Transcript of Ayman Fayed, Ph.D.

Date: January 28, 2025
Case: ADC Solutions Auto, LLC -v- The NOCO Company (PTAB)

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ADC SOLUTIONS AUTO LLC,

Petitioner

V.

THE NOCO COMPANY,

Patent Owner.

Case IPR2024-00577 and IPR2024-00671

Patents 11,447,023 and 11,584,243

Virtual Deposition of AYMAN FAYED, Ph.D.

Tuesday, January 28, 2025

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Pages: 1 - 62

Reported Stenographically by:

Tiffany M. Pietrzyk, CSR RPR CRR

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Virtual deposition of AYMAN FAYED, Ph.D., pursuant to notice, before Tiffany M. Pietrzyk, a Certified Shorthand Reporter in the States of Illinois, Texas, and California, Registered Professional Reporter, Certified Realtime Reporter, and a Notary Public in and for the State of Illinois.

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A P P E A R A N C E S

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E X H I B I T S

(Attached to transcript.)

DEPOSITION EXHIBITS		PAGE
Exhibit 1001	U.S. Patent Number 11,447,023	55
Exhibit 1003	Declaration of Dr. C. Arthur MacCarley for U.S. Patent No. 11,447,023, dated 9/20/22	18
Exhibit 1005	U.S. Patent Application Publication Number U.S. 2013/0154543, dated 6/20/13	29
Exhibit 1006	U.S. Patent Number 9,391,467	37

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2 DEPOSITION EXHIBITS		PAGE
3 Exhibit 1012	Data sheet for XR3403,	54
4	DC/DC Converter, Bates	
5	number IPR2024-00577	
6 Exhibit 1025	Battery Charging	49
7	Specification, dated	
8	3/8/07, Bates numbers	
9	USPIF000001 to 30	
10 Exhibit 2011	Declaration of Dr. Ayman	13
11	Fayed for U.S. Patent No.	
12	11,447,023, dated 11/21/24	
13 Exhibit 2014	Declaration of Dr. Ayman	15
14	Fayed for U.S. Patent No.	
15	11,584,243, dated 11/21/24	

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1 P R O C E E D I N G S
2 (Witness sworn.)
3 WHEREUPON:
4 AYMAN FAYED, Ph.D.,
5 called as a witness herein, having been first duly
6 sworn, was examined and testified as follows:
7 EXAMINATION
8 BY MR. SMELCER:
9 Q. Good morning. Could you please state and
10 spell your name for the record?
11 A. Yes. My name is Ayman Fayed. Ayman is
12 A-y-m-a-n. Fayed is F-a-y-e-d.
13 Q. And is it okay if I address you as
14 Dr. Fayed?
15 A. Yes.
16 Q. Okay. And, Dr. Fayed, have you been deposed
17 before?
18 A. I have, yes.
19 Q. Okay. About how many times?
20 A. I want to say eight times off the top of my
21 head.
22 Q. Okay. And so you're most likely familiar

7

1 with some of this, but just to ensure we're on the
2 same page today, is it okay if we go over a few
3 ground rules?
4 A. Yes, please. No problem.
5 Q. Okay. Do you understand that you're here
6 today under oath with an obligation to provide
7 truthful and complete answers to my questions?
8 A. I do.
9 Q. Okay. Since we have a court reporter here
10 today transcribing your testimony, can we agree not
11 to speak over one another so we have an accurate
12 record?
13 A. Yes.
14 Q. And can you agree to let me know if I ask
15 another question before you have finished one of
16 your answers?
17 A. Yes.
18 Q. And to ensure we're getting accurate
19 testimony, can we make sure that we're giving
20 audible answers as opposed to a, you know, head or a
21 gesture, a nod, anything like that?
22 A. Yes.

8

1 Q. And can we agree that you'll let me know if
2 you don't understand one of the questions that I ask
3 today?
4 A. Yes.
5 Q. And we can take a break today anytime as
6 needed. The only thing that I'll ask is that you
7 answer any question that's pending before we go on a
8 break.
9 Is that fair?
10 A. Yes.
11 Q. Okay. And throughout the course of the
12 deposition today, can you let me know if you need to
13 supplement one of your answers?
14 A. Yes.
15 Q. Okay. Is there anything today that would
16 prevent you from truthfully or accurately answering
17 my questions?
18 A. No.
19 Q. And is it your understanding that you're
20 here today to provide testimony in connection with
21 two inter partes review proceedings?
22 A. Yes.

9

1 Q. Okay. And those proceedings relate to
2 NOCO's '023 and '243 patents?
3 A. That's correct.
4 Q. Okay. So you know which patents I'm
5 referring to if I use the terminology the
6 '023 patent and the '243 patent today?
7 A. Yes, yes, I do.
8 Q. Okay. And just to be clear for the record,
9 so the '023 patent, that's U.S. patent number
10 11,447,023. And the '243 patent is the patent
11 number 11,584,243.
12 Is that your understanding?
13 A. I believe that's correct, yes.
14 Q. Okay. And you submitted two declarations,
15 one for each patent in these proceedings; is that
16 right?
17 A. That is correct. One declaration for every
18 patent, yes.
19 Q. Okay. And would you agree there's a fair
20 amount of repetition between those two declarations?
21 A. That's true, yes. They are very similar.
22 Q. Okay. I'm going to ask some questions today

10

1 that I'll assume are applicable to both declarations
2 unless you tell me otherwise or unless the question
3 is directed to a specific patent.
4 Is that fair?
5 A. Yes, it is.
6 Q. Okay. What did you do today to prepare for
7 the deposition -- or sorry. Strike that.
8 What did you do to prepare for today's
9 deposition?
10 A. I read my declarations. I did study the
11 patents, very quick look on the patents one more
12 time. I look at some of the prior art that is
13 discussed in the report. That's primarily what I
14 have done.
15 Q. Okay. And approximately how long did you
16 spend reviewing those documents?
17 A. So I started the review over the weekend, so
18 I want to say in total, maybe ten hours.
19 Q. And did you -- I'm sorry. Go ahead.
20 A. Yeah, I said including the review that I did
21 yesterday as well.
22 Q. Okay. So ten hours total reviewing

