DLL?

A. Yes, it does.

Q. And there's a statement in there about, oh, four or five lines down which says, "There is some nervousness about the required accuracy," and that refers to the DLL, does it not?

A. That refers to the DLL in a noisy DRAM environment, yes.

Q. Then it goes on to say, "but in principle, they all know how to do DLL's since they have a license for the 'dark side.'"

Do you see that?

A. Yes.

Q. And you understood that at the time you received it to be a reference to Rambus, the reference to the "dark side," correct?

A. Yeah, I mean, that was my interpretation

Q. Let me go back --
A. Then I don't understand your question.
Q. Let me ask my question again, if I can, so we can try to get a clear record.
You understood Mr. Wiggers to be saying to you that in his view, the DRAM manufacturers had learned how to implement the DLL on a DRAM chip in a noisy environment from Rambus, correct?
A. He didn't state anything about a noisy environment. All he says -- his statement says what it says.
Q. Okay.
A. I do not --
Q. I'll take it at that. That's fine.
A. I don't want to think what he was thinking.
Q. Okay.
JUDGE McGUIRE: Objection sustained.
MR. STONE: Thank you.
BY MR. STONE:
Q. You were shown earlier I believe CX-2315. Do you have that in front of you or is it easier if I just give you another copy?
May I approach, Your Honor?
JUDGE McGUIRE: Yes.
THE WITNESS: It's always easier if you give me

another copy.

BY MR. STONE:

Q. I'll just hand you another copy of it. Here you go.

A. Okay, thank you.

Q. Do you recall looking at this email earlier today?

A. Yes.

Q. You -- when you were asked about this email earlier, you were asked about I think the bottom of the first page of CX-2315. Do you recall that?

A. Yes.

Q. And at the time that you -- let me strike that.

When you wrote this email, the one that's on the bottom of the first page, and you talked about the world transitioning from EDO to SDR, you were talking about a transition in DRAMs from extended data out to the first of the SDRAM devices, correct?

A. Yes.

Q. And that was a change from an asynchronous device to a synchronous device, correct?

A. Pseudo-asynchronous.

Q. Pseudo-asynchronous to synchronous, correct?

A. Yes. Well, pseudo-synchronous to synchronous.

Q. And the -- when you said here what was unclear

was not whether they would move but when they would move, did you mean by that to say that there were no choices other than moving from extended data out to SDRAM?

A. That was the next standard DRAM that was being discussed by JEDEC, so it was -- and I think they would -- I do not know of other DRAM technologies in that time frame that you could consider other than maybe some -- there may have been proprietary stuff.

Q. When was the first time, to your knowledge, that the customers who buy DRAMs had a choice as to which path could be taken?

A. You mean between a new -- two new technologies being introduced at the exact same time?

Q. Or roughly the same time.

A. That may have been the -- the Rambus case, I think.

Q. And what was the choice --

A. At least to my knowledge.

Q. -- what was the choice between?

A. It would be between DDR or Rambus.

Q. And that's what you were talking about earlier in your email where you said, "The world may stay SDR until Rambus is available."

You thought that the world might choose Rambus

over DDR, right?

A. That's what -- the info that I had to date. That info was based on what was in the public press.

Q. Did you have any personal knowledge on that issue one way or the other on your own?

A. Like I stated earlier, that through nondisclosure agreements, we saw road maps from the DRAM vendors, and Rambus was on their road map.

A. Um-hum.

Q. What was that? What was M14?

A. I don't believe it's a group. It was just referring to the 14 memory companies that were in the world at that point, but I don't believe there was actually a group.

Q. Did you know whether or not there were meetings of M14 or M9 or M11?

A. I did not have any knowledge of what the DRAM manufacturers were up to.

Q. They never told you that they got together, did they?

A. I did have knowledge through my work in JEDEC that the Japanese DRAM makers, through their -- I want to say it's EIJ, a trade organization in Japan maybe, EIAJ, something like that, that I believe they would get together to discuss issues, but I'm not -- I was never privy to their discussions.

Q. Okay. If I could show you a document, we may have looked at this earlier, it's RX-1306.

JUDGE McGUIRE: Yes.

MR. STONE: May I just approach, Your Honor?

BY MR. STONE:

Q. Do you recognize RX-1306 as an email set of minutes that you sent out for the Future DRAM Task

Force meeting that occurred in November of 1998?

