UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NINTENDO CO., LTD., and NINTENDO OF AMERICAN, INC.
Petitioner

v.

ANCORA TECHNOLOGIES, INC.,
Patent Owner

IPR2021-01338
IPR2021-1406

VIDEO CONFERENCE DEPOSITION OF:
DR. ANDREW WOLFE

TAKEN BY: Attorney for Patent Owner

DATE: April 22, 2022

TIME: 12:00 p.m. - 1:36 p.m.

PLACE: Via Video Conference

Examination of the witness taken before:

Jerry Lefler CSR RPR CRR CM
U.S. Legal Support

APPEARANCES:

DAVID GOSSE, ESQ. (Via Video)
Fitch, Even, Tabin & Flannery, LLP
120 South LaSalle Street, Suite 2100
Chicago, Illinois60603
Dgosse@fitcheven.com

Counsel for Patent Owner

KYLE CANAVERA, ESQ. (Via Video)
Perkins Coie, LLP
11452 El Camino Real, Suite 300
San Diego, California 92130
Canavera-ptab@perkinscoie.com

Counsel for Petitioner

JON WRIGHT, ESQ. (Via Video)
Sterne, Kessler, Goldstein & Fox PLLC
1100 New York Ave, NW Suite 600
Washington DC 20005

Counsel for Roku and Vizio

I N D E X



EXHIBIT INDEX

(NONE)

P R O C E E D I N G S

DEPOSITION OFFICER: Before we proceed, I will ask counsel to agree on the record that there is no objection to the Deposition Officer administering a binding oath to the witness remotely.

Will all counsel please state your agreement on the record.

MR. CANAVERA: This is Kyle Canavera for Nintendo. Agreed.

MR. GOSSE: This is David Gosse for Ancora. Agreed.

Just to be clear, Jon, I don't know if you agreed to swear the witness on the record.

MR. WRIGHT: Agreed.

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THEREUPON,

DR. ANDREW WOLFE

was adduced as the deponent herein, and being first duly sworn upon oath, was questioned and testified as follows:

DIRECT EXAMINATION

BY MR. GOSSE:

Q. With the preliminaries out of the way, good morning, Dr. Wolfe.

A. Good morning.

Q. I assume you've had your deposition taken before.
A. I have.
Q. Okay. Well, I'll keep the introductories short. The thing I like to always say is that as the witness, you're entitled to a clear question. So if you don't understand something I've asked, just let me know and I'll try to rephrase it in a way that makes more sense to you.
Is that okay?
A. That's fine.
Q. Okay. And on the flip side, I appreciate a clear answer wherever possible, so I might follow up with you on occasion, and I hope you don't mind that.
A. Okay.
Q. Just since we are remote, I'd like to confirm with you that there's no one else in the room with you there on your end.
A. There is no one else here.
Q. Okay. Are you in any -- are you in communication with anyone else from where you sit right now aside from the people on the video chat?
A. No.
Q. Okay. Do you have any communication devices in the room with you right now?
A. There's lots of computers, but this is the only one that's turned on.

Q. Okay. That works.

Just so you understand that any communication with other people during the deposition could be discoverable and I might ask you questions about that later. Is that clear?

A. I understand.

Q. Okay. Are there any circumstances that would prevent you from providing truthful and accurate testimony today?

A. No.

Q. Great. Dr. Wolfe, what's the nature of your employment as we sit here today?

A. I am an academic year adjunct lecturer at Santa Clara University full-time. I also have a consulting practice where I work with companies on various matters, primarily relating to intellectual property.

I'm also on the Board of Directors of a company, a public company called Turtle Beach.

Q. Okay. If you had to estimate, what fraction of your income comes from your consulting practice?

A. It varies over time.

Q. In the last two years maybe?

A. I don't know. It really just depends a lot. My Turtle Beach compensation is primarily in stock, so the value of that varies widely.

Q. Okay. All right.

We're going to be talking a little bit today about your declaration in the two IPR proceeding. We have IPR 2021-1338. And that's the one filed by Nintendo. We also have IPR 2021-1406, which is the one filed by Roku and Vizio.

I mailed you a packet with papers. I think both of your declarations are in that packet. So for purposes of the record, I'd like to mark as Exhibit 1 --

A. Can I open this?

Q. Yes, please.

MR. WRIGHT: David, this is Jon Wright. I don't think we should mark exhibits that are in the record as anything other than the exhibit number that we've already been marked, just for clarity in the proceeding and in the deposition transcript. Does that make sense?

MR. GOSSE: That's fine with me. We can proceed that way.

MR. WRIGHT: Okay. Thank you.

THE DEPONENT: Okay. I have those two declarations.

BY MR. GOSSE:

Q. Okay. Just for purposes of the record, I'm going to be referring to Exhibit 1003 from the 1338 IPR.

My understanding after review of both of the

declarations is that there's not much in the way of differences between them. Is that accurate?

A. I'm not aware of any substantive differences in my opinion. The differences are things like the names of the parties.

Q. Okay. Perfect.

If there is something that comes up in the course of your testimony where there's a difference between the documents, kindly let me know.

