

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MERCEDES-BENZ USA, LLC
Petitioner,

v.

DAEDALUS PRIME, LLC
Patent Owner.

IPR2023-01335 (Patent 8,775,833 B2)
IPR2023-01345 (Patent 10,705,588 B2)

Held: December 3, 2024

Before: WILLIAM V. SAINDON, GREGG I. ANDERSON, and
ARTHUR M. PESLAK, *Administrative Patent Judges*.

IPR2023-01335 Patent (8,775,833 B2)
IPR2023-01345 (Patent 10,705,588 B2)

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P R O C E E D I N G S

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JUDGE SAINDON: Welcome, everyone. This is an oral hearing for two cases involving Mercedes-Benz USA, the Petitioner, and Daedalus Prime, the Patent Owner. The cases are IPR2023-01335 involving patent 8,775,833, and IPR2023-01345 involving patent 10,705,588. I'm Judge Saindon, and with me today are Judges Anderson and Peslak. Can we get appearances from the parties? Let's start with Petitioner.

MR. LEWIS: Hi. My name is Damon Lewis on behalf of Mercedes-Benz USA, LLC.

MR. HUGHES: Scott Hughes also on behalf of Mercedes-Benz, and I'll be arguing the 1345 petition.

JUDGE SAINDON: Okay, thank you. Welcome. Anyone else from Petitioner's side going to present or otherwise want to make an appearance?

MR. LEWIS: No, Your Honor.

JUDGE SAINDON: Okay. And Patent Owner?

MR. FAHMI: Yes. Good day, Your Honor. It's Tarek Fahmi on behalf of the Patent Owner.

JUDGE SAINDON: Okay. Anyone else going to present or otherwise make an appearance today?

MR. FAHMI: No, it's just myself.

JUDGE SAINDON: Okay, thank you. Welcome. So, just a few housekeeping matters. We have two cases today, but they are going to stay separate even if they end up on the same transcript. We have allocated a

IPR2023-01335 Patent (8,775,833 B2)

IPR2023-01345 (Patent 10,705,588 B2)

1 total of 45 minutes plus 45 minutes, although as we said in the order, we
2 don't need to break it up that way. You are free to allocate more time for
3 one case or the other, and I think that would be recommended given that it
4 appears one case has significantly more issues than the other. Have the
5 parties discussed an allocation ahead of time?

6 MR. LEWIS: We have not, Your Honors.

7 JUDGE SAINDON: Do you plan on using 45 and 45, or do you
8 plan on breaking it up a different way?

9 MR. LEWIS: We have planned to use 45 and 45, although the
10 arguments may both be less.

11 JUDGE SAINDON: Okay. And same for Patent Owner?

12 MR. FAHMI: Yeah, that's fine with us, Your Honor. I agree with
13 Mr. Lewis. I think the second case, the 1345 case, probably won't take the
14 full time.

15 MR. HUGHES: Yeah, so I would just say if there's, especially
16 because the 1345 won't take additional time, if Your Honors do have
17 additional questions at the end of the first proceeding on the '833 patent, feel
18 free to use some other time from the 1345 proceeding for that.

19 JUDGE SAINDON: Very well. All right. So, we can get started.
20 Let's start with the 1335 case. Petitioner, you're up first. Do you want to
21 reserve some time for rebuttal?

22 MR. LEWIS: Yes, please. I would like to reserve 10 minutes for
23 rebuttal time.

24 JUDGE SAINDON: Okay. You may begin when ready.

25 MR. LEWIS: May it please the Board. Again, my name is Damon

IPR2023-01335 Patent (8,775,833 B2)

IPR2023-01345 (Patent 10,705,588 B2)

1 Lewis on behalf of Mercedes-Benz LLC, this is inter partes review
2 IPR2023-01335 against U.S. Patent Number 8,775,833, currently assigned
3 to Daedalus Prime.

4 Apologies, Your Honors. It looks like we're having some trouble
5 with the slides. Can you see the slides, Your Honor?

6 JUDGE SAINDON: Yes.

7 MR. LEWIS: It says Mercedes hearing demonstratives?

8 JUDGE SAINDON: Yes.

9 MR. LEWIS: All right. We'll improvise. Okay. First, today I
10 will go over an overview of the '833 patent and the four chief prior art
11 references in view of which Mercedes believes renders the '833 patent
12 unpatentable. These are the Finkelstein, Conroy, Nussbaum, and Bose
13 references. Having presented our arguments in chief and being met with a
14 decision instituted by this Board, there remain only five main disputes
15 concerning the patentability of the '833 patent, which I will discuss in turn.

16 First, let's take a look at the '833 patent. The '833 patent discloses
17 a multi-domain processor that allocates power budget between domains
18 based on -- I'm sorry, allocates power between domains based on a power
19 budget. Claim 1 is representative. This patent claims in chief a processor
20 comprising a first domain and a second domain, which operate at
21 independent voltage and frequency. The processor has a first logic to
22 dynamically allocate a power budget between the two domains at runtime,
23 all according to sharing policies controllable by user-level software.