A. It was actually two sets of minutes.

Q. Two sets of minutes?

A. One from September; one from October.

Q. Okay. So, this is your email sending out those two sets of minutes, is it?

A. Yes.

Q. And if you could turn to page 3, Exhibit RX-1306 --

A. Just to be clear, they are not my minutes. They were reviewed by me.

Q. Okay. So, someone else writes them, you review them, and then you send them out?

A. Yes.

Q. Okay. Turning to page 3 of the minutes that you reviewed and sent out, RX-1306, do the minutes begin about a third of the way down where it says, "September 18, 1998, Future DRAM Task Group"?

A. Yes.

Q. And you'll see the very first heading is, "M9 Presentation. Fujitsu presented for M9."

Do you see that reference?

A. Yes.

Q. And is it -- is this meant to convey to everyone that there was a presentation made on behalf

of the DRAM manufacturers with Fujitsu being the presenter?

A. Yes, that would have been the case.

Q. And does this group include companies from the U.S. as well as other countries?

A. IBM is mentioned.

Q. And Micron?

A. And Micron.

Q. And at this meeting, if you would turn to page 5, the fourth bullet point down where it starts, "Burst interrupt for users, Jon Jasper did a nice survey. Some discussion about variable burst length."

Do you see that reference?

A. Five?

Q. It's the third bullet point down, third and fourth?

A. Yes.

Q. Was there a discussion at this meeting in September of '98 about the possibility of eliminating the variable burst length feature?

A. I just don't remember so many years ago, and it would seem to indicate so since there was a note here. I just don't remember. I'm sorry.

Q. That's okay.

Turn, if you would, to page 8, Mr. Macri.

Under the Action Items -- and we talked about the heading Action Items earlier.

A. Um-hum.

Q. And I think this portion of the minutes is still the September minutes, but I'm not positive.

A. Yes, it looks like the September minutes.

Q. Okay. Under Action Items, item number 3 says, "Removing DLL and impact on turn around time," and I believe you were asked about that earlier.

A. Yes.

Q. Was someone at HP assigned the responsibility to look into the possibility of removing DLL from the design of DDR2?

A. Yes, that's indicated by these minutes.

Q. And who at HP was given that assignment?

A. I don't recall.

Q. Was there someone at IBM who undertook to examine eliminating the variable burst length?

A. Yes, that's indicated here.

Q. And do you know who that was?

A. No, I don't recall.

Q. And was someone from MOSAID given the responsibility to do a survey and see what the preferred burst length would be of the various members of the Future DRAM Task Group?

A. Yes, that would be -- that's indicated here also.

Q. And do you know who that was?

A. I don't recall.

Q. Let me ask you, if you would, to take a look at CX-137, which is minutes of the DRAM Future Task Group.

May I approach, Your Honor?

JUDGE McGUIRE: Yes.

THE WITNESS: Thank you.

BY MR. STONE:

Q. Do you recognize Exhibit CX-137 to be minutes of your task group at a meeting that was held in December of '98 in San Diego?

A. Yes.

Q. And let me direct you to the third page. You'll notice item number -- it's on the right-hand side, item number 10, "HP elimination of DLL presentation." It's on the screen in front of you if that's easier to read, Mr. Macri.

Do you see that there?

A. Yes.

Q. Now, do you have an independent recollection of that presentation?

A. I remember that meeting. I don't remember that exact presentation. Let me see if there's anything

here in the minutes that --

Q. Let me see if I can short-circuit that. I'm not going to ask you about the details then of the --

A. It's just it was so many years ago.

Q. Let me ask you this, if you would turn back to the first page.

A. Yes.

Q. And you will see that there's one individual from Hewlett Packard who appears on the list of attendees.

A. Yes.

Q. A Mr. Johnson, is it?

A. Right, Jon Jasper.

Q. I'm sorry, then there's another one for -- I'm not doing very good. There's another one for Hewlett Packard.

A. I see one Hewlett Packard, but it's Mr. --

Q. One Hewlett Packard and one HP.

A. Jon Jasper from Hewlett Packard. Oh, there are --

Q. Look up a little higher.

A. Oh, I see it, yes, Leith Johnson.

Q. Seeing those two names, does that at all jog your memory as to who it was from HP who took responsibility for this elimination of the DLL issue?