A. Okay.

Q. Otherwise, we'll assume that your testimony related to this Exhibit 1003 from 1338 IPR applies to both proceedings.

A. Yeah. I mean, I don't intend to check every paragraph back and forth. But to the extent that the declarations are consistent, then my testimony would apply to both.

Q. Perfect. Okay. We want to keep things short here today, if we can.

So with those preliminaries out of the way, if you could turn to appendix A of the Exhibit 1003.

A. Okay.

Q. What is -- I'm sorry. It's appendix A of Exhibit 1003. What is this document?

A. It's a copy of my CV probably as of sometime in

2021.

Q. Okay. Has anything about your employment changed since this CV was drafted?

A. The description of what courses I teach would be longer, but other than that, no. My address has changed.

Q. Okay. If I could direct your attention to page 2 of your declaration. There's a section there that begins "Work Experience."

A. Yes.

Q. Okay. Great.

In paragraph 8, it refers to some work you did with Touch Technology. It says you designed IO cards for PC-compatible computer systems. Do you see that?

A. Yes.

Q. Do you recall as part of your work for Touch Technology, did you do anything relating to the BIOS of a PC?

A. Yes.

Q. What sort of things did you do?

A. I worked device drives, and those device drivers would directly interact with the BIOS. And at times they would replace BIOS functionality, like tapping into what we called "interaffectors."

Q. And were those device drivers for a Windows system? Probably not in 1983.

A. Sort of. So, the first device that I worked on was intended to work with Windows 1.0, which we had a prototype of but not the final version. Primarily they ran -- at that point, Windows ran on top of MS DOS, so the device drivers were at MS DOS and they were designed to provide touch input and touchpads for Microsoft mouse compatible things, like Microsoft Word and Microsoft Windows 1.0.

Q. Got it. Let's flip over to page 7 of the declaration. There's a section there that begins "Level of ordinary skill in the art." Do you see that one?

A. I do.

Q. And the following page has a paragraph, it talks a little bit about the legal framework for evaluating the ordinary skill in the art. And one of the items there is the rapidity with which innovations are made.

A. Yes.

Q. In the context of developing your opinions on the ordinary skill in the art, how did the rapidity with which innovations are made play into your analysis?

MR. CANAVERA: Objection, form.

THE WITNESS: It was one of the factors that I considered.

BY MR. GOSSE:

Q. And at the time of the invention that's disclosed

in the 941 patent, would you consider the rapidity to have been fast or slow in the relevant art?

MR. CANAVERA: Objection, form.

THE DEPONENT: I think "medium" is probably the most accurate. PC BIOSes, for example, had been around for more than 15 years. They were quite mature. They were improving in an incremental manner. They were not static, but they certainly weren't changing rapidly. They had standardized.

There was a concept of a standard Windows PC by that time, so again it was evolving. But it was not in the early stages of chaos the way some technologies are.

So it's -- I think it was what I would consider ordinary for my field. It was kind of in the middle of its development cycle.

Q. Okay. Now, you characterized yourself as a person of at least ordinary skill in the art, down in paragraph 25. Do you see that?

A. Yes.

Q. Would you agree that you have significantly more skill than the ordinary person in the art?

A. As of 1998 or as of today?

Q. As of 1998.

A. Yes.

Q. And that would also be true: You had more skill

than the ordinary person of skill in the art as of 1996?

A. Yes.

Q. Okay. Flipping over to page 10 of your declaration, paragraph 30, we can agree, right, that the priority date of the 941 patent is May 21st of 1998?

MR. CANAVERA: Objection, form.

THE DEPONENT: I assumed that for purposes of this proceeding.

BY MR. GOSSE:

Q. Okay. Thinking back a little bit about the ordinary skill in the art, if we could go back to page 8. Sorry to jump around a little bit.

On page 8, you say that "the ordinary skill in the art is, among other things, someone would have had at least a BS degree in computer science, computer engineering, or electrical engineering, and would have had at least two years of experience."

Do you see that?

A. Yeah. You left out a few words. I said, "Or equivalent experience." It doesn't need to be formal education, but it needs to be equivalent to formal education.

Q. Sure. Would the person of ordinary skill in the art be someone working at a particular company?

A. Not necessarily. They could be an academic.

They could be working in any one of the hundreds of companies that were involved in PCs at the time or they could have simply been somebody with training in these areas.

Q. Okay. In that context, would an academic, or perhaps someone working at certain companies, have experience that would go well beyond the person of ordinary skill in the art?

MR. CANAVERA: Objection, form.

THE DEPONENT: Some people would.

BY MR. GOSSE:

Q. Okay. People with more than two years of experience, for example?

A. There were certainly some people who had more than two years of experience.

Q. Okay. And would people working in certain environments or with certain technologies be exposed to information or technologies that were beyond what the person of skill in the art would be aware of?

MR. CANAVERA: Objection, form.

THE DEPONENT: Yes, there were certainly people somewhere that had -- that were exposed to technologies more sophisticated than what a person of ordinary skill would be exposed to.

MR. GOSSE: Okay.

Q. I want to back up just a little bit. Just companies in that time period, for example. Are you familiar with IBM?

A. Yes. A very big company, but I'm familiar with many parts of it. And I was working with them at that time.

Q. Okay. What did you do with IBM around that time?

A. They were both a customer and a supplier in 1998.

Q. A customer in what sense?

A. They used the chips that I was developing. The main chip I was working on in 1998 went into the first Thinkpad T Series computer.