11

1 documents approximately?
2 A. I think that would be fair, yes, correct.
3 Q. Okay. And did you speak with anyone during
4 your preparation?
5 A. I have -- yeah, I have spoken with my
6 attorneys.
7 Q. Okay. And who is that?
8 A. So that would be Joseph Sauer and Jack.
9 Q. Okay. And both of them are in the room with
10 you today?
11 A. Correct, yes.
12 Q. Okay. Is there anybody else in the room?
13 A. No.
14 Q. Okay. And besides these two attorneys, did
15 you speak to anybody else?
16 A. Regarding this case, I don't -- no, I did
17 not.
18 Q. Okay. So you didn't speak to anybody who is
19 not a lawyer in preparation for today's deposition?
20 A. Certainly not, no.
21 Q. Okay. In preparing your declarations, did
22 you speak to anyone who is not a lawyer for purposes

12

1 of preparing the declaration?
2 A. No.
3 Q. Okay. You didn't speak to anybody at NOCO?
4 A. No.
5 Q. In connection with your preparation for
6 today's deposition, did you review any materials
7 that are not identified in your declarations?
8 A. Yes, I did.
9 Q. And what were those materials?
10 A. That was a transcript of a prior deposition.
11 Q. And whose deposition was that?
12 A. It was my own deposition.
13 Q. And what case was that from?
14 A. That was a prior case that involved
15 similar -- involved some of the prior art.
16 Q. Was that a case before the International
17 Trade Commission?
18 A. Yes, that's correct.
19 Q. Was that transcript marked confidential?
20 A. Yes, it was.
21 Q. Okay. And it's my understanding that you
22 have a set of exhibits printed out and available to

EXHIBIT 1045
Petitioner ADC (IPR2024-00671)

13

1 you today; is that right?
2 A. Correct, yes.
3 Q. Okay. And are there any notations or
4 highlighting on these exhibits?
5 A. Not that I'm aware of. They're all --
6 they're all brand-new printed.
7 Q. Okay. And do you have any other notes or
8 reference materials in front of you today?
9 A. I do not, no.
10 Q. Okay. Bear with me a moment. I'm gonna go
11 ahead and upload one of the documents here.
12 MR. SAUER: Which document so I can grab it?
13 MR. SMELCER: Sure. It's gonna be
14 Exhibit 2011, Dr. Fayed's report for the
15 '023 patent.
16 (Exhibit 2011 was marked for
17 identification and is attached to the
18 transcript.)
19 MR. SMELCER: Okay. So I've uploaded
20 Exhibit 2011 from the IPR proceeding 2024-00577 for
21 the '023 patent.
22 ///

14

1 BY MR. SMELCER:
2 Q. Dr. Fayed, do you also have this document in
3 front of you, which is your declaration?
4 A. Yes, I do.
5 Q. Okay. And is this the declaration we talked
6 about earlier which you prepared in connection with
7 the '023 patent?
8 A. Yes, that's correct.
9 Q. Okay. And if we turn to the final page of
10 Exhibit 2011, do you see your signature there on the
11 final page?
12 A. Yes, I do.
13 Q. Okay. And so if we talk about your
14 declaration today, unless I talk about the
15 '243 patent, which is a separate declaration, do you
16 understand that we'll be referring to this exhibit
17 here, Exhibit 2011?
18 A. Yes, I understand.
19 Q. Okay. And did you write this declaration?
20 A. I have write -- I have written large
21 portions of the declaration, and the other parts
22 were written under my supervision and review.

15

1 Q. Approximately how long did you spend
2 preparing this declaration?
3 A. The declaration itself, since I started
4 working on it, I want to say something like 50,
5 50 hours, 50 to 60 hours. Something around that.
6 Q. Okay. And do you recall any major
7 differences between this declaration and the second
8 declaration you submitted for the '243 patent?
9 A. Major differences? I would say no, I don't
10 remember there were any major differences. The
11 second declaration was pretty much minor
12 modifications to the '023 one. So I don't recall
13 that there were anything major difference.
14 Q. Okay. And I'll go ahead, if we could please
15 also have you get out your copy of Exhibit 2014 in
16 the second IPR proceeding, which is your declaration
17 for the '243 patent.
18 (Exhibit 2014 was marked for
19 identification and is attached to the
20 transcript.)
21 A. Okay, I have that.
22 Q. Okay. And do you recall approximately how

16

1 long you spent preparing this second declaration for
2 the '243 patent?
3 A. I'm gonna say a fraction of the time that I
4 spent because a lot of it were identical to the
5 other declaration, so maybe -- maybe five hours.
6 Q. And if we turn to the final page of this
7 document, is that your signature on the final page?
8 A. Yes.
9 Q. Okay. And was the process of preparing this
10 declaration different or similar to your declaration
11 for the '023 patent?
12 A. It's very similar, yes.
13 Q. Okay. So wrote this declaration with the
14 assistance of others at your supervision?
15 A. That is correct.
16 Q. Okay. We can set that declaration aside.
17 And let's look back at your declaration for the
18 '023 patent.
19 A. Okay.
20 Q. Do you have that in front of you?
21 A. I do, yes.
22 Q. Okay. If we could please turn to the first

17

1 numbered page of this document, so that will be
2 page 1. I think it's about the fourth page in.
3 A. Yes, page number 1.
4 Q. Sure.
5 And do you see paragraph 3 there, you've
6 identified a list of materials that you considered
7 in preparing your declaration?
8 A. Yes, I do see that.
9 Q. Okay. And are you aware of any materials
10 that are exhibits in this proceeding that you did
11 not consider?
12 A. That I did not consider? The list of the
13 material listed here, this is what I considered for
14 this report.
15 Q. Okay.
16 A. Yeah.
17 Q. And so if we look through the subsections
18 for paragraph 3, do you see that, when we get down
19 to subsection N, compared to subsection O, there are
20 a number of exhibits that aren't listed there, such
21 as Exhibit 1022, 1023, and 1024.
22 Do you see that?

18

1 A. I do not. Are you referring to page
2 number 1 or page number 2 now?
3 Q. This is on page 2 now.
4 A. Oh, on page 2 and then you're asking about
5 items M and N?
6 Q. Sorry. Between N and O, there's a few
7 exhibits there that aren't listed which would be
8 Exhibit 1022, 1023, and 1024.
9 A. I'm not sure what you're referring to,
10 Counsel. I mean, I'm looking at N -- you're saying,
11 between N and O, there are exhibits that are not
12 listed? Is that what you are saying?
13 Q. Sure. I think it will help if we take a
14 look at a document, so if we could please pull out
15 Exhibit 1003, which is Dr. MacCarley's declaration
16 in IPR proceeding 2024-00577.
17 MR. SMELCER: And I'll go ahead and upload
18 that now.
19 (Exhibit 1003 was marked for
20 identification and is attached to the
21 transcript.)
22 A. Okay. So I have Exhibit 1003.