A. I don't believe it was Leith, because he was focused more on -- I'm not -- I can't --

Q. Okay, that's fine.

A. -- confirm. I just -- I would believe -- I would guess it might be Jon, just based on the type of presentation.

Q. Now, look, if you would, at page 4, Mr. Macri, of Exhibit CX-137. There is an item under the heading Verniers.

Do you see that?

A. Yes.

Q. And it says, "IBM made another presentation --" I'm having trouble reading it, if we could pick up under Verniers.

"IBM made another presentation (see Attachment I) that if we don't have data strobes -- that if we have data strobes we don't necessarily need a DLL, but if we have verniers, we don't necessarily need a bi-directional data strobe."

Do you see that?

A. Yes.

Q. Earlier when I asked you about verniers, you indicated that they were in the controller rather than with respect to the DRAM?

A. Yes.

Q. Is this again a discussion related to the controller, or is this a discussion related to use of verniers on the DRAM, if you know?

A. I believe verniers there -- so, this -- can I explain -- not just to pick out a piece of this sentence, but give you some answer on both pieces or just one? Verniers, I believe they were on the controller.

Q. On the controller?

A. Yes.

Q. Okay, hang on to that one more minute.

Turn, if you would, to page 27 of CX-137, and do you see at the bottom half of the page, there's a sign which says -- it's a PLL with a symbol of "not"? Do you see that? That's the heading. So, this was part of a presentation of Why No PLL?

A. Yes.

Q. And then up above is their quote from Einstein that I botched earlier?

A. I may have botched it, too.

Q. Yes, okay. That's all I have on that one.

Let me show you, if I might, CX-140, which is the minutes of another DRAM Future Task Group.

May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. STONE:

Q. Do you recognize these to be the minutes from the meeting that was held in April of 1999 in Tokyo?

A. Give me one moment, please. (Document review.) Yes.

Q. And turn, if you would, to page 3, item number 6. Is this a summary of your presentation at the meeting regarding the basic philosophy of the Future DRAM Task Group?

A. Yes, that's my synopsis of it.

Q. And did you review these minutes before they were sent out?

A. Most probably, yes.

Q. You were shown earlier by Mr.

JUDGE McGUIRE: Davis.

BY MR. STONE:

Q. -- Davis -- I am sorry, that's very embarrassing -- a copy of CX-398, which you may have in front of you, but if I can approach, Your Honor, I'll give you another copy so you don't have to hunt.

JUDGE McGUIRE: Yes.

THE WITNESS: That would be great.

BY MR. STONE:

Q. I know we're getting a stack here.

Do you recall seeing this document earlier?

A. Yes.

Q. And the -- this is an email exchange that started way back on the second page of the document with a note from Mr. Townsend to various people that doesn't seem to include you and references you, though, by name, and then somehow you get picked up on the chain.

Do you see that?

A. I --

Q. If you look at the bottom of page 2, the original message, I think, from Jim Townsend to Bill Gervasi and a number of others, and I didn't -- oh, you're there. Your name's there, Joe Macri. So, this is where it started, right?

A. Um-hum.

Q. Then at some point you made a proposal to Mr. Townsend, did you not, that the participants in the JEDEC Future DRAM Task Group should patent the new ideas that they came up with during the -- the course of their work?

A. I think I stated in JEDEC. I mean, if -- it was more of a question than a proposal, but I thought it might be best if JEDEC owned all the DDR2 patents.

Q. Okay. And your idea was that if JEDEC could own all the DDR2 patents, then they could charge

royalties to non-members if they wanted?

A. I have no idea if that's accurate.

Q. Was there a discussion at your Future DRAM Task Group meetings about certain MOSAID patents on DLL features?

A. Could you --

Q. It's not in that document, Mr. Macri.

A. No, I'm not looking at the document. I just have -- I'm just thinking. I can't recall exactly, but I do recall --

Q. Let me see if I can show you a document that will jog your memory in this respect.

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. STONE:

Q. Let me show you what's been marked as RX-1457. Do you recognize this to be a series of emails involving Mr. Foss at MOSAID and various other persons, including yourself?

A. Yes, I recognize it as an email.

Q. Okay. Do you recall any discussions regarding the subject of MOSAID patents on DLLs in the course of JEDEC meetings or Future DRAM Task Group meetings?

