

Dr. Andrew Wolfe
April 22, 2022

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
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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.

1 Q. I assume you've had your deposition taken before.

2 A. I have.

3 Q. Okay. Well, I'll keep the introductions short.

4 The thing I like to always say is that as the witness,
5 you're entitled to a clear question. So if you don't
6 understand something I've asked, just let me know and I'll
7 try to rephrase it in a way that makes more sense to you.

8 Is that okay?

9 A. That's fine.

10 Q. Okay. And on the flip side, I appreciate a clear
11 answer wherever possible, so I might follow up with you on
12 occasion, and I hope you don't mind that.

13 A. Okay.

14 Q. Just since we are remote, I'd like to confirm
15 with you that there's no one else in the room with you
16 there on your end.

17 A. There is no one else here.

18 Q. Okay. Are you in any -- are you in communication
19 with anyone else from where you sit right now aside from
20 the people on the video chat?

21 A. No.

22 Q. Okay. Do you have any communication devices in
23 the room with you right now?

24 A. There's lots of computers, but this is the only
25 one that's turned on.

1 Q. Okay. That works.

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

6 A. I understand.

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

10 A. No.

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

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

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

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

21 A. It varies over time.

22 Q. In the last two years maybe?

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

1 Q. Okay. All right.

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

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

10 A. Can I open this?

11 Q. Yes, please.

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

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

19 MR. WRIGHT: Okay. Thank you.

20 THE DEPONENT: Okay. I have those two
21 declarations.

22 BY MR. GOSSE:

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

25 My understanding after review of both of the

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

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

6 Q. Okay. Perfect.

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

10 A. Okay.

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

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

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

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

22 A. Okay.

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

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

1 2021.

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

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

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

9 A. Yes.

10 Q. Okay. Great.

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

14 A. Yes.

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

18 A. Yes.

19 Q. What sort of things did you do?

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

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

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

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

12 A. I do.

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

17 A. Yes.

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

21 MR. CANAVERA: Objection, form.

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

24 BY MR. GOSSE:

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

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

3 MR. CANAVERA: Objection, form.

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

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

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

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

19 A. Yes.

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

22 A. As of 1998 or as of today?

23 Q. As of 1998.

24 A. Yes.

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

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

2 A. Yes.

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

6 MR. CANAVERA: Objection, form.

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

9 BY MR. GOSSE:

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

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

18 Do you see that?

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

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

25 A. Not necessarily. They could be an academic.

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

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

9 MR. CANAVERA: Objection, form.

10 THE DEPONENT: Some people would.

11 BY MR. GOSSE:

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

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

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

20 MR. CANAVERA: Objection, form.

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

25 MR. GOSSE: Okay.

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

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

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

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

9 Q. A customer in what sense?

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

13 Q. Okay.

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

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

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

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

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

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

1 MR. CANAVERA: Form.

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

4 BY MR. GOSSE:

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

6 A. Yes.

7 Q. Okay. What was their general reputation as of
8 1996?

9 A. 1996?

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

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

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

16 MR. CANAVERA: Objection, form.

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

19 BY MR. GOSSE:

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

22 MR. CANAVERA: Objection, form.

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

25 MR. GOSSE: Okay.

1 Q. How about Sun Microsystems? Are you familiar
2 with them in that time period?

3 A. I am.

4 Q. What was their general reputation?

5 A. They were in transition at the time. They were
6 moving towards being more of a system solution web
7 infrastructure supplier and away from microprocessor
8 design. But they did still have microprocessor design
9 teams at that time. And they did design their own
10 computer systems in some cases.

11 Q. Was Intel involved in designing hardware at the
12 time?

13 A. Yes. They designed chips. They designed some
14 computer systems at the time.

15 Q. Okay. And memory chips being one example of
16 those?

17 A. They were just doing flash memory at the time. I
18 don't remember them doing any other memory chips at that
19 time.