24 Moving to slide 6, Mercedes asserts that the '833 patent is
25 unpatentable over the seven grounds shown here. Our first dispute is

1 whether the Finkelstein reference discloses a first and second domain that
2 operate at independent voltage and frequency. Mercedes posits that it does.

3 Moving to slide 8 for a quick discussion on the Finkelstein
4 reference. Finkelstein, like the --

5 JUDGE SAINDON: Counsel?

6 MR. LEWIS: Yes.

7 JUDGE SAINDON: If I could jump in here. This is Judge
8 Saindon. So, you have this labeled as a Finkelstein argument about the
9 “independent” issue. When I was reviewing the briefs, I understood this to
10 be an issue regarding the Conroy-Finkelstein ground rather than just the
11 Finkelstein alone ground. Am I right in that, or does it apply to both?

12 MR. LEWIS: My understanding was that it applied to both.

13 JUDGE SAINDON: I'm looking at the Patent Owner response
14 pages 59 to 60, and that's where I see the “independent” argument. And, of
15 course, there's a claim construction argument as well, but perhaps I missed
16 it. I didn't think I saw it in the Finkelstein alone ground. We can put a pin
17 in it. I just wanted to ask the question to make sure I didn't miss something.

18 MR. LEWIS: I appreciate it. I had read that and compartmented it
19 in my head as an argument that pertained to Finkelstein and Conroy because
20 it was a claim construction issue that the Patent Owner raised. And the
21 argument in counter of that is more based on the claim construction issue
22 about whether or not the word independent requires difference or separate
23 control or whatnot. Would you like me to address that first?

24 JUDGE SAINDON: Yes, yeah. We've got to talk about the claim
25 construction either way, I suppose so.

1 MR. LEWIS: Okay. Let's go to slide 9, then. Actually, let's go to
2 slide 11, please. So, the Patent Owner is arguing that, well, they argue that
3 Finkelstein in particular does not disclose independent control over multiple
4 power planes because in their mind independent means separately
5 controlled. But separately controlled is not a limitation that appears in the
6 patent. And they appear to be making the mistake that Petitioner's argument
7 is that the frequency and voltage must be different to be independent. And
8 that Patent Owner argues that independence does not preclude the voltage
9 and frequency of the domains from having a relationship with dependency
10 on each other. That's a misunderstanding of Petitioner's argument, and
11 Petitioner actually agrees that the domains can have dependency on each
12 other for the voltage and frequencies, or they can be different, but separate
13 control is not a requirement of the claim. In fact, Patent Owners' expert does
14 not use the term independent to apply that the two domains are separately
15 controlled. Instead he noted in his deposition, that each of the values or
16 budgets for the domains can be set or operated independently. Again,
17 Mercedes would agree with that position.

18 And he continued, moving to slide 13, that in the '833 patent, each
19 domain could have a different voltage and frequency than the other domain,
20 in green with the position taken by Dr. Horst. So, of course, Mercedes here
21 agrees as well. And if we go back to slide 10.

22 Now, just asking more directly on the Finkelstein reference,
23 Finkelstein discloses the independent voltage and frequency because it is
24 disclosing the control of the domain's voltage and frequency just per power
25 plane. A person having ordinary skill in the art would understand that the

1 logic 140 could modify the voltage and/or frequency of either Core 1 or
2 Core 2 without affecting the operating voltage and/or frequency of the other.

3 And just to make sure that we're on the same page of what I'm
4 discussing, let's go to slide 8. Thank you. In the Finkelstein patent, we've
5 annotated here as -- this is the last slide. All right, slide 9 is the better slide.
6 Thanks. Finkelstein discloses a first and second domain, which it annotated
7 in Figure 1 as red for the first domain and blue for the second domain with
8 the power management logic 140 in yellow as the component that controls
9 the supply of power per power plane.

10 JUDGE PESLAK: Counsel, this is Judge Peslak. So, if you're
11 taking the position that independent means different, can you just tell us how
12 Finkelstein discloses -- how that meaning applies to Finkelstein and how
13 they're different?

14 MR. LEWIS: Well, with respect, Your Honor, Petitioner is not
15 taking the position that independent means different. That was a
16 misquotation of our expert during deposition. In fact, the position of
17 Mercedes is that independent is the plain and ordinary meaning, which it can
18 be different. It can also be the same, but they can move independently of
19 each other. So, with that context Finkelstein disclosing that the voltage and
20 frequency can be set per power plane, with a person having ordinary skill in
21 the art to understand that they could be set differently or the same. They're
22 just not necessarily required to be separately controlled. There can be a
23 dependency. Does that answer Your Honor's question?

24 JUDGE PESLAK: I think I understand what you're saying. But
25 this is a device claim, so how to set differently or set, I mean, how does set

1 independently apply to a device claim?

2 MR. LEWIS: Okay. So, I'm trying to understand the question.

3 For this device, if we can go back to slide 9 for the Figure 1. See here that in
4 Figure 1, there are two cores, Core 0 and Core 1, one indicated in red and
5 one indicated in blue. The Finkelstein reference discloses that each of those
6 cores can have its frequency and voltage set independently of the other. And
7 so that's how the device would operate.