19

1 Q. Okay. Great. And if you could please turn
2 to -- if you could please turn to page 6 of
3 Exhibit 1003 and let me know when you're there?
4 A. Yes, I'm there.
5 Q. Okay. And if we look at page 6 of
6 Exhibit 1003, then leading on to the next page,
7 page 7, do you see that there's some exhibits listed
8 there, Exhibit 1022, 1023, and 1024?
9 A. I see -- that's in page 6 and it's 1022,
10 1023, and 1024. I am seeing this list, yes.
11 Q. Okay. So if we just take a look at
12 Exhibits 1022, and 1023, do you see that those
13 exhibits are identified as the Chinese and certified
14 English translations of a utility model patent
15 numbered CN 203788026 U?
16 A. Yes, I see that.
17 Q. Okay. And then, if we could please turn
18 back to your declaration, paragraph 3 that we were
19 looking at before?
20 A. Okay.
21 Q. I just wanted to confirm, so you did not
22 consider Exhibits 1022 and 1023 in connection with

20

1 your declaration?
2 A. Okay. So I did consider the Chinese utility
3 model patent. We call it the Yu patent, and that
4 one is listed under item F in the list of documents
5 that I considered. These are the ones, that Yu
6 patent is the one that I considered.
7 Now, this patent listed here in page 6 of
8 the petition, which is 1022, 1023, I have to go
9 compare the numbers, but it appears that the numbers
10 are different. So unless -- I want to go and look
11 at the '243 list of items considered because I know
12 that there was an extra prior art, I believe, in the
13 '243, but I don't remember whether it would be that
14 one or not. Like, I don't remember the numbers.
15 Q. Okay. Well, we can turn to Exhibit 2014,
16 then, which is your declaration for the '243 patent.
17 A. Okay.
18 Q. If you could please confirm that Exhibits
19 1022 and 1023 are also not identified in your list
20 of materials considered?
21 A. So I do not see that particular number
22 listed in '243. So based on that list in both

21

1 declarations, that document is not listed.
2 Q. Okay. And are you aware why you did not
3 consider that document?
4 MR. SAUER: Objection. Form.
5 A. I have to look at my folder where -- I mean,
6 maybe I have read it, but I -- what I know for sure
7 is the list of documents listed in my report, this
8 is what I considered for the purpose of writing the
9 report. So if it's not listed there, then I didn't.
10 Q. Okay. And so then that would mean that
11 you've not considered every document that was
12 considered by Dr. MacCarley?
13 MR. SAUER: Objection. Form.
14 A. Well, I can tell you that I have read his
15 declaration and I have studied all the points that
16 he is referring to in his declaration. But if
17 it's -- if I didn't list it in this report, in my
18 own report, then I didn't rely on something from it
19 for the purpose of my report.
20 Q. Understood. If we could please turn back to
21 your declaration for the '023 patent, which, again,
22 for the record, is gonna be Exhibit 2011, and if we

22

1 could please turn to page 35, and feel free to let
2 me know when you're there.
3 A. Okay. I'm there.
4 Q. Okay. And do you see in the first sentence
5 of paragraph 70, you're talking about the duration
6 of a jump start?
7 A. Yes, correct.
8 Q. Okay. And so is it your opinion that a jump
9 start is gonna require power to be discharged for
10 approximately 20 to 50 milliseconds from the
11 batteries of the jump starter device?
12 A. That's the typical range that you would
13 expect for a jump starter to be able to provide the
14 peak current for in order to jump-start the vehicle.
15 Q. Okay. So is power being provided outside of
16 that 20-to-50-millisecond window?
17 A. Not the peak amount. The peak current is
18 basically what jump-starts the vehicle, and that's
19 what you need to provide for that period of time.
20 What happens after that will depend on what happened
21 to the vehicle. If the vehicle started, then, you
22 know, your alternator is running and now the battery

23

1 is running. So how much power will be transferred
2 during that period, I did not really look into that.
3 Q. And so if we were gonna assume, for the sake
4 of an example, that we have a jump starter that's
5 gonna discharge power at 12 volts with a peak
6 current of 1,000 amps for 20 to 50 milliseconds, can
7 you use those numbers to calculate how much power is
8 being discharged?
9 MR. SAUER: Objection. Form.
10 A. Theoretically, you could. I mean, power is
11 basically rate of energy. And if you have the
12 voltage and if you have the amount of current that
13 you are discharging during that period of time, you
14 can multiply V times I and integrate that over the
15 period of time where you are consuming that power,
16 and that will give you the total energy that you
17 have transferred during that time.
18 Q. Okay. So in this example, if we multiply
19 our 1,000 peak amps by our 12 volts, that's going to
20 give us the amount of watts?
21 A. That will give you that, what we call the
22 instantaneous power, the instantaneous power, and/or

24

1 the rate of energy, if you will. Now, if you take
2 that number and multiply it by the period of time,
3 20 to 50 milliseconds, that will give you the total
4 energy during that period of time that you
5 transferred.
6 Now, of course, there are a lot of
7 mathematical assumptions for you to be able to do
8 that. For example, you will have to assume that the
9 12-volt is actually remaining fixed at 12 during the
10 entire duration. You'll also have to assume that
11 the amount of current, which is 1,000-amp that
12 you're referring to, is also fixed during that
13 duration. If they are, then it's a simple
14 multiplication, as I described earlier. If they're
15 not, then you're gonna have to find the waveform and
16 perform an actual integration to be able to figure
17 it out.
18 Q. And so if I have 20 to 50 milliseconds of
19 time in this example, if I divide that by 3600,
20 that's gonna give me hours, the amount of hours that
21 are gonna be involved in this jump start?
22 A. Yeah. If you want to transfer millisecond

25

1 to hours, then you have to divide by 1,000 first to
2 get it in seconds and then you divide by 60 to get
3 it in minutes and then you divide by another 60 to
4 get it in hours. So I think the 5600 that you're
5 referring to is only 60 times 60, so you would be
6 missing another factor of 1,000 there.
7 Q. Got it. And so if I wanted to determine a
8 reasonable estimate of the amount of power that's
9 gonna be consumed under this scenario, I would take
10 my 20 to 50 milliseconds and convert it into hours,
11 multiply by my volts and my 1,000 peak amps, and
12 that's going to give me an estimate of my watt hours
13 that are used for this jump start?
14 A. Okay. I just want to make sure we don't
15 conflate power and energy because they're two
16 different things. Right? So what you're referring
17 to just now, that will give you the total energy
18 during that period of time. So you would be correct
19 there, yes. If you take the 20 to 50 millisecond,
20 convert that to hours, take that and multiply by the
21 voltage and current, it will give you the total
22 energy that was transferred during that period of