20 Q. So they were developing flash memory around that
21 time?

22 A. They did cache memory chips as well.

23 Q. So, is it accurate to say that Intel, as of -- in
24 the 1996 to 1998 period, they were developing flash clips.
25 Is that what you said?

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

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

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

7 A. Not that I'm aware of.

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

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

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

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

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

19 A. Yes.

20 Q. What was the nature of their business?

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

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

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

4 MR. CANAVERA: Objection in form, scope.

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

8 Q. Okay.

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

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

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

18 A. Yes.

19 Q. Okay.

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

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

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

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

4 MR. CANAVERA: Objection, form, scope.

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

7 BY MR. GOSSE:

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

11 MR. CANAVERA: Objection, form, scope.

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

14 BY MR. GOSSE:

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

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

19 Q. Okay.

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

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

25 A. Yes.

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

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

7 A. Okay.

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

10 A. October 24th, 2000.

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

13 A. I don't know.

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

16 MR. CANAVERA: Objection to the form.

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

21 BY MR. GOSSE:

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

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

1 Q. Okay. Okay.

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

6 Do you mind flipping over to the 592 patent?

7 A. Yes.

8 Q. Okay.

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

11 MR. GOSSE: Sure thing, yep.

12 MR. CANAVERA: Okay. I'm ready.

13 BY MR. GOSSE:

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

16 A. Yes.

17 Q. What is it?

18 A. September 1st, 1998.

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

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

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

25 A. Yes.

1 Q. I'll note that's Exhibit 1019 in the Roku matter.

2 A. Yes.

3 Q. And what's the issue date of the 594 patent?

4 A. November 10th, 1998.

5 Q. Are you aware of any evidence showing that the
6 594 patent was publicly available sometime before
7 November 10th, 1998?

8 A. I'm not currently aware of such evidence.

9 Q. Okay. Let's flip over to page 21 of your
10 declaration.

11 A. Okay.

12 Q. The top of that page begins a section titled
13 "Claim Construction." Do you see that?

14 A. I do.

15 Q. Great. And paragraph 58 indicates that you have
16 "interpreted the challenged claims as they would have been
17 understood by a person of skill in the art." Is that
18 accurate?

19 A. Yes. At the time of the invention.

20 Q. Perfect. Just so we're clear, what you mean by
21 that, did you give meaning to claim terms other than what
22 you consider their plain and ordinary meaning?

23 MR. CANAVERA: Objection, form.

24 THE DEPONENT: No. Although I think it's more
25 accurate to say I gave them their plain and ordinary

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

4 BY MR. GOSSE:

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

8 MR. CANAVERA: Objection, form.

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

12 BY MR. GOSSE:

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

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

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

19 A. I don't recall.

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

22 MR. CANAVERA: Objection, form.

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

1 a person of ordinary skill in the art.

2 BY MR. GOSSE:

3 Q. Did you base that plain meaning on any particular
4 dictionary definitions or definitions beyond sort of the
5 Webster's type ordinary definition?

6 MR. CANAVERA: Objection, form.

7 THE DEPONENT: I just interpreted the words using
8 their ordinary English meaning to a person of ordinary
9 skill in the art, in context.

10 There was one exception. And that was it was my
11 understanding that -- Well, no, not "exception." It's
12 still plain meaning. So...

13 BY MR. GOSSE:

14 Q. So no terms -- no terms that you gave any meaning
15 to other than the plain meaning.

16 A. Correct.

17 Q. We're going to talk a little bit about the
18 Hellman patent, which is Exhibit 1004 in both matters.

19 We'll probably be jumping back and forth between
20 your report and that reference for just a little bit.

21 A. Okay.

22 Q. There's a paragraph in your report, it's on page
23 26, paragraph 68 is the paragraph. And towards the bottom
24 of the page it describes a variety of reasons why an
25 Authorization A cannot be reused. Do you see that?

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

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

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

10 Do you see that?

11 A. Yes.

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

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

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

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

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

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

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

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

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

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

21 A. Correct.

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

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

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

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

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

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

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

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

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

23 Q. Sure. Okay.

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

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

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

5 A. Yes.

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

9 MR. CANAVERA: Objection, form.

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

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

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

23 BY MR. GOSSE:

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

1 you mean by that?