A. Just give me a moment to read through the whole thing. Maybe it will jog my memory.

Q. Please.

A. (Document review.) I don't recall if -- I just don't recall if this took place in a committee or in the Future DRAM Task Group.

Q. Do you recall any discussion in any JEDEC context?

A. Not directly. I'm not picturing it in my mind. I don't recall a discussion in reference to the work that we were doing in the Future DRAM Task Group.

Q. Do you recall anyone ever objecting that Mr. Foss' disclosure of the DLL patents occurred after the patents had issued rather than while they were in the application stage?

A. No, I just don't recall this discussion.

Q. Do you recall anyone ever objecting that the two-tiered license arrangement that Mr. Foss describes in the top paragraph of this email chain was in any way inappropriate?

A. I just don't recall right now.

Q. You'll notice he talked about a difference depending on whether you license somebody broadly or whether you license them just on the DLL patents.

Do you see that?

A. Yeah, he is inferring that he taught people DLL design.

Q. I'm sorry?

A. He is inferring that he taught people DLL stuff, but I don't recall this conversation.

Q. Well, if you look up at this Re: line, you will see the Re: line is, "The MOSAID DLL patents."

MR. DAVIS: Objection, Your Honor. He has already stated a couple of times that he doesn't recall.

JUDGE McGUIRE: Yes, he has. Sustained.

BY MR. STONE:

Q. Let me show you a document and ask if you can confirm that this is Mr. Townsend's response to Mr. Foss' email.

If I may approach, Your Honor, and show the witness CX-400?

JUDGE McGUIRE: Yes.

BY MR. STONE:

Q. Can you identify CX-400 as a document that -- an email from Mr. Townsend to Mr. Foss, copied to a variety of people, including yourself?

A. Yes, I was copied on it.

Q. And is this Mr. Townsend's response to the two-tiered description in the exhibit we just looked at, RX-1457?

A. It is Mr. Townsend's response.

Q. Did you ever after receipt of this email ever

raise with anyone that you thought the two tiers were not reasonable?

A. No, I mean, this -- at the time frame of this, I was not worried about JEDEC leadership issues. I was more getting my hands around the task group and keeping them focused. This would have been something that I got copied on and, you know, I may have -- I don't know -- I don't recall this, so I may never even have read it. I just don't know.

Q. Let me take you back to some of your task group issues, if I might. Do you recall Micron making a proposal to go with fixed CAS latency during the course of your Future DRAM Task Group meetings?

A. I recall there was a discussion on reducing test costs, and Micron -- I'm not sure who did any presentations, and I'm not sure -- I'm just not sure.

Q. Did Micron also make other proposals for how to determine CAS latency other than the use of programmable CAS latency as it had been used in DDR1?

A. I don't recall any direct presentations on that. Maybe you can jog my memory.

MR. STONE: May I, Your Honor?

JUDGE McGUIRE: Yes.

BY MR. STONE:

Q. I've shown you, Mr. Macri, what's been

identified as CX-2766, a document that appears to be a Micron presentation entitled Pin Selectable Posted CAS for DDR-II.

A. Yes, I see that. I see that title.

Q. Do you have any recollection of this presentation being made at a Future DRAM Task Group meeting?

A. I mean, I do remember this discussion.

Q. Does this relate -- earlier today I think we talked -- how can I phrase this -- let me ask it this way, Mr. Macri: Can you explain to us what pin selectable posted CAS for DDR2 is as it's referred to in this document in a few sentences?

A. Posted CAS had to do with how the commands were issued to the DRAM, the relative position between the RAS command and the CAS command, and this allowed them to be back to back or any number of cycles up to where the CAS would be for, you know, a normal DDR1 SDRAM.

Q. Okay.

A. The pin selectability of that allowed more dynamic control of where you place that CAS relative to the RAS. That was the -- you know, that was the -- that had to be the major goal of this, and there may have been side effects.

JUDGE McGUIRE: Okay, I think he's satisfied.

MR. STONE: I am. Thank you, Your Honor.

various clock forwarding schemes utilized by DDR1, SLDRAM and RDRAM?