Q. Okay.

A. But they also used our products in desktop computers and other things as well.

Q. Sure. In what sense were they a supplier for you?

A. They were a memory supplier, and somewhere around that time they became a chip supplier as well.

Q. Okay. What was the general reputation of IBM in that time frame?

A. The general reputation? It was a sophisticated company, but sometimes very bureaucratic and slow-moving.

Q. Okay. Would they have been involved with cutting-edge technologies and research and development?

MR. CANAVERA: Form.

THE DEPONENT: A big company. There would be a portion of the company that was involved in that, yes.

BY MR. GOSSE:

Q. Okay. How about Intel: Have you heard of them?

A. Yes.

Q. Okay. What was their general reputation as of 1996?

A. 1996?

Q. '96 to '98, sort of the time frame around and before the date of invention.

A. They were the largest manufacturer of microprocessors for PCs at the time.

Q. Safe to say that they were doing some cutting-edge research and development?

MR. CANAVERA: Objection, form.

THE DEPONENT: Yeah. A very big company. Somewhere in the company, some people were doing that.

BY MR. GOSSE:

Q. Okay. Would people working at Intel have been exposed to technologies beyond what was publicly known?

MR. CANAVERA: Objection, form.

THE DEPONENT: Some people would; some people would not.

MR. GOSSE: Okay.

Q. How about Sun Microsystems? Are you familiar with them in that time period?
A. I am.
Q. What was their general reputation?
A. They were in transition at the time. They were moving towards being more of a system solution web infrastructure supplier and away from microprocessor design. But they did still have microprocessor design teams at that time. And they did design their own computer systems in some cases.
Q. Was Intel involved in designing hardware at the time?
A. Yes. They designed chips. They designed some computer systems at the time.
Q. Okay. And memory chips being one example of those?
A. They were just doing flash memory at the time. I don't remember them doing any other memory chips at that time.
Q. So they were developing flash memory around that time?
A. They did cache memory chips as well.
Q. So, is it accurate to say that Intel, as of -- in the 1996 to 1998 period, they were developing flash clips. Is that what you said?

A. They were producing them. And I guess since they had new generations that came out after that, I guess they would have been developing some new ones as well.

Q. What about Intel? I'm sorry. Strike that.

What about IBM? Was IBM involved in producing or developing flash chips?

A. Not that I'm aware of.

Q. Did they develop any other sorts of hardware at that time period?

A. They did. They developed chips for various kinds of computers, primarily for their big main frames.

Q. And you mentioned Sun Microsystems had a microprocessor design team. Did they develop any other sorts of hardware? Memory chips, for example?

A. I'm not aware of them developing memory chips at that time.

Q. Okay. What about American Megatrends? Have you ever heard of them?

A. Yes.

Q. What was the nature of their business?

A. They provided BIOS -- maybe some other kinds of software -- to certain third parties. BIOS software. I mean, not physical BIOS chips, but the software that would be used in a BIOS chip.

Q. Okay. Do you have any sense for their, I guess,

market share? You mentioned they were supplying BIOS to a variety of third parties. What was the competitive landscape for them?

MR. CANAVERA: Objection in form, scope.

THE DEPONENT: There were three or four leading companies at the time. Phoenix. I don't remember the third and fourth one.

Q. Okay.

A. It's been a lot of years. And Intel may have had their own. I don't remember. That varied from years to years.

But, yeah, there were a number of players in that field, and my recollection is that the market share was reasonably well distributed.

Q. Okay. So of the three or four major BIOS manufacturers, American Megatrends and Phoenix are the two that you can remember?

A. Yes.

Q. Okay.

A. Award. That was one of the other ones.

Q. Do you have a sense for whether American Megatrends was bigger or smaller than Phoenix, for example?

A. It changed from year to year, so I don't recall specifically for those particular years.

Q. Okay. How about American Megatrends versus Award? Do you have a sense for whether American Megatrends was bigger or smaller than Award?

MR. CANAVERA: Objection, form, scope.

THE DEPONENT: I don't recall in those particular years.

BY MR. GOSSE:

Q. Okay. Safe to say, though, that all three of those companies were leading BIOS manufacturers in that time period?

MR. CANAVERA: Objection, form, scope.

THE DEPONENT: It depends what you mean by "leading."

BY MR. GOSSE:

Q. Were they recognized as major BIOS manufacturers in the industry?

A. I would have recognized them that way at the time.

Q. Okay.

A. I'm not sure a person on the street would.

Q. Sure. If you could flip over to page 14 of your declaration. There's three paragraphs there, starting with paragraph 40 at the top of the page. Do you see those?

A. Yes.

Q. Okay. And referenced in paragraph 40 is an Exhibit B7, which is U.S. patent ending in 236. And this is I think one place where your declarations may differ. That's referenced in the Roku declaration as Exhibit 1017.

Do you mind flipping back to exhibits in the back of your declaration to that 236 patent?

A. Okay.

Q. What's the date of issuance on the 236 patent? Do you see that?

A. October 24th, 2000.

Q. Okay. Would you agree that this patent didn't become public until October 24th, 2000?

A. I don't know.

Q. Do you have any sense for when patents become public?

MR. CANAVERA: Objection to the form.