8 JUDGE PESLAK: I think I understand what you're saying. Go
9 ahead.

10 MR. LEWIS: I actually think that's the end of the requisite
11 discussion of the first dispute about whether the Finkelstein discloses
12 independent voltage and frequency as required by those first six claims, and
13 the conclusion would be that the Finkelstein disclosure of control per power
14 plane meets a limitation that the voltage frequency for the first and second
15 domains can be set independently.

16 The second dispute on slide 14, begins on slide 14, is whether
17 Finkelstein discloses dynamically allocating a power budget of a processor
18 between the first and second domains. Mercedes argues that it does.

19 Moving slide 15, the claim limitation in question is whether it
20 requires dynamically allocating a power budget for the processor between
21 the first and second domains. Finkelstein discloses that multiple power
22 planes share a power source, a common package power/energy budget that
23 allows power to be shifted from one plane to another when processor
24 resources are not fully utilized. For example, if more graphics performance
25 is required, the Finkelstein disclosure transfers more power from the other

1 power planes to the power plane containing the graphics card, or vice versa.
2 A POSITA would understand this to be a runtime shift based on workloads.
3 Therefore, a dynamically allocation of a power budget.

4 Moving slide 16, Finkelstein discloses an energy budget for
5 various situations. We call those situations constraints and abbreviate the
6 constraints to k . So, E_k is just the total energy budget under a particular
7 constraint, k . Finkelstein discloses dividing E_k into portions for each
8 domain labeled i , and that's called E_{ki} . We get each E_{ki} by multiplying E_k
9 by a weight, which is just a fraction, which Finkelstein calls W_{ki} because it
10 differs based on the domain i and the constraint k . You can imagine this as a
11 pie chart where all of the W_{ki} times E_k pieces add up to E_k , the entire pie,
12 the overall budget for the chip. And for each domain, once we have the
13 budget E_{ki} for that domain, Finkelstein discloses that we can calculate the
14 surplus available by subtracting the actual high energy usage by that domain
15 E_{ii} . It is this surplus that Finkelstein discloses may be dynamically
16 reallocated to other domains of the processor in satisfaction of this
17 limitation.

18 JUDGE SAINDON: Counsel, could I jump in here? This is Judge
19 Saindon again. So, let's take a step back. We have an energy budget E_k ,
20 and I'm looking at paragraph 31 of Finkelstein, and it says that there are a set
21 of energy budgets, E_{nk} . And as you mentioned, the k is some constraint.
22 So, am I to understand this as -- what is this constraint here? Am I to
23 understand this as there is one energy budget and k are different
24 circumstances?

25 MR. LEWIS: Yes.

1 JUDGE SAINDON: Or is there a bunch of energy budgets
2 relating to maybe different things that you want to keep track of different
3 groups of pieces of hardware in the computer?

4 MR. LEWIS: My understanding is that the constraints of k refer to
5 different circumstances, different situations that the chip might find itself in.

6 JUDGE SAINDON: Do you have any kind of cite to, if you don't
7 have it now, maybe you can get it back on rebuttal, of where it's talking
8 about what these constraints k are?

9 MR. LEWIS: I can give you a brief answer now. It is in
10 paragraph 31, and I think it continues on to the next couple of paragraphs
11 where it describes that the -- a set of energy budgets E_k may be maintained
12 where k corresponds to a specific constraint and n is the time step. And k is
13 further described in that paragraph as well. And I can give you a better
14 response to that question after in the rebuttal time.

15 JUDGE SAINDON: Okay. My overarching question here is,
16 depending on what k is, that may color how we read the reference in terms
17 of whether this is an energy budget for a processor. Because if there are a
18 whole bunch of these constraints being used at the same time, well, that
19 might -- E_k might not be a processor's budget, it could be just some
20 subcomponent. So, I guess that is what's motivating this question.

21 MR. LEWIS: So, the answer to that is E_k is for the processor. E_{k_i}
22 is for an individual domain, where the i 's represent the individual domains.
23 And so, when you sum up the E_{k_i} 's, you end up getting E_k . And each
24 individual E_{k_i} is found by multiplying a viable weighting W_{k_i} .

25 JUDGE SAINDON: Okay. So, I guess that also raises a question

1 of what i is, you know, we know they are domains, but do we know what the
2 domains of, just like what is k , what is i here? Do we know that the sum of
3 all i equals one processor, for example?

4 MR. LEWIS: I believe the answer to that question is yes, Your
5 Honor, the sum of all the E_{k_i} 's, or the sum of all i 's would be the processor
6 as a whole. Your Honor, I think you're referring to what we were actually
7 going to discuss shortly.

8 Go to slide 17, please. The Patent Owner has argued that the
9 unused budget is described not as a power budget for a processor, but as
10 according to the Patent Owner, an unused budget is an excess of a power
11 budget for a power plane. The limitation does not stop at power budget for a
12 processor. It continues that power budget is allocated for the processor
13 between the first and second domains. Now we're talking about the bits of i ,
14 the first i and a second i , so the power budget is allocated for the processor
15 between the first and second domains.