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

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

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

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

20 A. Not unless you had some additional information.

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

25 How does that work?

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

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

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

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

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

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

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

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

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

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

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

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

12 Q. Okay. Perfect.

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

16 A. Not by name, he does not.

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

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

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

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

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

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

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

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

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

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

18 A. Not necessarily.

19 Q. Would that be true for DOS?

20 MR. CANAVERA: Objection, form.

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

24 BY MR. GOSSE:

25 Q. Okay. Were there examples of general purpose

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

3 MR. CANAVERA: Objection, form, scope.

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

6 BY MR. GOSSE:

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

10 MR. CANAVERA: Objection, form, scope.

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

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

19 BY MR. GOSSE:

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

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

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

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

5 A. Okay.

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

7 A. Yes.

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

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

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

16 MR. CANAVERA: Objection, form.

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

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

23 BY MR. GOSSE:

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

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

3 MR. CANAVERA: Objection, form, scope.

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

7 BY MR. GOSSE:

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

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

11 MR. CANAVERA: Objection, form.

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

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

19 BY MR. GOSSE:

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

25 Would you agree that that refers to a computer

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

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

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

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

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

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

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

20 MR. CANAVERA: Objection, form.

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

23 BY MR. GOSSE:

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

1 computer?

2 MR. CANAVERA: Objection, form, scope.

3 THE DEPONENT: As of 1998?

4 BY MR. GOSSE:

5 Q. Yes.

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

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

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

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

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

18 MR. GOSSE: Ten minutes. Is that good?

19 MR. CANAVERA: Works for me.

20 (Recess held at this time.)

21 MR. GOSSE: Back on the record.

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

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

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

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

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

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

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

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

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

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

20 MR. CANAVERA: Objection, foundation.

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

25 But I don't recall whether or not faster ones

1 were available and just too expensive for the kinds of
2 commercial systems that I was working with at the time.

3 BY MR. GOSSE:

4 Q. When you say "general purpose storage," would
5 DRAM be the ordinary alternative, or were you thinking
6 about other non-volatile storage devices?

7 A. Well, at the time, main memory would have been
8 DRAM in most computer system, and then long-term
9 non-volatile storage would have been hard drives in most
10 computer systems at that time.

11 Q. Why did long term non-volatile storage use hard
12 drives instead of EPROMs?

13 MR. CANAVERA: Objection, foundation.

14 THE DEPONENT: They were cheap per unit storage.

15 BY MR. GOSSE:

16 Q. Okay. Down below, you mention that "A typical
17 computer as of May 1998 would have had less than five such
18 EPROM modules."

19 A. I'll be really careful. We don't call them
20 "EPROMs." We call them EEPROMS. Because there's a
21 different device called an EPROM. So I just want to make
22 sure that the court reporter is getting that. I assume
23 that's what you're talking about: E-E-P-R-O-M.

24 Q. That's right, yes.

25 A. Okay. I did say that a typical computer would

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

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

4 A. It would depend on the --

5 MR. CANAVERA: Objection, form.

6 THE DEPONENT: It would depend on the computer.

7 So, at that time, situations where you'd have more than
8 one might be if you had put that computer together from
9 multiple suppliers. So if you had gotten the network card
10 from one supplier, graphics card from another, each of
11 those might have had a double EPROM module.

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

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

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

20 THE DEPONENT: I would not agree with that.

21 BY MR. GOSSE:

22 Q. Why not?

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

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

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

5 Q. Okay. I'd like to skip ahead to page 66 of your
6 declaration. On page 66, there's a paragraph 142 where
7 you start off by saying that "A person of skill in the art
8 would have recognized that Hellman's approach does not
9 protect against tampering once the authorized use value M
10 is stored in the non-volatile Memory 37 of the base unit
11 12."

12 Do you see that?

13 A. I do.

14 Q. What do you mean by that sentence?

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

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

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

1 explains would be discouraged if you would void the
2 warranty.