THE DEPONENT: I think you're entitled to release the text of the patent or publish it anytime after it's been filed. There's nothing to prevent you from doing that.

BY MR. GOSSE:

Q. Do you have any evidence that this patent published prior to October 24th, 2000?

A. No. As I said, I don't know one way or the other.

Q. Okay. Okay.

Paragraph 41 of your declaration references a 592 patent, which is also in the appendices of your declaration. In the Roku matter, I believe it's Exhibit 1018.

Do you mind flipping over to the 592 patent?

A. Yes.

Q. Okay.

MR. CANAVERA: Give me one second to catch up here.

MR. GOSSE: Sure thing, yep.

MR. CANAVERA: Okay. I'm ready.

BY MR. GOSSE:

Q. The 592 patent, do you see the date of issuance on that patent?

A. Yes.

Q. What is it?

A. September 1st, 1998.

Q. Do you have -- Are you aware any of evidence that this 592 patent published before September 1st, 1998?

A. I'm not currently aware of any evidence of that.

Q. Okay. Paragraph 42 of your declaration references a 594 patent. Do you mind flipping over to that in the appendices?

A. Yes.

Q. I'll note that's Exhibit 1019 in the Roku matter.
A. Yes.
Q. And what's the issue date of the 594 patent?
A. November 10th, 1998.
Q. Are you aware of any evidence showing that the 594 patent was publicly available sometime before November 10th, 1998?
A. I'm not currently aware of such evidence.
Q. Okay. Let's flip over to page 21 of your declaration.
A. Okay.
Q. The top of that page begins a section titled "Claim Construction." Do you see that?
A. I do.
Q. Great. And paragraph 58 indicates that you have "interpreted the challenged claims as they would have been understood by a person of skill in the art." Is that accurate?
A. Yes. At the time of the invention.
Q. Perfect. Just so we're clear, what you mean by that, did you give meaning to claim terms other than what you consider their plain and ordinary meaning?
MR. CANAVERA: Objection, form.
THE DEPONENT: No. Although I think it's more accurate to say I gave them their plain and ordinary

meaning when viewed by a person of ordinary skill in the art at the time, in light of the specification and the intrinsic record.

BY MR. GOSSE:

Q. Okay. Did you review the specification to arrive at any particular claim constructions for any of the terms of the 941 patent?

MR. CANAVERA: Objection, form.

THE WITNESS: I reviewed the specification in coming to my understanding of the meaning of the terms in the claim.

BY MR. GOSSE:

Q. Okay. Did you rely on the file history in coming to an understanding of the meaning of the claim?

A. I did, both -- at this point, both the original prosecution history and the re-exam history.

Q. Do you cite the file history anywhere in your declaration?

A. I don't recall.

Q. Did the file history color your interpretation of any the claim terms in the 941 patent?

MR. CANAVERA: Objection, form.

THE DEPONENT: I certainly took it into consideration, but in the end, I concluded that the plain meaning was the best interpretation of the claim terms for

a person of ordinary skill in the art.
BY MR. GOSSE:
Q. Did you base that plain meaning on any particular dictionary definitions or definitions beyond sort of the Webster's type ordinary definition?
MR. CANAVERA: Objection, form.
THE DEPONENT: I just interpreted the words using their ordinary English meaning to a person of ordinary skill in the art, in context.
There was one exception. And that was it was my understanding that -- Well, no, not "exception." It's still plain meaning. So...
BY MR. GOSSE:
Q. So no terms -- no terms that you gave any meaning to other than the plain meaning.
A. Correct.
Q. We're going to talk a little bit about the Hellman patent, which is Exhibit 1004 in both matters.
We'll probably be jumping back and forth between your report and that reference for just a little bit.
A. Okay.
Q. There's a paragraph in your report, it's on page 26, paragraph 68 is the paragraph. And towards the bottom of the page it describes a variety of reasons why an Authorization A cannot be reused. Do you see that?

A. Yes. Well, it can't be used for a request that uses a different random value.

Q. Okay. I want to make sure I understand what you're trying to say there.

The first example is that because Authorization A contains the Hash Value H, the Authorization A, if intercepted on the insecure channel 11, cannot be reused for any other software package which would have had a different hash value.

Do you see that?

A. Yes.

Q. Is it purely the presence of the hash value that prevents reuse?

A. Well, let's be really clear here. Because there seems to be some confusion.

You could reuse an authorization. It just wouldn't work. It wouldn't authorize anything, right? It would just be useless. It would be meaningless.

So as Hellman explains it, he says you can't reuse it, because he means you can't reuse it in a way in which it has any effect.

There's nothing, of course, to prevent somebody from using a number for whatever they want.

Hellman then explains that it is impractical to reuse a value, an authorization value, because the

probability of it matching something other than what it was intended to authorize, if you follow his recommendations and include enough bits and things, is infinitesimally improbable. And that's what he's trying to explain.

Now, there are a number of things in that value, but one of them is the hash value. And the hash value is an identifier of the program that's being authorized. So if the hash value changes, then it no longer is an effective authorization for that same program.