16 So, the disclosed formulas that I've just recited about E_k represents
17 the budget across all domains, whereby the unused budget W_{k_i} times E_k
18 minus E_{i_i} for each domain i can be redistributed amongst the other domains
19 within the E_k . If multiple power planes are sharing the same power source,
20 then these planes may share a common package power/energy budget with
21 the E_k formula as exemplars of such sharing. And for those reasons, I
22 believe a POSITA would understand Finkelstein to disclose dynamically
23 allocating a power budget of the processor between the first and second
24 domains.

25

1 Judge Saindon, I think that answers your question, but I want to
2 make sure before I continue.

3 JUDGE SAINDON: I suppose my question is it still remains, and
4 maybe it turns on how this limitation is parsed. I certainly see a reallocation
5 of access from one domain into the other. But does the claim require
6 allocating a budget for the processor, some whole, between two things? So,
7 the whole pie gets divided up between two things. If what you're pointing to
8 here, this subtraction where you minus out the E_{high} , I don't see the whole
9 budget in play. They're only the excess to requirements for a given plane.
10 So, that's not necessarily a whole budget. So, anyway, could you speak to
11 that a little more?

12 MR. LEWIS: So, the W_{ki} times E_k minus $E_{high\ i}$, that is a value
13 that is different from a scaled portion of the entire budget. That is the
14 surplus that had been allocated to a domain i that it doesn't need. So W_{ki}
15 times E_k is how much budget is allocated to a particular domain right now.
16 If you subtract the $E_{high\ i}$, that's the surplus. That's the amount that's left.
17 $E_{high\ i}$ represents the amount of power that the individual domain i is using
18 at its peak. So, now we've got -- that's the ultimate highest need. And
19 there's a term in the patent, I apologize for drawing a blank on what the
20 language of the patent is. But that's the concept that the individual domain
21 has a certain power to draw. And that can be represented by $E_{high\ i}$. If you
22 subtract that from the amount that has been allocated to it, which is W_{ki}
23 times E_k , now you're left with the surplus. That surplus represents the
24 amount of surplus power that could be redistributed to the other domains i
25 based on their weightings W_{ki} . So, the patent actually describes dividing up

1 the rest, by the individual Wki's for the other domains.

2 JUDGE SAINDON: Okay, Counsel, I understand that. I guess my
3 question is, is that excess the budget in your claim mapping?

4 MR. LEWIS: That is the part of the budget that gets dynamically
5 allocated.

6 JUDGE SAINDON: Okay. I understand. Or as a corollary to
7 that, if I could follow up. This is Judge Saindon again. So, you're reading
8 the first logic to dynamically allocate the power budget for the processor,
9 that's not a logic that is coming up with a budget for the processor. That's a
10 logic that is just moving around a budget that's reallocating parts of a budget.
11 Is that accurate?

12 MR. LEWIS: Yeah, I think that that does read on the limitation in
13 8.3, and I apologize. We're having some rather significant technical
14 problems. I can't see the screen that you're looking at right now, but you're
15 on slide 16?

16 JUDGE SAINDON: Yes.

17 JUDGE PESLAK: Counsel, this is Judge Peslak again. So, this --
18 our budget that we were just speaking of for Claim 1. Just so I understand, I
19 have a difficult time understanding how you're reading this, so. But for
20 Claim 2 says the first slide determines a portion of the power budget to
21 allocate to the first domain.

22 MR. LEWIS: Yes.

23 JUDGE PESLAK: So, how is -- is that portion -- how is the
24 portion for claim -- where in Finkelstein does the portion in Claim 2 come
25 from?

1 MR. LEWIS: Right. Your Honor, I would say that the portion that
2 gets reallocated in Claim 2, that is the surplus W_{ki} times E_k minus E_{high} .
3 So, it is the surplus of available energy that is going to be moved from the
4 domain that doesn't need it to the domains that could use it. And that surplus
5 is calculable as W_{ki} times E_k minus E_{high} for each domain i .

6 JUDGE PESLAK: Okay. I understand what you're saying.

7 MR. LEWIS: Okay.

8 JUDGE SAINDON: And Counsel, this is Judge Saindon again.
9 Just to keep asking questions on this. So, following that line of logic,
10 Dependent Claim 5 now says the first logic is to determine the power budget
11 for a current time interval, et cetera. So, this one seems to be more: instead
12 of the first logic to dynamically allocate being limited to just the allocation,
13 which I think Claim 2 seems to be honing in on. Claim 5 seems to be more
14 broadly calculating the whole budget, and you're allocating the whole budget
15 again. Is that a fair reading of Claim 5 in view of Claim 1? And Counsel, if
16 you want we can save this for rebuttal so that we can move through the rest
17 of these issues. There's quite a few here.

18 MR. LEWIS: I understand. That's fine. We can pick this up in
19 the rebuttal.

20 Moving to the third dispute of slide 19. This dispute concerns
21 whether Claims 13 to 15 and 17 to 18 teach a per domain power budget
22 allocation. I'm sorry, this is where the Nussbaum teaches a per domain
23 power budget allocation accordance to the preference value. Mercedes
24 already said it can. Looking quickly at the Nussbaum reference, Nussbaum
25 is another power management system for a multi core processor. In this

1 case, a power budget is dynamically allocated according to whether an
2 application is CPU-bounded or GPU-bounded. The system reallocates
3 power from less active to more active components by measuring boost
4 sensitivity and measurement of how beneficial a boost in power would be to
5 each computational unit in the system.