26

1 time. This is under the assumption that the 12-volt
2 remains constant during that period and the
3 1,000-amp also remain constant during that same time
4 period.
5 Q. And if the 12-volt and the 1,000 amps did
6 not stay constant, would they be decreasing,
7 potentially, during that period?
8 A. I mean, they could be decreasing. They
9 could be increasing. It really depends on what they
10 are going to. Right? I mean, they could be spiking
11 upward. They don't have to be decreasing. If you
12 have a little bit of an extra impedance in the path,
13 for example, of the load that you're transferring
14 that to, then that 1,000-amp can cause the voltage
15 to spike above 12. Or if you have any drew [sic].
16 So I cannot tell you if -- I cannot tell you
17 exactly how it will move, but it is definitely
18 conceivable that it can go up or down. There are a
19 variety of reasons that can cause it to behave in
20 either way.
21 Q. Got it. And so this calculation we've run
22 of peak amps times volts times hours is going to

27

1 give us, in watt hours, a reasonable estimate of how
2 much energy has been discharged from our jump
3 starter battery during one jump start?
4 A. That would be correct, yes.
5 Q. And if we turn to a few sentences down in
6 this paragraph 70, which is on page 35 of
7 Exhibit 2011, do you see that you're talking about a
8 peak current need typically between 1,000 and
9 4,000 amps for a jump starter?
10 A. That is correct, yes, I see that.
11 Q. Okay. And do you see that you did not cite
12 any documents here to support these amp values?
13 A. I do not see citation, no.
14 Q. Okay. And are you aware of a specific
15 vehicle that, as of July 2, 2014, would have
16 required 4,000 amps to be jump-started?
17 MR. SAUER: Objection. Form.
18 A. I cannot tell you that. I cannot tell you,
19 like, there was a specific vehicle that would
20 require 4,000 amps. I cannot identify or tag a
21 specific tag -- a specific vehicle for that, no.
22 Q. What about 3,000 amps? Can you think of a

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1 specific vehicle or engine that would need that
2 amount of peak amps?
3 A. Not a specific vehicle, no. The way these
4 numbers came about is that I actually looked at the
5 variety of jump starters and I looked at their
6 specifications in terms of peak current. So it was
7 not driven by a vehicle, it was driven by devices.
8 Q. And were these devices devices that are on
9 the market today?
10 A. Many of them, I believe, are on the market
11 today or remain to be on the market today, yes.
12 Q. Did you confirm whether any of those devices
13 were marketed with these peak amp values before
14 July 3, 2014?
15 A. I cannot confirm that, no. I looked at a
16 variety of devices available in the marketplace and
17 I looked at their specifications. I didn't look at
18 specific dates as of what these specs were in 2014
19 or before 2014. Unless, obviously, vehicle
20 specifications changed dramatically from 2014 until
21 now, I have no reason to think that it would have
22 been any different.

29

1 Q. But you did not review any documents to
2 confirm that?
3 A. No, I have not.
4 Q. And are you aware of any engines that
5 existed before July 3, 2014, that used a 48-volt
6 starter system?
7 A. I cannot identify a specific vehicle that
8 would use 48-volt. I know from my experience in the
9 field that there has been a lot of research being
10 done, a lot of work on the vehicle electrical system
11 and that 48-volt was one of the voltage levels that
12 were known. But I can't tell you, like, a specific
13 car model, for example, that had that.
14 Q. Okay. If we could set aside this exhibit
15 and turn to Exhibit 1005, which is the Richardson
16 reference.
17 MR. SMELCER: And I will go ahead and upload
18 that now.
19 (Exhibit 1005 was marked for
20 identification and is attached to the
21 transcript.)
22 A. Yeah, I have it ready, Paul -- Counsel.

30

1 Q. Great. Thank you. I will upload it now.
2 If we could please turn to paragraph 55 of
3 the Richardson reference, which is going to be on
4 page 18. If you could please let me know when
5 you're there.
6 A. Okay, I am at page 18. Which specific
7 paragraph?
8 Q. Paragraph 55, please.
9 A. Yes, I am there.
10 Q. Okay. And do you see in the middle of this
11 paragraph, the references discuss an example where
12 capacitors 21 and jump starter batteries can be
13 fully recharged in about 1 to 5 minutes?
14 A. Yes, the full statement says, "This allows
15 the capacitor 21 and jump starter batteries 22 to be
16 fully recharged in about 1 to 5 minutes and can
17 therefore start many vehicles in a row without
18 becoming discharged."
19 Q. And then do you see in the second -- sorry.
20 Strike that.
21 Do you see in the next sentence that the
22 Richardson reference goes on to describe that in

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1 this example where the batteries don't have enough
2 power, you could use the capacitors to perform a
3 jump start?
4 A. Yes. If you don't mind, I will just read
5 the sentence out loud. It says, "Even in situations
6 in which the jump starter batteries 22 may be
7 discharged to an extent that they alone may not be
8 able to provide the necessary power to start a
9 vehicle, the capacitors 21 may be rapidly recharged
10 to start many vehicles in a row."
11 Q. And so is this sentence explaining that
12 you're able to jump-start a car using just the
13 capacitors?
14 A. Well, the sentence itself is not saying
15 that. It says that if the battery is discharged, so
16 it has limited ability in providing you the peak
17 current that you need, which by the way, does not
18 mean that the battery is necessarily empty, it just
19 is unable to provide the necessary peak current,
20 then the capacitor that is placed in parallel can
21 help with that process and provide that charge very
22 rapidly in order to jump-start the vehicle. Very

32

1 common practice, you know, in many electrical
2 systems where you have a big capacitor in parallel
3 to provide you a peak current that your energy
4 source may not be able to at this particular moment.
5 Q. In your experience, would it be possible to
6 jump-start a car using solely capacitors?
7 A. In my experience, no. These capacitors are
8 only transient. They help you provide -- supplement
9 the peak current if the main energy source is unable
10 to do that for one reason or another. But to
11 jump-start the capacitor -- the vehicles with a --
12 capacitors only, I am not aware of any device that
13 does that.
14 Q. So in your opinion, a capacitor would not be
15 able to store sufficient energy and be able to
16 supply enough peak current to jump-start a vehicle?
17 A. In my experience, it's always supplementary
18 source of energy for transient purposes, being able
19 to very rapidly give you a large amount of charge in
20 a brief period of time. That's what the capacitors
21 are for.
22 It's -- I can elaborate a little bit on the