So what he's explaining here is that this is only an authorization for one specific program running on one specific machine in this one specific instance, unless you don't follow his recommendations and you do a terrible design, or an event happens that is unlikely to happen in the entire history of the world.

Q. Perfect. And the same would be true, then, in the context of the number of uses. You say that "If Authorization A is intercepted, it cannot be reused for a different number of authorized uses."

A. Correct.

Q. So what you're saying there is if the Number N changed, the Authorization A would also change. Is that accurate?

A. Correct. And, again, that is to not let somebody

request one use of the software and then somehow trick it into giving them a hundred.

Q. Sure. So if I requested 10 uses, and then later substituted and said I want a hundred uses, the Authorization A would change in those two different circumstances, just based on the number of uses that I've requested.

A. Correct. And then it would no longer match.

Q. Okay. Is the same true for the Random Number R? If you change the Random Number R, you say that the Authorization A cannot be reused for another request. It uses a different random value.

A. Correct. Again, this is with extraordinarily high probability, just because that's the way these things work.

Q. Sure. So one time out of umpteen billions of chances, there's a possibility that the Authorization A would be the same, even though there's two different random numbers supplied.

A. Right. And there's guidance given to make sure that that would happen so infrequently that it's likely the entire population of the world would never see it.

Q. Sure. Okay.

Did you understand that the Authorization A is generated through the use of a hash function?

A. Yes, in at least the main preferred embodiment, yes.

Q. All right. We'll change gears just a little bit. Page 28, paragraph 73. It discusses Hash Value H.

A. Yes.

Q. When we think about the Hash Value H, is it accurate to say that that would be effectively a random number, perhaps within some range?

MR. CANAVERA: Objection, form.

THE DEPONENT: It's not random, but it's intended to have the same statistical properties as a random number.

In other words, if you put the same inputs in the same hash function, you get the same output every time. So it's not random.

But it's designed in such a way that -- and theoretically there's a reverse function. It's just too complicated to compute. But it's designed to have similar properties to a random number, and therefore can be thought of as something that -- "random" is not the right word. It's extremely mixed up so that you can't extract the original information from it.

BY MR. GOSSE:

Q. Sure. When you say that there's a reverse function, but that it's too difficult to compute, what do

you mean by that?

A. So, there's a theoretical way to -- it depends what characters the hash function are. Typically in this kind of a situation, and almost every situation which hash functions are used practically, we use compressing hash functions, where there are many inputs that produce the same hash value.

Theoretically, you could figure out what those many inputs are. But for practical purposes, it's uncomputable even on the fastest computers.

Once you figured out the possible inputs that can create the hash output, there's really no way, without additional information, to figure out which one actually did.

Q. So even if you were able to create a series of possible inputs that caused the particular output hash value, you wouldn't know for sure which of the inputs actually generated the output hash value. Is that accurate?

A. Not unless you had some additional information.

Q. This paragraph 73 describes accessing "a non-volatile Memory 37, and the base unit retrieves a value of stored in the memory represented by Hash Value H."

How does that work?

A. In the non-volatile memory, there would be a table. It would be very small. It could be large. Hellman gives us that flexibility.

But the Hash Value H would be what we call an "index" into that table. It would tell us which entry to use in the table.

And the idea is that, in practice, each Hash Value H would represent a different application program. So, therefore, you would have a table in that non-volatile memory that would tell you how many authorized uses you had for each application program that participates in the system, with -- in some embodiments, a particular value representing "unlimited."

Q. When you talk about a "table in memory," would that be basically each of the memory locations that could be addressed by a given value of H?

A. No. It would be each of the locations that could be accessed by all of the values of H. A given value of H would access one entry in that table.

So you can think of it almost like an Excel sheet, right, where there might be 20 different things, and H tells you which one we're trying to authorize.

Q. Sure. So the more potential values of H, the larger the table would be. Is that accurate?

A. Correct. There's a trade-off. And one example

is -- 256 entries is one example that's given in Hellman. But it could be smaller; it could be larger.

Q. Dr. Wolfe, I usually try to remind people at the beginning of the deposition that if they need a break, just let me know. We have been going for almost 50 minutes, so I just want to mention that.

I'll keep going unless you prefer to take a break. Usually I like to break once an hour or so, if that works for you.

A. I understand. Certainly if the court reporter needs a break, he should speak up.

Q. Okay. Perfect.

Let's take a look at the Hellman reference itself. In your report, you mention that Hellman does not disclose a BIOS. Is that accurate?

A. Not by name, he does not.

Q. Does it disclose a BIOS by some other name?

A. Not specifically. He discloses a non-volatile memory which would be suitable for holding BIOS. But that's why I combined it with the Chow reference.

Q. Got it. Would you also agree that Hellman does not disclose any sort of an operating system?

A. Again, not by name. But he talks about a computer. I think I would assume that a computer has an operating system.

He talks about running application software like Lotus 123. That certainly required an operating system.

Q. So the presence of application software suggests that there is some kind of an operating system present. That's the way you interpret that?

A. Well, it depends what the system is. There's certainly systems that have applications without operating systems. But the presence of Lotus 123 suggests an operating system.

Q. Why does the presence of Lotus 123, in particular, suggest the presence of an operating system?

A. Because at that time it only ran on, as far as I know, on DOS and Windows and similar systems. Actually, at that point only DOS, in 1983.