6
7 We note that Nussbaum's explicitness quoted example in
8 paragraph 25 that the boost sensitivity is measured on a computational unit
9 basis, as opposed to per core, a distinction which will become relevant in
10 just a second.

11 The dispute here is on slide 21. The limitation is that the subject of
12 this dispute is that the multicore processor has a first domain, including a
13 plurality of cores. Moving to slide 22, Patent Owner argues that Nussbaum
14 does not disclose this limitation because in Nussbaum, frequency
15 sensitivities are per component, e.g., per core attributes, and not per domain
16 attributes. But Nussbaum does disclose a first domain that includes multiple
17 cores, Nussbaum's Cores 0 and 1. While Patent Owner appears to assume
18 that computational unit can only refer to a single core, Nussbaum repeatedly
19 refers to cores or other computational units, implying that a computational
20 unit may be something other than just a core. Indeed, Nussbaum provides an
21 example of computational units that include multiple cores.

22 Moving to slide 23. As shown in Nussbaum Tables 1 and 2, a
23 sample processor may have four cores, a GPU, a memory controller, and an
24 IO bridge. Nussbaum shows in Table 1 a balanced allocation of power
25 across the four cores, Core 0 through Core 3. But moving to Table 2,

1 Nussbaum discloses that Core 0 and Core 1 have been boosted in tandem to
2 a higher frequency voltage point, while Core 2 and Core 3 have been
3 dropped in tandem. Thus, Core 0 and Core 1 may be in a single domain.
4 Core 2 and Core 3 may be in a single domain, and the GPU and other
5 components are in their own domains. Thus --

6 JUDGE SAINDON: Counsel?

7 MR. LEWIS: Yes.

8 JUDGE SAINDON: This is Judge Saindon. So, the Claim 13
9 requirement is the first domain includes a plurality of cores, and I see that
10 Table 2 shows Core 0 and Core 1 having the same value, but how do we
11 know that they are in the same domain as opposed to two separate domains
12 that just happen to have the same value?

13 MR. LEWIS: All right. I thank you for the question. The answer
14 is that a person having ordinary skill in the art when reading this disclosure
15 in Nussbaum would see the pairing of Core 0 and Core 1 and Core 2 and
16 Core 3 moving in tandem with each other as adhering to the same frequency
17 and voltage point, which as again that the '833 describes, is the definition of
18 the domain. That a POSITA would also be informed by the fact that other
19 references, such as the Finkelstein reference I disclosed earlier, have
20 expressly indicated that a domain can include multiple cores. That's actually
21 mentioned in our petition and our declaration as further support for this
22 limitation. And further support for why a POSITA would read the pairings
23 of cores in Table 1, moving to Table 2, as indicating that they could be in the
24 same domain.

25 JUDGE SAINDON: Well, Counsel, I guess, sure they could be in

1 the same domain, but we need to find that they are in the same domain. And
2 that's what I'm having trouble with. I understand that domains operate in the
3 same voltage and frequency, but does that mean anything that operates at the
4 same voltage and frequency is in the same domain?

5 MR. LEWIS: I am actually not sure about the answer to the
6 question regarding any, but in this disclosure, the example shows that they
7 are moving in tandem, and that would be read by a POSITA as showing in
8 the same domain, is the (INDISCERNIBLE) of our petition.

9 JUDGE SAINDON: Okay. Thank you.

10 MR. LEWIS: So, again, a computational unit is not necessarily the
11 same domain. If you read it the way that we have argued that a POSITA
12 would understand this, and Nussbaum and therefore has disclosed that it can
13 distribute power amongst active cores or other computational units based on
14 frequency sensitivity, where the other computational units disclosure
15 suggests that it could be something other than just core by core. It could be
16 something bigger, like pairs of cores at a time. Therefore, under this
17 reading, because the computational unit disclosed as possibly including
18 multiple cores, Nussbaum discloses distributing power headroom per
19 domain, where a domain includes a plurality of cores.

20 Moving to slide 26. Patent Owner also disputes whether
21 Nussbaum teaches the minimum reservation value required of Claim 17.
22 Mercedes posits that it does. According to the '833 patent, the minimum
23 reservation value is the minimum amount of power budget that can be
24 allocated to a domain. These minimum reservation values indicate a floor
25 level corresponding to a minimum amount of power budget to be allocated

1 to a given domain.

2 Moving to slide 28. Nussbaum discloses these minimum
3 reservation values in the form of Deep Cstate and P3 power levels. In Table
4 3, Nussbaum discloses a Deep Cstate and P3 for a first domain including a
5 computational core. In Table 4, Nussbaum discloses a GPU P3 state for a
6 second domain, including eGPU. A POSITA would understand that the
7 lowest operational points of Tables 3 and 4 correspond to the lowest
8 performance states in each respective domain, i.e., the minimum reservation
9 values.

10 JUDGE SAINDON: Counsel --

11 MR. LEWIS: Yes.

12 JUDGE SAINDON: -- sorry to jump in again, but we are just
13 about to start going into your rebuttal time. And I was hoping that we could
14 skip ahead to Conroy, the current time interval issue.