A. Yes, the three rather drastically different schemes were referenced.

Q. And were they being discussed because consideration was being given to each of those three for possible use in DDR2?

A. Yes, this was I believe a DDR2 presentation.

Q. So, is it correct, then, that in September of 2000, the Future DRAM Task Group was considering the use of the DDR1 clocking scheme, the SLDRAM clocking scheme and the RDRAM clocking scheme?

A. No, they had already settled on the DDR1 clocking scheme. This was a presentation, you know, to see if the committee could come -- you know, Micron thought they might have a better way, and they wanted to see if they could convince the committee of it, and they brought up the three rather, you know, totally different clocking schemes.

Q. And then if you turn to the fifth page, the next page, Mr. Macri, you'll see that Micron proposed yet a fourth scheme which was one covered by a patent, 4,519,034.

Do you see that reference?

A. Yes, I see the reference.

Q. And so, is it consistent with your recollection that one of the proposals or proposed alternatives that Micron asked your group to consider was a scheme that was patented under the patent number I just read?

A. Yes, they were fulfilling their JEDEC responsibility.

Q. And -- Di 6 rtere fulfilld alteir Jusir JEDE(

scheme that would not be covered by the Rambus patents?

A. No, I don't believe that at all. The -- their -- Micron and many companies would bring proposals to JEDEC all the time. They would bring these proposals because they believe there's an inherent advantage. There are disadvantages to the clocking scheme used by DDR1. Engineers always try to come up with better solutions, and they are presented to the committee for the committee's judgment. This was just, you know, yet another Micron presentation on an alternative scheme.

Q. And is one of the considerations that you take into account whether or not they're covered by patents?

A. Micron had pointed out that there was a patent. They met their JEDEC responsibility. And they pointed out that the patent was due to expire before the production date. They were using this as -- you know, I don't recall exactly, but they may have used it to -- as part of the -- you know, just to set members at ease.

Q. Going back to my question, Mr. Macri -- and just focus on my question, not on this -- was it one of the goals of the Future DRAM Task Group to take into account whether a particular technology was or was not patented?

A. That's not a goal of the Future DRAM Task Group. JEDEC has a patent policy that says if a patent is -- is exhibited, if there is a patent exhibited, the committee must examine alternative methods, and it's in the -- in the -- I don't know if the exact wording is correct, but there is wording in the patent policy that -- or in the policy somewhere in JEDEC that says, you know, we should try to come up --

Q. What alternatives did JEDEC look at for the design of DDR2 to avoid the Rambus patents?

A. I don't recall us doing -- having an effort to avoid the Rambus patents. So, this was, you know, a scheme that was actually presented in September of 2000, so this was fairly far down the road of the definition of DDR2.

Q. Well, it wasn't so --

A. If Micron would have did this in '98, maybe we would have -- there may have been a -- you know, a -- you know, a better look at this, but I don't recall the

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back to my question, let's just see if I can get a shorter, simpler answer perhaps.

A. Okay.

Q. What, if anything, did either the Future DRAM Task Group do or did JEDEC do in the DDR2 design to look for alternatives to those designs which Rambus contended were covered by its patents?

A. I don't recall us doing anything to get around what Rambus was contending.

Q. And did the committee listen to and consider the presentation that Micron gave in September of 2000?

A. The committee has to listen to all presentations. You -- the committee does not have a choice.

Q. You were shown earlier Exhibit 426, I believe, CX-426. Let me hand you another copy.

If I may approach, Your Honor?

JUDGE McGUIRE: Go ahead.

THE WITNESS: I've got a little bit of a mound here.

BY MR. STONE:

Q. Yes, you do.

Do you recall CX-426?

A. Yes.

Q. Okay. And this is an email that was sent from

path, and SDR may be a preference.

Q. Okay. And then if you turn to the third page, under that -- halfway down the page where it says, "IBM."

A. Um-hum.

Q. You'll see there's a reference under IBM where it says, the second bullet point, "Agrees with the need to avoid IP issues."

A. Yes, I see that.

Q. Weren't those Rambus IP issues that were being talked about at this time frame, November of 2000?

A. I believe it was just IP issues in general.

Q. You don't think there was any mention in November of 2000 of the Rambus IP issues?

A. I do not recall the discussion of Rambus IP during this call or during the task group meeting.

Q. Well, wasn't it your obligation to tell JEDEC members of any patents that you knew of?

A. Ah, yes, we all have an obligation to -- to notify the committee of patents that we do not believe the membership already knows about.