Q. In general, would you understand that if there is an application running on a computer, there's an operating system underlying it?

A. Not necessarily.

Q. Would that be true for DOS?

MR. CANAVERA: Objection, form.

THE DEPONENT: Well, DOS is an operating system. So if the application is running under DOS, then it's running under an operating system.

BY MR. GOSSE:

Q. Okay. Were there examples of general purpose

computers in 1998, at the time of invention of the 941 patent, that did not run an operating system?

MR. CANAVERA: Objection, form, scope.

THE WITNESS: It depends on how you define "general purpose."

BY MR. GOSSE:

Q. Okay. How would you have to define "general purpose" to make it so you'd find one where there is not an operating system?

MR. CANAVERA: Objection, form, scope.

THE DEPONENT: There were certainly things that ran an ordinary Intel microprocessor on an ordinary Intel mother board that did not run an operating system. I don't know whether or not you'd consider that general purpose or not.

If you bought a computer, a desktop computer, for home use, that would almost always have an operating system.

BY MR. GOSSE:

Q. Okay. So, in general, computers that were manufactured for home use would generally have had an operating system as of 1998. Is that accurate?

A. Well, there are all kinds of computers for home use. Again, it depends how you're defining the boundary of that term.

A general purpose desktop computer, like an ordinary PC, would usually have an operating system.

Q. Okay. With respect to Hellman, do you mind flipping over to Figure 8 of the reference?

A. Okay.

Q. Figure 8 illustrates Player 42. Do you see that?

A. Yes.

Q. And I think I understand your report to say that the player could be a microprocessor. Is that accurate?

A. I think that's in my report. That's what Hellman says.

Q. Okay. In the example where the Player 42 is a microprocessor, does Hellman say anything about what other -- whether the other parts of that system would also be a part of the microprocessor?

MR. CANAVERA: Objection, form.

THE DEPONENT: Part of the microprocessor? I don't think he says for certain one way or the other. But I think that they could be hardware or software.

Probably -- I don't think he restricts it one way or the other as to whether or not they can be on the same microprocessor or not.

BY MR. GOSSE:

Q. To the extent that those other features, the switch, the one-way hash or the update unit, if those were

software, you would expect them to be running on a microprocessor somewhere, correct?

MR. CANAVERA: Objection, form, scope.

THE DEPONENT: If they were software, I'd expect them to be running on a computer system, which most likely would include a microprocessor, in 1998.

BY MR. GOSSE:

Q. Okay. Did the typical -- Strike that.

The Switch 41, for example, would that be implemented in software?

MR. CANAVERA: Objection, form.

THE DEPONENT: It could. It could be software or hardware. Its function is to enable the player. So again, depending on what the player is, it could be hardware; it could be software.

There would have to be some hardware involved somewhere, but the functionality could be turning on an enabled bit in a microprocessor, for example.

BY MR. GOSSE:

Q. Turning over to Column 2 of Hellman, there's a section starting around line 24 that describes, for example, "A dishonest customer can make as many copies as he wants of the regular version and give or sell them to acquaintances with similar base units (computers)."

Would you agree that that refers to a computer

without the inventive secure software distribution system features that are disclosed in Hellman?

A. Yes. He's trying to describe prior circumstances, things that do not use his technology.

Q. So the systems -- the systems known in the art at the time of Hellman included computers that did not have the security functions that Hellman ultimately discloses. Is that accurate?

A. There were certainly some computers on the market at that time that did not include the security capabilities that Hellman describes.

Q. Are you aware of any software or any system that ultimately adopted the type of system that Hellman describes?

A. I don't know one way or the other.

Q. Okay. Would you have expected the Hellman disclosure to have been typical in any way, or would that have been additional to the ordinary, or what one would consider an ordinary computer in 1998?

MR. CANAVERA: Objection, form.

THE DEPONENT: I'm not sure I understand the question.

BY MR. GOSSE:

Q. Would you understand Hellman to require additional hardware or software beyond the typical

computer?

MR. CANAVERA: Objection, form, scope.

THE DEPONENT: As of 1998?

BY MR. GOSSE:

Q. Yes.

A. It would require at least one or the other, because his invention was not known yet. So one would have to incorporate either some additional software or some additional hardware to get the additional functionality, or perhaps both, in later computers. That doesn't mean that those things would not become typical.

Q. Are you aware that they ever did become typical?

A. I don't know one way or the other.

MR. GOSSE: Why don't we take a quick break. We're at a good stopping point.

MR. CANAVERA: How long do you want to take, David?

MR. GOSSE: Ten minutes. Is that good?

MR. CANAVERA: Works for me.

(Recess held at this time.)

MR. GOSSE: Back on the record.

Q. Dr. Wolfe, during the break, did you speak with counsel for either Nintendo or Roku?

A. No. I didn't speak with anyone.

Q. Perfect. I'd like to turn your attention, if I

could, to paragraph 114 of your declaration. And that paragraph extends on to page 50, which is where I'm interested.

You mention that EPROM modules were a special type of memory not used for general purpose storage. Do you see that?