15 MR. LEWIS: Yes.

16 JUDGE SAINDON: And also the Conroy-Finkelstein
17 combination issue. And then we can steal some time from the other case,
18 but I want to make sure we hit those first.

19 MR. LEWIS: Okay. So, first the Conroy current time, that is --
20 let's move to slide 48. Yes. Okay. So, regarding the current time limitation,
21 the issue here is that Claim 14 as limitation that the variable power budget is
22 determined for a current time interval, Mercedes posits that it does in
23 Conroy. Conroy discloses an iterative process with each time interval being
24 described as past or next. As shown here in paragraph 70, time t is
25 associated with the sequence of time intervals Conroy explicitly calls, quote,

1 "past power usage", while t plus delta is associated with the quote, "next
2 time interval". We interpret next, meaning that which comes after the past,
3 either present or current time. Patent Owner argues on slide 50, and Patent
4 Owner argues that T plus delta is a next time interval and not a current time
5 interval, arguing that T without the delta must be the current time. But a
6 POSITA reading Conroy would understand that T plus delta is the current
7 time interval because Conroy refers to the time intervals proceeding as being
8 in the past. The thing that comes after the past is the present or current time.
9 Does that answer the question regarding that or can I (INDISCERNIBLE)?

10 JUDGE SAINDON: Yes, Counsel, I have a couple of questions.
11 So, Conroy does call T plus delta the next time interval. So, you're saying
12 because T is within "past" that we can kind of ignore what Conroy says and
13 say, well, that's the current time interval. And I guess my question is
14 twofold. The first part is I'm struggling with kind of overriding what a
15 reference says. So, I was wondering if maybe you could bolster that
16 argument a little bit. But maybe what the bigger issue here is, what is the
17 current time interval in the claim? What does that really mean? Because a
18 budget is, I mean, budgeting something that is in the past doesn't make any
19 sense, right? Budgeting is future-looking. So, I'm trying to understand what
20 does a current budget look like, a current time interval, when we're
21 calculating a budget? What exactly are these calculations of, with respect to
22 the claim? And then how does that relate back to what Conroy is teaching
23 here with past and next, but no current?

24 MR. LEWIS: Thank you, Your Honor, for the question. I would
25 agree with you that this is -- these are calculations that are forward-looking,

1 but they're based on what's happened in the past, trying to figure out where
2 the next amount of power budget should be placed for the current time
3 interval based on what had happened in the previous iterations. That is what
4 Conroy is doing, you'll see in paragraph 40, I'm sorry, paragraph 70 of
5 Conroy. The whole paragraph is talking about the knowledge of the past
6 power usage, as in the times leading up to T, or concluding with T, so that it
7 can dynamically determine the level of power budget for the next time
8 interval. That would be the current one.

9 The one that -- I think that Your Honor's question is very apt, but
10 we're talking about figuring out what the current allotment of power should
11 be based on what has happened in previous iterations of this sequence. And
12 that is exactly what Conroy is doing in its description in paragraph 70. It is
13 taking a calculation of the past and figuring out from that how to apply a
14 budget for the current time interval. Now, the language used is different in
15 Conroy than it is in the '833, but that's okay. That's fine because the concept
16 is the same. The concept is taking the past power usage, and Conroy is
17 calling that T minus 1 delta, T minus m minus 2 delta, and so forth and so on
18 until you get to T in order to figure out the next one, which is the current
19 one, which is T plus delta.

20 So the concepts are actually the same in Conroy as in Claim 14 of
21 the '833.

22 JUDGE SAINDON: Counsel, if I could ask a clarification. So,
23 when you mean the concepts are the same, do you mean that the current time
24 interval in Claim 14 and the next time interval in Conroy are the exact same
25 thing with different language used?

1 MR. LEWIS: Yes, that's what we're saying.

2 JUDGE SAINDON: Okay. And so, I guess the follow up to that
3 is, okay, those are different words. So, we need to interpret or construe the
4 language here. Do we need to have a claim construction? And if so, what is
5 that?

6 MR. LEWIS: Oh, I have a difficult time trying to construe a word
7 next or current though. I do think that they are still under plain and ordinary
8 meaning, you know, with given the context of the claim language itself and
9 the disclosure of Conroy.

10 JUDGE SAINDON: Well, I guess, Counsel, maybe to clarify my
11 question, is there anything in the challenged patent that supports the notion
12 that when the claim says "current," it's saying the same thing as when
13 Conroy says "next"? An example embodiment, for example.

14 MR. LEWIS: I can get you a better answer in rebuttal, but the idea
15 is that in the '833 patent, the current time interval is the thing that is being
16 calculated. And in the Conroy, the thing that's being calculated is the "next
17 time interval". And both are being calculated based on the past power
18 usage.