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1 technical aspect for it, but what you -- what you
2 need to take into account, that the capacitor, the
3 voltage across a capacitor is a direct function of
4 the amount of charge stored on the capacitor,
5 meaning that once you start taking any charge from
6 the capacitor, the voltage on the capacitor will
7 drop. It will not stay the same. And that's the
8 biggest distinction between a capacitor and a
9 battery.
10 A battery is capable of giving you that
11 charge but maintaining the voltage. And remember
12 you need both. So the capacitor, once you start
13 taking that charge, the voltage will immediately
14 drop. And if it drops below what the other battery
15 is, then it's not gonna be able to do anything. In
16 fact, it might end up transferring energy on the
17 opposite direction. But the battery is what
18 maintains the voltage. So the capacitor is usually
19 added in parallel to be able to give you that
20 supplemental charge at the very rapid pace, and the
21 battery maintains the voltage. So it's complicated.
22 It's not a simple thing that I can just take a

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1 capacitor and use it for that purpose.
2 Q. What about an ultracapacitor? Would those
3 be sufficient to jump-start a vehicle?
4 A. I'm sorry. What about what type of
5 capacitor again?
6 Q. If you had a series of ultracapacitors
7 connected, would that be sufficient to jump-start a
8 vehicle?
9 A. A series of ultracapacitors?
10 Q. Yes.
11 A. I'm not sure what you mean by
12 ultracapacitors. What is that? Do you mean
13 supercapacitors? What is that term "ultra"?
14 Q. Why don't we go turn to page 15 of the
15 Richardson reference and look at paragraph 15.
16 Please let me know when you're there.
17 A. Yes, I'm there.
18 Q. Okay. And do you see that in paragraph 15,
19 the Richardson reference is talking about examples
20 of ultracapacitor cells and identifies the Boostcap
21 Energy Storage Module available from Maxwell
22 Technologies?

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1 A. Yeah. These are supercapacitors we also
2 call them. That's another expression for it, yes.
3 So he's citing, like, a specific product from a
4 company or something, Maxwell Technologies, so maybe
5 that's the name they call it. But it's a
6 supercapacitor. These are what we call
7 high-capacity capacitors. Yeah.
8 Q. And so if you had enough supercapacitors
9 connected in series, would you have enough energy
10 and peak current to be able to jump-start a vehicle?
11 A. I believe if they're fitted or they're
12 connected in parallel, not in series because when
13 you connect capacitors in series, you actually
14 reduce the capacitor. So I believe you are
15 referring they're connected in parallel, so you add
16 the charge up.
17 So you're saying -- well, these
18 supercapacitors, they do not alter the fundamental
19 behavior of a capacitor. A capacitor behaves
20 whether it's supercapacitor or any other type of
21 capacitor. It has the same impedance versus
22 frequency. The supercapacitors are just high

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1 capacity, meaning that they allow you to charge a
2 very large amount of -- to store a very large amount
3 of charge in a small volume.
4 If these capacitors are very high capacity,
5 then the drop in voltage as you take charge out is
6 going to be smaller. So if you have a very large
7 capacitor -- and by the way, a battery, you know how
8 like I say the battery will maintain the voltage as
9 you take charge? A lot of times, we model that as
10 if it's a very large capacitor, like a huge
11 capacitor. So it would all depend on the size of
12 these capacitors.
13 If you have a huge value capacitance, then
14 you could potentially use the 4,000 peak current
15 that you need out of it, and the voltage will not
16 drop to a level where the jump-starting process will
17 fail. So it's just a matter of what the size of
18 these capacitors are going to be. But in theory,
19 yes, if you have an infinite amount of capacitance,
20 you can do whatever you want to do with it, and the
21 voltage will remain the same.
22 Q. If we could please turn to Exhibit 1006,

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1 which is the Zhao reference, and please let me know
2 when you have that in front of you.
3 A. Okay.
4 (Exhibit 1006 was marked for
5 identification and is attached to the
6 transcript.)
7 A. I do.
8 MR. SMELCER: Okay. I'm gonna go ahead and
9 upload this.
10 Q. If we could please turn to page 11 of
11 Exhibit 1006. Please let me know when you're there.
12 A. I'm there.
13 Q. Okay. And if we look at column 4 of the
14 Zhao reference, lines 40 to 41, there's an example
15 there that's talking about a final voltage that can
16 be about 8.4 volts.
17 Could you please let me know when you're
18 there?
19 A. Yes, I am there. And if I read the full
20 sentence, if that's okay, "When battery voltage
21 V BAT is greater than threshold voltage
22 V threshold 1 but less than the final voltage V CV

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1 (for example, final voltage V CV can be about
2 8.4-volt if two lithium batteries are connected in
3 series), step-up converter control circuit 102 can
4 maintain output current I OUT at a predetermined
5 operating current" -- I think that's sufficient, I
6 guess, for your purpose.
7 Q. Uh-huh.
8 My specific question is in this example,
9 there's two lithium cells discussed.
10 What is the nominal voltage of these cells?
11 A. So lithium-ion batteries specifically, their
12 voltage obviously varied with time as you'll start
13 consuming but typically, for the most period of
14 time, usable time of the battery, it's about
15 3.6-volt. That's the nominal voltage of the
16 lithium-ion battery. When you charge the
17 lithium-ion battery and it becomes fully charged,
18 it's about 4.2-volt. But once you load it with some
19 loading, it will very quickly drop to 3.6 and
20 remains there for an extended period of use. And
21 then towards the end when it becomes, you know,
22 not -- when it becomes discharged, if you will, that

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1 3.6 rapidly drops all the way to 2.7 and then 2.3.
2 And depending on the system that is using it and
3 what voltage it can or cannot tolerate, you will
4 determine whether you shut down the system or not.
5 But that's the typical -- we call it the
6 discharge profile of the battery. When you're fully
7 charged, it's 4.2-volt. You start loading it, it
8 quickly drops to 3.6. And then for the vast
9 majority of time, it stays at 3.6.
10 Now, the definition of nominal voltage of
11 the battery is actually the integration of the
12 entire voltage profile over time, which you can
13 think of it as if it's the average of the voltage,
14 and because most of the time it stays at 3.6, that's
15 why the result of that math is about 3.6. So the
16 nominal voltage of a lithium-ion battery is about
17 3.6-volt.
18 Q. Okay. And so in this example here where
19 Zhao is talking about two lithium batteries are
20 connected in series and there's 8.4 volts
21 contemplated, does that mean that each of these
22 batteries has 4.2 volts?