Q. And wasn't it -- wasn't it your obligation, if you knew of Rambus patents, to tell the committee?

A. It was my belief that by this time everyone knew of Rambus' allegations. There was no need to

reinforce that.

Q. So, you didn't tell them about the Rambus patents because you assumed they all knew?

A. At this point, it was common knowledge in the press. You'd have to live in a hole not to.

Q. And if -- I'm sorry, you would have to?

A. Live in a hole, under ground.

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believed that the members already knew about them?

A. At this point in time, there was -- you know, there was discussions among membership, you know, of what was happening in the press regarding Rambus. At that --

JUDGE McGUIRE: Okay, now again, when you say at this point in time, you're talking about the year 2000?

THE WITNESS: I'm talking about -- yeah, the time frame that he's talking about here.

JUDGE McGUIRE: Well, we just get so far down the road that we tend to lose context, so I just want it to be clear, you know, for the record the time frame we're talking about now.

THE WITNESS: Yeah, for this question here. I mean, I don't know what happened at every JEDEC meeting, you know, I just don't know, but I know at this point in time for this call, I believe that the committee had already understood Rambus' belief on their patents.

BY MR. STONE:

Q. Well, had there been a discussion at a Future DRAM Task Group meeting of Rambus' patents?

A. I do not recall a discussion at this point in time on Rambus' patents.

Q. What led you to the belief that everyone knew about them if there had been no discussion?

A. The sheer fact that at this point in time, it was all -- it was in the press. People were talking about it in the street. It was common knowledge. I did not believe that, you know, standing up and wasting the committee's time informing them of something they already knew would be beneficial to the committee.

Q. Did your committee later -- did you sort of -- did it get merged into the work of the JC-42.3 committee?

A. Yes, eventually all task groups dissolve and merge back into the committee.

Q. And by March of 2001, had that happened?

A. I believe that's probably true. I don't know the exact date, but the task group slowly dissolved.

Q. Let me show you, if I might, CX-168. Do you recognize CX-168 to be the minutes of the March 2001 meeting?

A. (Document review.) Yes, that's what they look like, the minutes of the March 2001 meeting.

Q. Okay. And were you the chairman at this time?

A. Yes.

Q. Okay. Can I ask you to turn to page 7, the bottom of page 7?

A. Yes.

Q. Where there's a vote, the very bottom, it says, "Motion by AMI2, seconded by Samsung to send to council to modify. The vote was unanimous."

Do you see that?

A. Yes.

Q. And that's a vote on a particular low-power SDR function, correct?

A. Yes.

Q. Then if you turn to page 8 at the very top, it says, "Later in the meeting Mr. Ryan showed a comment he had received on patents affecting this ballot, Rambus 6,021,076 and Siemens 6,046,953."

Do you see that?

A. Yes.

Q. When those patents were identified later in the meeting after the vote had been taken, did the committee do anything in response to those patents being identified, such as pull the ballot back, revote it, table it or anything like that?

A. I don't know. I mean, this was for low-power SDRAM, and that's a discussion that I just wasn't interested in.

Q. But you were still the chair, though, right?

A. Yes.

Q. Okay. And as the chair, in trying to apply the JEDEC patent policy as you understood it at the time, did you as the chairman say, wait, a patent has now been disclosed by Micron, two patents in fact, that relate to this ballot, and we need to revote it or table it until we get resolution of any patent issues?

A. No, I didn't. As I said, I mean, this was something that I wasn't interested in and just -- hsw.g thaon in

JEDEC patesome2body offhsw lebut-whwas s

A. I'm not aware of anything that was not consistent with the JEDEC rules.

Q. Okay. When was the preliminary specification for DDR2 published, the first one? Was that July of 2001?

A. Yes, I'm not sure of the date, but there was -- and I'm not -- actually, I have got to be honest, I'm not -- I'm not sure when the first revision of JESD-79-2 was published.

Q. Well, what I have is a preliminary specification. Do you recall that being published?

A. But preliminary -- so, that may have been within the committee itself, but it's not published generally in JEDEC meetings that's outside of the committee.

Q. That's fine. Someone took the time and effort into putting together a complete specificationeliminary -- so, t

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the process that you felt it appropriate to assign someone to put the specification together for committee purposes?