19 JUDGE SAINDON: Okay, thank you.

20 MR. LEWIS: What was the other dispute that you wanted to jump
21 to?

22 JUDGE SAINDON: The Conroy-Finkelstein rationale argument.
23 I see this starting in slide 56. My question here is regarding the parties'
24 disputes. When I was reviewing the petition, the Conroy-Finkelstein ground
25 starts off with a rationale to combine section. It talks about putting stuff on

1 a single chip. And then once you get into the individual limitations, it's
2 Conroy, Conroy, Conroy, the whole way down, there might be in the
3 preamble, there's perhaps this backup position about whether you would put
4 it on a chip as taught in Finkelstein. But it also -- the petition also alleges
5 that Conroy discloses a CPU, a GPU, and a power manager, a person of
6 ordinary skill in the art would have understood such a system to be the
7 processor. And then there's a "moreover" position, which I think is a backup
8 position, but maybe not. You can clarify that. Because then as you go
9 through the body of the claim, everything's citing to Conroy until we get
10 down to the last one, Element 1D, two little is. And then we talk about
11 Conroy in view of Finkelstein, and then we have a rationale that's specific to
12 the modification being made about the first and second sharing policy values
13 being controlled by user level software. And that's what Finkelstein teaches
14 as being modified into Conroy.

15 My question is, the parties' arguments seem to be about the chip
16 limitation, which may or may not even be necessary to the ground, maybe
17 about a backup position. Is there any argument on the actual modification of
18 Conroy-Finkelstein? I just want to make sure I haven't missed something or
19 misunderstood what the what the combination is and what the rationales are.

20 MR. LEWIS: So, I'll ask again, Your Honor, I apologize, is there
21 any -- I'm sorry, I just missed the last little bit of what you said.

22 JUDGE SAINDON: Right. So, I want to make sure I'm not
23 missing arguments. The parties' arguments on the rationale to combine seem
24 to focus on the chip, single chip aspects, the kind of -- the rationale that
25 began -- that's at the very beginning of the ground. But then when you go in

1 the ground, the only modification that I'm seeing is beginning on page 77 of
2 the petition, Conroy in view of Finkelstein in order to bring in the user-level
3 control of Finkelstein into Conroy. And then there's a rationale there, and I
4 don't see the parties talking about that rationale. So, I want to make sure I'm
5 not missing something because this rationale seems to be fairly important
6 because it's what the actual combination of the Conroy-Finkelstein ground
7 is.

8 So I guess to ask a more specific question, on page 77 through 78,
9 I see a rationale to combine Conroy and Finkelstein, and I don't see that
10 discussed in the briefs. Have I missed something? Anything in the
11 subsequent briefs? Obviously, it's in the petition.

12 MR. LEWIS: I don't think we discussed anything. I don't have
13 that answer at the top of mind, unfortunately Your Honor. Would you like
14 me to look at that during the Patent Owner's arguments and get back to you?

15 JUDGE SAINDON: Yes, please. And one other question I have
16 on the same thing is I'm looking at page 70 of the petition. This is talking
17 about the preamble in the Conroy-Finkelstein ground of the processor
18 requirement, and the second paragraph there's a discussion of Conroy
19 teaching the CPU, GPU, power manager, and it says this would have been
20 understood to be a processor. And then there's a figure and then there's a
21 "moreover . . . would also have found it obvious to implement system on a
22 chip in view of Finkelstein." So, I read this as Conroy teaches, and
23 moreover, just as a backup position or additional reason, whatever you want
24 to characterize it as, a second additional combination. And my question is if
25 we agree that Conroy teaches the processor do we need to even get into this

1 moreover aspect of this limitation over of the preamble?

2 MR. LEWIS: Right. I understand. I would say the short answer is
3 no. If you agree that Conroy discloses the processor, then no. You don't
4 have to reach the moreover section following.

5 JUDGE SAINDON: Okay, thank you.

6 MR. LEWIS: All right. I think I've gone over my time but I'll use
7 as much rebuttal time as the panel would like me to.

8 JUDGE SAINDON: Yes. Before we switch over I just want to
9 make sure and ask the panel to see if there are any further questions.

10 JUDGE PESLAK: I don't have any more.

11 JUDGE ANDERSON: None from me.

12 MR. LEWIS: Thank you, Your Honors.

13 JUDGE SAINDON: Okay, thank you. Looks like you went over,
14 and I'll calculate -- about 12 minutes. So, I will -- we'll steal 10 minutes
15 from the next case so that you still have 10 minutes to have a rebuttal.

16 MR. LEWIS: All right. Thank you.

17 JUDGE SAINDON: Okay, thank you. So, Petitioner -- I'm sorry,
18 Patent Owner, you may begin when ready, and if you have some rebuttal
19 time you would like to reserve, and you'll also get an additional 10 minutes
20 so you have 55 minutes here to the extent you need it.

21 MR. FAHMI: Thanks, Your Honor. I would like to reserve 10
22 minutes for rebuttal, please. May it please the Board, let me try and address
23 the issues that the Petitioner has raised with you. Let me say first, with
24 respect to the challenges based on Finkelstein alone, I think Mr. Lewis
25 agreed that the so-called unused budget that's being allocated, let me refer to

1 our slide number 10, the expression on the righthand side in the parentheses,
2 this WkiEk minus E i high. I think Mr. Lewis agreed that that portion,
3 which is being dynamically allocated, is an excess or a remainder of a power
4 budget for a particular power plane. And that was our point in our response
5 that this quantity, whatever it is, is not the entire budget for the processor,
6 which is what the claim is actually requiring, the allocation of the budget for
7 the processor. But what the petition seems to be trying to demonstrate is the
8 allocation of the power budget or a portion of the power budget assigned to a
9 particular power plane. Those are not the same. And so, we think the
10 petition has failed to actually demonstrate the requirements of the claim.