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1 A. He's contemplating in this when the battery
2 is fully charged. Right? So that's kind of like
3 the maximum you would expect from them when they are
4 fully charged.
5 Q. Okay. So each of these cells that's
6 discussed here is 4.2 volts fully charged for a
7 total pack voltage of 8.4 volts?
8 A. Correct. Yes. If they are both fully
9 charged, each one is about 4.2 volt, and then there
10 is two of them so that will give you the 8.4 listed
11 in this patent.
12 Q. And so if I connect another cell in series
13 within that pack, I'm gonna get 12.6 volts for my
14 total pack voltage?
15 A. For a brief period of time, yes, when they
16 are fully charged. Once you load them with any
17 load, they will drop to 3.6 each. And then you can
18 multiply the 3.6 times 3 and that will get you what
19 you would expect to have for the vast majority of
20 time where you're using the battery.
21 Q. And so --
22 A. And one clarification, Counsel, that I think

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1 it's a useful data point, that in -- when we build
2 lithium-ion-operated systems and we start thinking
3 about the number of batteries that we need to use in
4 a system, we typically base it on the nominal
5 voltage, not on the fully charged voltage, because
6 the fully charged voltage only lasts for a brief
7 period of time. So keep that in mind.
8 Q. And so if we have a DC-DC boost converter
9 that can boost a 5-volt input to 8.4 volts, what
10 would be the primary difference between that DC-DC
11 boost converter and one that could boost from
12 5 volts up to 12.6 volts?
13 A. There would be notable difference in terms
14 of performance and in terms of design. So to -- in
15 terms of design, the difference is as follows:
16 These boost converters are what we call switching
17 power converters. And the way these converters
18 operate, they operate with a specific duty cycle
19 switching that is a function of the ratio between
20 the input voltage and the output voltage.
21 So when the space between the input and
22 output voltage, it gets bigger, or when the

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1 difference between them is bigger, your duty cycle
2 of switching becomes smaller and smaller. And what
3 that means is that all your power transistors, all
4 your devices in the system, they start to have to be
5 able to handle smaller pulses when the difference
6 between the voltages are big. That means you have
7 to make everything a lot faster. And what that
8 means is that your amount of losses becomes bigger.
9 So you start seeing significant drop in
10 efficiency of the converter as the difference
11 between the input and output gets bigger. And the
12 design becomes also more difficult and you might end
13 up -- actually most of the time you do, because
14 these pulses become too short, you end up having to
15 increase the switching period, which degrades your
16 ability to provide high amounts of current at short
17 periods of time. So basically the bandwidth of your
18 system will have to be degraded if the difference
19 between the input and output voltage becomes bigger.
20 So without too much details into that,
21 bottom line is, if the difference between input and
22 output from a design standpoint for the boost

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1 converter, the -- you're gonna get degraded
2 transient response and degraded power conversion
3 efficiency. So that's from a design standpoint.
4 Now, another aspect that significantly
5 degrades the efficiency is that, as you know, from
6 energy conservation, input power and output power
7 are supposed to be the same, ideally, if you don't
8 have any losses. What that means is, if you
9 increase the output voltage of that boost converter,
10 that means that, for the same amount of current that
11 you want to deliver at that higher voltage, the
12 corresponding input current becomes larger because
13 energy conserve. Like think about it like, if your
14 total energy is 4 and you're doing 2 times 2 versus
15 1 times 4, right, so when the voltage is less, the
16 current will have to go up. So the end result of
17 that, that the input current will increase. So when
18 you go from 8.4 to 12, for example, whatever the
19 issue is, 20 percent, 50 percent, whatever it is,
20 then your input current is gonna increase by the
21 same amount.
22 Well, the problem is that your input current

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1 determines a lot of what we call conduction losses.
2 These are I-squared-R losses. So they go with the
3 square of the current. So any increase in that
4 current gets squared and your losses are going to
5 increase accordingly. So that brings your
6 efficiency even further down in addition to the
7 design aspects that I just explained.
8 So in summary, therefore, yes, there is
9 material difference going from 8.4 to 12 volt and it
10 will be primarily degraded efficiency and degraded
11 transient response.
12 Q. And so if we turn to the Zhao reference at
13 column 1, lines 59 to 61, could you please let me
14 know when you're there?
15 A. Page number again, Counsel?
16 Q. So this would be page 10 of Exhibit 1006.
17 A. Okay, I'm there. And which lines?
18 Q. We're looking at column 1, lines 59 to 61.
19 A. Okay. I am there. This is the one that
20 describes "Figure 1 is a schematic block diagram of
21 a first example step-up battery charger in
22 accordance with embodiments of the present

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1 invention." I see that, yes.
2 Q. Okay. And then if we turn to the next
3 adjacent column, column 2, starting at line 63, do
4 you see that this paragraph is further describing
5 what's shown in figure 1?
6 A. I see that, yes.
7 Q. Okay. And if we turn to the next page, do
8 you see that, in this same paragraph, the second
9 sentence of column 3 is talking about an output
10 signal from the step-up converter?
11 A. Yes, I see that.
12 Q. Okay. And then the following sentence talks
13 about an output of the charging control circuit that
14 can charge a plurality of series-connected
15 batteries.
16 Do you see that?
17 A. Yes, I see that.
18 Q. Okay. And so the output of this charging
19 control circuit 201, that's gonna connect to the
20 batteries to provide their charging input?
21 A. I would like to read the entire paragraph
22 just to make sure I know the context.