A. Well, it was actually -- we actually did it much earlier than that even. It was just -- it was a very small group of people that were keeping the compilation of all the past ballots, and we finally got enough together that it seemed appropriate to start getting more people to look at it, to find errors and inconsistencies in the specification. So, you know, we very often keep things small until, you know, it's appropriate to have more people look at it.

MR. STONE: May I approach, Your Honor?

BY MR. STONE:

Q. Let me show you, Mr. Macri, RX-1854.

A. Okay.

Q. Can you identify this as the preliminary DDR2 SDRAM specification as of July 2001?

A. It looks like it is that.

Q. Okay, prepared within your group?

A. Prepared actually by the person I assigned to it and -- you know, and that was underneath the -- I believe that was still underneath the task group at that point.

Q. Okay. I notice it says JC-42.3 in the upper

right corner.

A. Yes.

Q. Does that indicate that it had been taken out of your group and given to JC-42.3, or was this still part of your group?

A. I -- we would have to -- we would have to go through the JEDEC meeting minutes and find when we kind of dissolved the task group, but 42.3 was what the task group was under, so that was -- it could be either.

Q. And I'm just trying to speed us along, so if you feel like I'm cutting you off, it might be true, but it's in the interest of time.

A. Don't worry, you can't insult me.

Q. And can you confirm that as of this date, July of 2001, the burst length was fixed at four in this particular specification? And I might direct you to page 20.

A. Yes, in this specification, it was fixed at four. Only past ballots could go into this specification, so the ballot process had to be completed on any concept that had been discussed. That was the rule.

Q. And after this specification had been put together and circulated within the committee, did you receive a letter or a copy of a letter from Desi Rhoden

on behalf of AMI2 in which he disclosed to you certain AMI2 patents that might relate to your specification?

A. That may have occurred. I just don't recall.

Q. Did the committee at any point in time do anything to look at the AMI2 patents and consider whether they should redesign the specification in response to the disclosure that AMI2 had patents?

A. It depends on the nature of that letter. I don't recall --

Q. And I'm not going to ask you about the letter. Let me interrupt you for a second and withdraw my question and just put it to you again and see if I can keep us focused.

Did the committee do anything to look at alternatives to features covered by any patents held by AMI2?

A. I don't recall that at all.

Q. Okay. And let me ask you if a vote was taken.

MR. DAVIS: Mr. Stone, is there a time when we could take a break?

MR. STONE: I was trying to get to the in camera part before we broke, Your Honor. We can break now if we need to. In about ten minutes or less, I should be to the in camera part.

JUDGE McGUIRE: Do you want to break now, Mr.

Davis?

MR. DAVIS: Ten minutes is okay.

JUDGE McGUIRE: If you need to break now, we'll break now.

MR. DAVIS: No, that's okay.

JUDGE McGUIRE: Let's go ten minutes, then we'll have a good clean separation.

MR. STONE: Thank you, Your Honor.

BY MR. STONE:

Q. Do you recall when there was a vote taken on going to a programmable burst length?

A. I don't remember the date, but I remember that we did have a ballot to cover, you know, the burst length and also a separate ballot for the interrupt.

Q. And a separate ballot to cover?

A. The interrupt.

Q. Okay.

A. The burst interrupt.

Q. If I can show you the minutes from September of 2001.

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. STONE:

Q. I've handed you what's been marked for identification as CX-174, and you'll see at the top of

the first page, it says, "Joe Macri, Chairman."

A. Yes.

Q. And you presided, did you not, at the September 2001 meeting in Las Vegas?

A. Yes.

Q. Turn, if you would, to pages 7 and 8 under the item 4, DDRII Request for Changes Item, and then there's 4.1, and then on page 8, there's 4.2.

A. Yes.

Q. And do you see -- is this the meeting at which the vote was taken on adding a burst length eight?

A. Yes. The ballot was given -- we were given permission to write the ballot or Intel was given permission to write the ballot.

Q. And so was this the first vote taken on whether those issues should be put to ballot, namely, going to programmable burst length?

A. Yes, by voting and with a motion and the motion passing.

Q. Okay, one last document.

Were you -- from time to time, did you attend the meetings of 42.4?

A. 42.4? I can't remember the name of that committee. Is that one of the SRAM volatile --

Q. The nonvolatile committee.

A. I rarely attended. It's more if there's no one else to go, then I might, but I'm generally not interested in nonvolatile issues.