A. Yes. That would have been true in 1998.

Q. What do you mean by "general purpose storage" in this context?

A. Bulk storage. They would have -- they were expensive as of 1998, so they would have been used for specialized functions. Now, they weren't knew. I used them as early as 1986 and they weren't new then.

But they were more expensive per unit of storage, so they would be used specifically where you needed a writable non-volatile memory.

Q. Was the only reason that EPROM devices were not used for general purpose storage the expense, or were there other reasons as well?

MR. CANAVERA: Objection, foundation.

THE DEPONENT: Again, it depends when. By '98, they -- the ones that were typically used would have been slower than the typical DRAM that was used for main memory.

But I don't recall whether or not faster ones

were available and just too expensive for the kinds of commercial systems that I was working with at the time.
BY MR. GOSSE:
Q. When you say "general purpose storage," would DRAM be the ordinary alternative, or were you thinking about other non-volatile storage devices?
A. Well, at the time, main memory would have been DRAM in most computer system, and then long-term non-volatile storage would have been hard drives in most computer systems at that time.
Q. Why did long term non-volatile storage use hard drives instead of EPROMs?
MR. CANAVERA: Objection, foundation.
THE DEPONENT: They were cheap per unit storage.
BY MR. GOSSE:
Q. Okay. Down below, you mention that "A typical computer as of May 1998 would have had less than five such EPROM modules."
A. I'll be really careful. We don't call them "EPROMs." We call them EEPROMS. Because there's a different device called an EPROM. So I just want to make sure that the court reporter is getting that. I assume that's what you're talking about: E-E-P-R-O-M.
Q. That's right, yes.
A. Okay. I did say that a typical computer would

have had less than five, and perhaps only one, yes.

Q. You say "perhaps only one." Would you agree that it's typical to have more than one EEPROM?

A. It would depend on the --

MR. CANAVERA: Objection, form.

THE DEPONENT: It would depend on the computer. So, at that time, situations where you'd have more than one might be if you had put that computer together from multiple suppliers. So if you had gotten the network card from one supplier, graphics card from another, each of those might have had a double EPROM module.

If you went to Best Buy and bought a Compaq computer, where they had already chosen components for you, then it would be not at all common for there to be only one.

Q. Would you agree that it was not common to have more than one EEPROM module?

MR. CANAVERA: Objection to form. It's a form objection.

THE DEPONENT: I would not agree with that.

BY MR. GOSSE:

Q. Why not?

A. Because there were lots of ordinary desktop computers that did have multiple modules.

So, for example, if I had bought a Dell or a

Gateway at the time, where I could choose my network card and I could choose my graphics card, it would be very common for those to have more than one double EPROM module.

Q. Okay. I'd like to skip ahead to page 66 of your declaration. On page 66, there's a paragraph 142 where you start off by saying that "A person of skill in the art would have recognized that Hellman's approach does not protect against tampering once the authorized use value M is stored in the non-volatile Memory 37 of the base unit 12."

Do you see that?

A. I do.

Q. What do you mean by that sentence?

A. I should be really careful about this. What Hellman actually explains is that if one could obtain the authorized use value M and modify it in non-volatile Memory 37, base unit 12, one could cheat the system and bypass authorization.

But he then recommends physical protection mechanisms to prevent that from happening. He recommends that one use epoxy or some other physical barrier material to keep people away from that.

A truly dedicated thief could grind back that epoxy and try to get access, which Hellman further

explains would be discouraged if you would void the warranty.

But from the perspective of a security professional, it's often not best practice to store something in plain text. That's critical.

So here I explain that, and I explain that that would have been a motivation, because that data was tamperable, to encrypt it.

Q. And Hellman itself does not disclose encrypting that value. Is that accurate?

A. Correct. Hellman recommends physical protection.

Q. Right. So Hellman relies on effectively hiding that value M in that non-volatile Memory 37. Is that accurate?

MR. CANAVERA: Objection to form.

THE DEPONENT: I wouldn't call it "hiding." But locking it up, physically protecting it. He doesn't teach against any other type of protection. He doesn't disclose any problems with encryption. But he doesn't directly teach further encryption of M as well.

Q. But making M inaccessible to the user is important to Hellman, right?

MR. CANAVERA: Objection, form, foundation.

THE DEPONENT: He discusses that if you don't make it difficult to alter M, then your security might not

be as good.
BY MR. GOSSE:
Q. Okay. I want to look just a little bit at the Chow reference, which is Exhibit 1005 in both of the matters. Do you have that one?
A. I do.
Q. And there's a flow chart, Figure 10, that I'd like to discuss with you.
A. Okay.
Q. Do you understand generally what Figure 10 illustrates?
A. I haven't looked at Figure 10 for a while. I don't remember opining on Figure 10. Is that in my report, my declaration?
Q. It may not be. Why don't you take just a minute. The text that describes Figure 10 is available starting in column 8, around line 42.
A. I'll take a look, but that's a pretty complicated drawing.
Q. Sure.
MR. CANAVERA: David, you said "Hellman." I think you meant Chow, right?
MR. GOSSE: I did mean Chow. I apologize.
THE DEPONENT: I've taken a quick look at that.
////////////////////////////////

BY MR. GOSSE:

Q. Okay. Generally familiar?

A. Generally.

Q. Okay. Perfect.

What does Figure 10 generally describe?