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1 Q. Sure.
2 A. Okay. I'm done. So what was the question
3 again?
4 Q. The question was, do you see that it's
5 describing that the output of charging control
6 circuit can charge the pack of batteries?
7 A. Yes, I see that.
8 Q. Okay. And so you would expect that this
9 charging output of the control circuit 201, that's
10 gonna connect to your battery pack?
11 A. I expect that to be the case, yes, but I
12 would like to, if you don't mind, I want to look at
13 figure 1 just to -- yes, that is correct.
14 Q. Okay. And so we're looking at figure 1 now,
15 which is page 2 of Exhibit 1006. So the output of
16 charging control circuit 201, that's connected to
17 those three symbols there on the far right-hand
18 side, the battery pack?
19 A. Yes.
20 Q. Okay. So in this figure, it's contemplating
21 that there's a pack of at least three cells here?
22 A. Well, a minimum of three of these units

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1 would be symbols, that is correct. The only thing I
2 will point out is that a lot of times, when people
3 use the symbol for the battery, it doesn't
4 necessarily mean that that means it's a single cell.
5 It could also by itself mean multiple cells. So the
6 only thing I can say for sure, by just looking at
7 the figure, that there are three units of batteries
8 that this patent is contemplating. Whether each
9 unit is a single cell or not, it may or may not be.
10 Q. And so if these are three cells here
11 connected in series, we talked before about Zhao
12 contemplating 4.2 volts per cell, so the total pack
13 here would be at least 12.6 volts; is that right?
14 A. If the fully charged voltage of each cell is
15 4.2 and there are three of them, then that will be
16 the number that you referred to, 12-point-something.
17 If they are lithium-ion batteries and they are fully
18 charged, then yes, that would be the voltage level.
19 Q. And so there's this three dots here or
20 ellipses in the pack which suggests that we could
21 add even more cells, connect them in series if we
22 wanted to?

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1 A. That's what that normally indicates in
2 schematics, correct.
3 Q. Okay. So our pack voltage could actually
4 go -- could go up above 12.6 volts here if we wanted
5 it to?
6 A. Yeah. If somebody is gonna use that circuit
7 and choose to add more cells, they could do that,
8 yes. Or that figure leaves the room for doing that,
9 yes.
10 Q. Okay. And if we could please turn to
11 Exhibit 1025?
12 MR. SAUER: Whenever a good time for a
13 break, a bio break would be --
14 MR. SMELCER: Yeah, let's go ahead and take
15 a break now if that's good for everybody.
16 MR. SAUER: Yeah.
17 (A short break was had.)
18 BY MR. SMELCER:
19 Q. So, Dr. Fayed, before the break, I asked you
20 to turn to Exhibit 1025, which I'll go ahead and
21 upload now. If you could please let me know when
22 you have that document in front of you.

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1 A. I do.
2 (Exhibit 1025 was marked for
3 identification and is attached to the
4 transcript.)
5 Q. And do you recognize this document as the
6 USB battery charging specification that was
7 originally issued on March 8, 2007?
8 A. Yes, I do.
9 Q. And are you familiar with this
10 specification?
11 A. Yes, I have looked at this document in the
12 process so I'm familiar with it, yes.
13 Q. Okay. And in connection with this
14 specification, would a USB input power source be
15 providing 5 volts?
16 A. I'm sorry, Counsel. Can you repeat the
17 question again?
18 Q. Sure. In connection with the power that can
19 be provided under this specification, would the
20 voltage be 5 volts?
21 A. Yes, the USB VBUS voltage is 5 volt,
22 correct.

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1 Q. And if we could please take a look at
2 page 29 of Exhibit 1025, and specifically I wanted
3 to look at table 5-2 labeled "Currents." If you
4 could please let me know when you're there?
5 A. Yes, I am there.
6 Q. Okay. And do you see that there's a few
7 listings here of currents that can be provided for
8 USB charging?
9 A. Yes, that is correct.
10 Q. Okay. And do you see in the third row,
11 there's an amperage of 1.8 amps that can be
12 provided?
13 A. I see that, yes.
14 Q. Okay. And below that there's 1.5 amps?
15 A. I see that, yes.
16 Q. Okay. So for that first example of
17 1.8 amps, if we're obtaining power at 5 volts, that
18 would be approximately 9 watts of power that can be
19 provided?
20 A. It would be 5 times 1.8, which would be,
21 yeah, around 9.4 I think, yeah.
22 Q. Okay.

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1 And then for the next example below that,
2 1.5 amps at 5 volts, that would be 7.5 watts?
3 A. Correct.
4 Q. Okay. And are you aware of revisions to
5 this specification that increased these amp values?
6 MR. SAUER: Objection. Form.
7 A. I am aware that, yeah, USB -- USB evolved
8 over the years, and there have been many revisions
9 that came later on that did alter or modify these
10 values, correct.
11 Q. And are you aware of specification revision
12 to this specification we're looking at that was
13 issued in 2012 that increased the amps to 5 amps?
14 MR. SAUER: Objection. Form. Outside the
15 scope.
16 A. I will say that I -- the documents -- for
17 the purpose of this report, I only considered these
18 documents, so I cannot really make specific comments
19 about any specific values without studying that
20 separately to be able to affirmatively answer your
21 question.
22 Q. Okay. So sitting here today, you're not

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1 aware of a revision to this specification in 2012
2 that increased the amps to 5 amps?
3 MR. SAUER: Same objection.
4 A. I am aware that there has been revisions to
5 USB specification over the years, but I -- sitting
6 here today, I can't really comment on specific
7 numbers and specific dates without me studying these
8 documents first, which I'm not prepared to answer
9 questions about these documents now.
10 Q. Are you aware of a 2012 revision to this
11 specification?
12 MR. SAUER: Same objection.
13 A. As I mentioned, I am aware of a variety of
14 USB specifications that came out over the years that
15 did modify what the power ratings will be, but I'm
16 unable to make any specific comment on -- in which
17 year what amperage was listed.
18 Q. Do you recall submitting a declaration in a
19 lawsuit with a company called Deltran?
20 MR. SAUER: Objection. Outside the scope.
21 A. I believe I had some declaration submitted
22 in a case that involved that name that you just

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1 mentioned, yes.
2 Q. Okay. And do you recall relying on certain
3 USB specifications in connection with that
4 declaration?
5 MR. SAUER: Same objection.
6 A. I recall that there was discussion of USB,
7 but I have not really prepared or looked into that
8 information for the purpose of this deposition or
9 this declaration. So I don't recall what was there.
10 Q. And so if we're looking at table 5-2 of
11 Exhibit 1025, would you agree that if these amp
12 values were increased to 5 amps, that you'd be able
13 to source 25 watts of power from USB?
14 MR. SAUER: Objection to form.
15 A. In theory, I mean, if you increase the
16 current rating of an energy source, it means that
17 you can take more power out of it. That statement
18 is factually correct.
19 Q. And so sitting here today, are you aware of
20 a revision to this specification that would allow
21 USB power to be provided at 25 watts before July 3,
22 2014?