Q. And some of the minutes I've looked at show you in attendance and others show you're a member absent. Is that consistent with your recollection?

A. Yeah, sometimes I was sitting there working away when the sign-in sheet would come by.

Q. And did you get distribution of minutes and mail from 42.4?

A. I may have, but not that I would pay any attention to.

Q. Did you -- were you aware of an issue involving

May I, Your Honor?

JUDGE McGUIRE: Go ahead.

BY MR. STONE:

Q. Do you recall receiving this email from Mr. McGhee in February of 2000 about a letter Micron had sent with respect to a patent application and whether they -- their disclosure of that patent application went beyond the patent policy of JEDEC?

A. I just don't -- I don't remember this, because it really doesn't say anything about what the patent was about. It's just a letter from Ken McGhee saying he received a letter from Micron.

Q. At any meeting after February of 2000, after the date of this email, do you remember anyone in a meeting saying, I think Mr. McGhee's description about the disclosure of patent applications and how that related to the JEDEC policy was wrong, incorrect, misunderstood or anything like that?

A. Ah, I just don't know. I mean --

Q. Okay.

A. -- he's -- a lot of complaining all the time.

Q. But do you recall any complaining about this issue?

A. No, it's not -- it's not jumping out at my mind.

MR. STONE: Okay, Your Honor, maybe now would be convenient. We could then reconvene in camera just briefly.

JUDGE McGUIRE: All right, very good. Let's take a ten-minute break. This hearing is in recess.

Again, let me just say to the audience, when we come back, you will be -- the public will not be allowed in for this portion of the proceeding.

(A brief recess was taken.)

JUDGE McGUIRE: Okay, this hearing is now in order and in in camera session.

(The in camera testimony continued in Volume 25, Part 2, Pages 4783 through 4788, then resumed as follows.)

MR STONE: No further questions, Your Honor.

JUDGE McGUIRE: All right, thank you.

Mr. Davis, redirect?

MR. DAVIS: No questions, Your Honor.

JUDGE McGUIRE: I'm sorry?

MR. DAVIS: No questions.

JUDGE McGUIRE: Oh, okay, sir, you're excused from this proceeding. Thank you very much for your testimony here today.

THE WITNESS: No problem.

MR. STONE: Can I just move in a couple of

exhibits, Your Honor? They would be CX-137.

JUDGE McGUIRE: Mr. Davis, any objection?

MR. DAVIS: No objection, Your Honor.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 137 was admitted into evidence.)

MR. STONE: CX-400.

MR. DAVIS: No objection.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 400 was admitted into evidence.)

MR. STONE: CX-2769.

MR. DAVIS: No objection.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 2769 was admitted into evidence.)

MR. STONE: CX-168.

MR. DAVIS: No objection.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 168 was admitted into evidence.)

MR. STONE: And CX-174.

MR. DAVIS: No objection.

JUDGE McGUIRE: Entered.

(CX Exhibit Number 174 was admitted into

evidence.)

MR. DAVIS: We would also like to move in CX-137.

MR. STONE: Oh, I just moved it in.

MR. DAVIS: Oh, did you?

MR. STONE: Yeah.

MR. DAVIS: That was the first one you moved in?

MR. STONE: Yes.

JUDGE McGUIRE: Once is enough.

Does that take care of our afternoon session from complaint counsel's side.

MR. OLIVER: Yes, Your Honor. We could continue with the deposition of Mr. Karp if you wish, but --

JUDGE McGUIRE: I would rather wait on that, so -- yes, I would rather wait.

MR. OLIVER: Okay.

JUDGE McGUIRE: All right, it's 4:00 right now. I understand the courtroom is going to be dark both Tuesday and Wednesday, correct, and we will be back in early Thursday morning, at 9:30?

MR. STONE: Yes.

MR. OLIVER: That's right, Your Honor.

MR. STONE: And I want to thank the Court and

complaint counsel again for accommodating me on the two days and allowing me to go back for graduation. Thank you.

JUDGE McGUIRE: You're quite welcome.

All right, this hearing is adjourned until Thursday morning. Thank you.

(Whereupon, at 4:00 p.m., the hearing was adjourned.)

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: JUNE 9, 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: 6/10/03

SUSANNE BERGLING, RMR

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