MR. CANAVERA: Objection, scope.

THE DEPONENT: Figure 10 illustrates the process executed by the security function according to the second embodiment.

BY MR. GOSSE:

Q. Okay. Does it also illustrate execution of BIOS routines?

MR. CANAVERA: Objection, scope.

THE DEPONENT: Box 127 does say "execute BIOS routine."

BY MR. GOSSE:

Q. Okay. Over in column 8, starting around line 42, it talks about "the user executes a boot-up command." Do you see that?

A. Yes.

Q. What would a boot-up command do in the context of a computer system?

A. It would be different in different computer systems. My understanding here is that this particular boot-up command begins the process in Figure 10.

Q. Okay. What does -- do you know what "post" stands for in the context of a computing system?

A. Well, in some computer systems it stands for "power-on self-test." And I believe that's what it means here.

Q. Is that typically understood to be part of a BIOS functionality?

A. It depends what computer. Some computers, it is.

Q. Okay. Would you understand the process illustrated in Figure 10 as being part of a BIOS routine?

MR. CANAVERA: Objection, scope.

THE DEPONENT: Well, at least a portion of what's illustrated in Figure 10 is a BIOS routine. It says so.

BY MR. GOSSE:

Q. Would the portion labeled "102. Execute post" be part of the BIOS routine?

MR. CANAVERA: Objection, scope.

THE DEPONENT: I think it probably would, since Figure 7 shows the post as being in the BIOS memory.

BY MR. GOSSE:

Q. Okay. What about the Box 127? Do you see that one?

A. There's three of them.

Q. So there are. There is one that's labeled "End boot-up." Do you see that one?

A. Yes.
Q. What do you understand that box to mean in the context of Figure 10?
MR. CANAVERA: Objection, scope.
THE DEPONENT: I haven't really studied that. It's something that happens. A setup mode is a note.
Again, that really wasn't part of my opinion, so I haven't looked at it in any detail.
BY MR. GOSSE:
Q. So as you sit here today, you don't have much in the way of an opinion on that?
A. I do not.
Q. Flipping over to Figure 7 in Chow --
A. Yes.
Q. -- there's two entries in Figure 7, Password 1 and Password 2. Do you see those?
A. I do.
Q. Would it be possible for a user to overwrite those memory locations, effectively deleting Password 1 or Password 2 in that memory location?
MR. CANAVERA: Objection, form, foundation.
THE DEPONENT: I believe in some circumstances you can. There's a process described in Chow of changing your password.

BY MR. GOSSE:

Q. So you'd have to use the process described by Chow in order to change your password. Is that accurate?

MR. CANAVERA: Objection, form and foundation.

THE DEPONENT: I don't know. Again, I haven't studied that particular issue as to whether or not there are other ways to change your password in his particular system.

BY MR. GOSSE:

Q. Okay. So you don't have an opinion about whether it's possible to delete Password 1 or Password 2 using means other than the means described by Chow?

A. Not at this time, no.

MR. GOSSE: That being the case, I don't have any further questions, for the time being.

MR. CANAVERA: Let's take a break here, David. I'll need to -- Due to the two cases, I'll need to talk to Roku's and Vizio's counsel briefly and then we can come back here and see if we have any redirect.

MR. GOSSE: Sure, that works. Five minutes?

MR. CANAVERA: Let's set it for 10, and if we can, we'll come back quicker.

MR. GOSSE: Perfect. Sounds good. Thanks.

MR. CANAVERA: Thanks.

(Recess held at this time.)

MR. CANAVERA: This is Kyle Canavera. The petitioners, Nintendo and Roku and Vizio, do not have any redirect.

COURT REPORTER: Kyle, to you need a copy of this?

MR. CANAVERA: Sure.

COURT REPORTER: Mr. Wright, do you need a copy?

MR. WRIGHT: Yes, we would. Standard delivery is fine.

(Deposition concluded at 1:36 p.m.)

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I, DR. ANDREW WOLFE, do hereby certify under penalty of perjury that I have read the following transcript of my deposition taken on April 22, 2022; that I have made such corrections as appear on the Deposition Errata Page, attached hereto, signed by me; that my testimony as contained herein, as corrected, is true and correct.

Dated this _____ day of _____, 2022, at _____ California.

_____

DR. ANDREW WOLFE

DEPOSITION OFFICER'S CERTIFICATE

STATE OF CALIFORNIA )
COUNTY OF LOS ANGELES )

I, Jerry Lefler, a Certified Shorthand Reporter, do hereby certify:

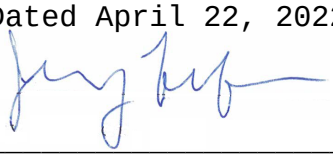
That prior to being examined, the witness in the foregoing proceedings was by me duly sworn to testify to the truth, the whole truth, and nothing but the truth;

That said proceedings were taken before me at the time and place therein set forth and were taken down by me in shorthand and thereafter transcribed into typewriting under my direction and supervision;

I further certify that I am neither counsel for, nor related to, any party to said proceedings, nor in any way interested in the outcome thereof.

In witness whereof, I have hereunto subscribed my name.

Dated April 22, 2022



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Jerry Lefler, CSR #14404

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DR. ANDREW WOLFE DATE