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1 MR. SAUER: Objection. Form. Outside the
2 scope.
3 A. As I mentioned, I am aware that USB spec has
4 been revised over the years and available of power
5 to be expected from a USB port has been revised over
6 the years. But I cannot, sitting here today,
7 comment on when any specific number was released or
8 became available. That's something that requires
9 further study to be able to answer.
10 Q. I want to please turn to Exhibit 1012.
11 Please let me know when you're there.
12 (Exhibit 1012 was marked for
13 identification and is attached to the
14 transcript.)
15 A. Yes, I have it.
16 Q. And do you recognize this document as a data
17 sheet for the XR3403 DC/DC converter?
18 A. I do, yes.
19 Q. Okay. And is this the DC/DC converter
20 that's depicted in the figures of NOCO's patents?
21 MR. SAUER: Objection. Form.
22 A. So the title, like, XR3403 rings a bell. I

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1 believe I've seen it before. I believe that's in
2 the NOCO patent. Not hundred percent sure. If you
3 would allow me to go back to the patent itself just
4 to verify that this is the same part, I'll be happy
5 to confirm.
6 Q. Okay. Yeah, if we could please turn to
7 Exhibit 1001, which is gonna be a copy of the
8 '023 patent.
9 (Exhibit 1001 was marked for
10 identification and is attached to the
11 transcript.)
12 Q. And I may be able to save you some time. If
13 we could please look at page 18 of Exhibit 1001,
14 you'll see in the center of the page, there's an
15 integrated circuit labeled XR3403 there.
16 A. Yes. Yes, that is correct. So it is the
17 same number. That is the part, correct.
18 Q. Okay. So if we could please turn back to
19 Exhibit 1012.
20 A. Okay.
21 Q. Do you see that at the bottom of page 1,
22 there's figure 1, a "Typical Application Circuit"?

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1 A. Yes, I see that.
2 Q. Okay. And is it common for data sheets to
3 include these type of reference circuits?
4 MR. SAUER: Objection. Form.
5 A. I have seen many data sheets in the past,
6 and it's not unusual that they would put an
7 exemplary, you know, use of the chip. So yes, I
8 would say yes it's not unusual to see that.
9 Q. So this typical application circuit would
10 provide guidance on how to integrate this chip into
11 a larger system to be used for its intended purpose.
12 MR. SAUER: Objection. Form.
13 A. I wouldn't say it provides guidance. I
14 would say it provides an example of how you may
15 choose to integrate it in your system. I have seen
16 many chips where we use it in ways that are not
17 shown necessarily in the data sheet.
18 Q. And so in those scenarios, you're able to
19 figure out on your own how to integrate the chip.
20 MR. SAUER: Objection. Form.
21 A. Right. Using the data sheet, using the
22 specification of the chip, you would -- it's not

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like -- it's not even optional. You actually have to consider these things to make sure that you are integrating it properly in your system. But the specific schematic that may be shown on the face of a data sheet is typically exemplary. There could be many variations to it in order for you to be able to use the chip.

Q. Okay. And then if we look at page 1 here, we see some applications listed and then some bullet points.

Do you see that?

A. I see that, yes.

Q. Okay. And so this would provide some suggestions on the types of devices that this chip could work with?

A. Yeah, example of applications that the chip can be integrated within these systems, correct.

Q. Okay.

A. I will note -- I will note, though, that doesn't mean -- doesn't mean it will, meaning, for example, when you see "portable applications," you probably would appreciate that that includes

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millions of things, right? So this is just meant as categories of devices that you could use it for. That doesn't mean every device can use it. It would all be a function of what specifications you're looking for. So it's all exemplary, I guess, the point that I'm trying to make.

Q. Okay.

MR. SMELCER: I'll pass the witness.

MR. SAUER: Can we take a ten-minute break? You're done?

MR. SMELCER: Yes.

MR. SAUER: I don't know that I have redirect. Let me take ten minutes to think about it and then come back.

MR. SMELCER: Okay. Sounds good.

(A short break was had.)

MR. SAUER: Just a couple questions on redirect.

EXAMINATION

BY MR. SAUER:

Q. I'm handing the witness Exhibit 1003, which is the declaration of Arthur MacCarley, and this one

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is from the '023 IPR.

Do you recognize this document?

A. I do, yes.

Q. And I think you testified that you reviewed this document in connection with preparing your declaration; is that true?

A. That is correct, yes.

Q. And in reviewing this document, were you provided with all the citations that are -- any documents cited in this document?

A. Yes, I have. I -- I -- it was -- yes, I received a folder that contained the declaration and all the documents associated with it.

Q. Did you review those documents?

A. I have when -- I have gone through all these documents. There were many of them, but I have, yes.

Q. And as you reviewed this declaration, if there was a statement made supported by a cited document, did you review that cited document?

A. I did, yes, absolutely.

MR. SAUER: No further questions.

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FURTHER EXAMINATION

BY MR. SMELCER:

Q. Dr. Fayed, we took a couple of breaks today during your deposition.

Did you speak with anyone about the substance of your testimony during the break?

A. No, I have not.

MR. SMELCER: All right. Thank you.

Pass the witness.

MR. SAUER: No further questions.

(Off the record at 10:26 a.m.)

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CERTIFICATE OF COURT REPORTER - NOTARY PUBLIC

I, TIFFANY M. PIETRZYK, Certified Shorthand Reporter No. 084-004371, CSR, RPR, CRR, and a Notary Public within and for the State of Illinois, do hereby certify:

That AYMAN FAYED, Ph.D., the witness whose deposition is hereinbefore set forth, was duly sworn by me before the commencement of such deposition and that such deposition was taken before me and is a true record of the testimony given by such witness.

I further certify that the adverse party, THE NOCO COMPANY, was represented by counsel at the deposition.

I further certify that the deposition of AYMAN FAYED, Ph.D. occurred virtually, via Zoom videoconference, on Tuesday January 28, 2025, commencing at 8:57 a.m. CST to 10:26 a.m. CST.

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I further certify that I am not related to any of the parties to this action by blood or marriage, I am not employed by or an attorney to any of the parties to this action, and that I am in no way interested, financially or otherwise, in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial seal this 1st day of February, 2025.

My commission expires: February 28th, 2028

Tiffany M. Pietrzyk

NOTARY PUBLIC IN AND FOR THE STATE OF ILLINOIS

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