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

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

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

11 A. Correct. Hellman recommends physical protection.

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

15 MR. CANAVERA: Objection to form.

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

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

23 MR. CANAVERA: Objection, form, foundation.

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

1 be as good.

2 BY MR. GOSSE:

3 Q. Okay. I want to look just a little bit at the
4 Chow reference, which is Exhibit 1005 in both of the
5 matters. Do you have that one?

6 A. I do.

7 Q. And there's a flow chart, Figure 10, that I'd
8 like to discuss with you.

9 A. Okay.

10 Q. Do you understand generally what Figure 10
11 illustrates?

12 A. I haven't looked at Figure 10 for a while. I
13 don't remember opining on Figure 10. Is that in my
14 report, my declaration?

15 Q. It may not be. Why don't you take just a minute.
16 The text that describes Figure 10 is available starting in
17 column 8, around line 42.

18 A. I'll take a look, but that's a pretty complicated
19 drawing.

20 Q. Sure.

21 MR. CANAVERA: David, you said "Hellman." I
22 think you meant Chow, right?

23 MR. GOSSE: I did mean Chow. I apologize.

24 THE DEPONENT: I've taken a quick look at that.

25 //////////////////////////////////////

1 BY MR. GOSSE:

2 Q. Okay. Generally familiar?

3 A. Generally.

4 Q. Okay. Perfect.

5 What does Figure 10 generally describe?

6 MR. CANAVERA: Objection, scope.

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

10 BY MR. GOSSE:

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

13 MR. CANAVERA: Objection, scope.

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

16 BY MR. GOSSE:

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

20 A. Yes.

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

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

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

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

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

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

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

11 MR. CANAVERA: Objection, scope.

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

14 BY MR. GOSSE:

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

17 MR. CANAVERA: Objection, scope.

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

20 BY MR. GOSSE:

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

23 A. There's three of them.

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

1 A. Yes.

2 Q. What do you understand that box to mean in the
3 context of Figure 10?

4 MR. CANAVERA: Objection, scope.

5 THE DEPONENT: I haven't really studied that.
6 It's something that happens. A setup mode is a note.

7 Again, that really wasn't part of my opinion, so
8 I haven't looked at it in any detail.

9 BY MR. GOSSE:

10 Q. So as you sit here today, you don't have much in
11 the way of an opinion on that?

12 A. I do not.

13 Q. Flipping over to Figure 7 in Chow --

14 A. Yes.

15 Q. -- there's two entries in Figure 7, Password 1
16 and Password 2. Do you see those?

17 A. I do.

18 Q. Would it be possible for a user to overwrite
19 those memory locations, effectively deleting Password 1 or
20 Password 2 in that memory location?

21 MR. CANAVERA: Objection, form, foundation.

22 THE DEPONENT: I believe in some circumstances
23 you can. There's a process described in Chow of changing
24 your password.

25 //////////////////////////////////////

1 BY MR. GOSSE:

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

4 MR. CANAVERA: Objection, form and foundation.

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

9 BY MR. GOSSE:

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

13 A. Not at this time, no.

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

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

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

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

23 MR. GOSSE: Perfect. Sounds good. Thanks.

24 MR. CANAVERA: Thanks.

25 (Recess held at this time.)

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

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

6 MR. CANAVERA: Sure.

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

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

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

11 //////////////////////////////////////

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

19
20 Dated this ____ day of _____, 2022,
21 at _____ California.

22
23 _____
24 DR. ANDREW WOLFE
25

DEPOSITION OFFICER'S CERTIFICATE

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES)

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

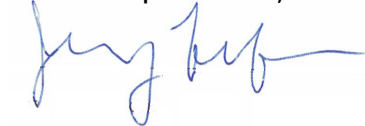
That prior to being examined, the witness in
the foregoing proceedings was by me duly sworn to
testify to the truth, the whole truth, and nothing but
the truth;

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



Jerry Lefler, CSR #14404

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