11 The discussion that the panel had with Mr. Lewis, I think,
12 ultimately resolved that question and in your final decision, I think you
13 should resolve it in favor of the Patent Owner.

14 Moving on to the discussion regarding Nussbaum, the argument, I
15 think, that ultimately the Petitioner settled on was that in Nussbaum, what's
16 being described are per component or per computational unit frequency
17 sensitivities that ultimately decide how power gets allocated. And let me
18 find the representative slide here for you. This is our slide number 20. So,
19 the boost sensitivities or the frequency sensitivities are per core attributes,
20 and Nussbaum is not describing power allocations based on a per domain
21 criterion, which is what the claim is specifying. The argument that the
22 Petitioner made was that, well, sometimes Nussbaum says that there may be
23 more than one core per domain. But even if that's the case, Dr. Brogioli
24 already addressed that situation in his testimony and indicated that it would
25 still be the case that the boost sensitivities are calculated per core. So,

1 whether there's more than one core in a domain or not, the boost sensitivities
2 are still calculated per core. And in fact, the power allocations would still be
3 addressed according to those individual core boost sensitivities. And there
4 was nothing provided in the way of a rebuttal declaration or anything from
5 Dr. Horst to, you know, counter the testimony. So, even if you accept the
6 fact that there might be more than one core per domain, it remains the fact
7 that the basis on which the power is being allocated is going to be this per
8 core type of allocation rather than a per domain allocation.

9 As to the Conroy argument that was presented, I struggled with
10 this one. This is our slide number 16, because the Petitioner would like you
11 to interpret past as past but next as current. And yet they offer no basis for
12 such an interpretation. On the other hand, Dr. Brogioli explained that in
13 these types of expressions, these algebraic expressions, the variable without
14 the delta term, so that is just key, is going to be understood as the current
15 time interval and the T plus delta is exactly what Conroy says it is, and it's
16 the next time interval.

17 Now, the panel asked, is there anything in the '833 patent to, you
18 know, help understand what a current time interval is. And in fact, there is.
19 You don't have to guess. It's actually described explicitly in column 3.
20 Equation 1, which is about line 30 in column 3, has an expression for E sub
21 n, which is the energy budget for the current that is again the valuation
22 instant. So, that is the current time interval. There's no indication that it's a
23 next interval. It is the current interval. So, current means what it says, and
24 the Petitioner argued for a plain and ordinary meaning, and we don't see any
25 reason for the Board to depart from that in this case and somehow read

1 current as next.

2 JUDGE SAINDON: Counsel, this is Judge Saindon, if I could
3 jump in for a moment.

4 MR. FAHMI: Please.

5 JUDGE SAINDON: So, we had a discussion with Petitioner about
6 this, and I was wondering in the context of providing a budget, when you're
7 providing a current energy budget, in some sense, it seems like that would
8 have to be, it has to be future looking, because the past is the past. You can't
9 budget for that. In current, maybe that includes the time period you're in,
10 but if that doesn't include the future, I'm struggling to see how that's a
11 budget. So, what I'm trying to decide here is, is the patent's use of current
12 evaluation instant, En, does that mean what we're evaluating now to be our
13 parameters for operating in the time interval that is maybe about to occur or
14 that is occurring but still has some future for us to use the budget? And is
15 that the same as what Conroy calls T plus delta, the next time interval, which
16 is the budget that they are calculating again to be used as the budget that
17 we're going to be using. So anyway, I was wondering if you could comment
18 on that.

19 MR. FAHMI: Yes, of course. So, I think Conroy is pretty explicit,
20 Your Honor. Conroy is dynamically determining an allowable power
21 allocation or power budget for a time interval that has not yet occurred, T
22 plus delta. So, that is some future time interval. In the '833 patent, on the
23 other hand, what you see here is the computation for the energy budget of
24 the time interval within which you currently find yourself, the nth interval.
25 And I think an example is given of one millisecond intervals, but of course it

1 could be different. But that's how the two are distinct. Conroy, if I
2 remember correctly, is concerned about computing the future time interval
3 because measured over the course of many instances of time intervals, the
4 actual power used has to remain below a certain cap. Basically, I think, if I
5 remember correctly, Conroy gives the example of trying to fit different areas
6 under a curve or making sure that the area under the curve which represents
7 a future time interval is no more than the sort of available area that would be
8 permitted. So, this is sort of the exemplifier of Figure 2 of Conroy, the area
9 207, which represents some excess power that's going to be used in that next
10 time interval, T plus delta, has to be less than the area 209, which is sort of
11 the available area in a power curve that could be allocated and yet still
12 remaining under a limit for average power uses.

13 So, that's why the computation is done as it is in Conroy, whereas
14 in the '833 patent, it's describing the computation for the current, that is the
15 time interval in which you are presently operating.

16 JUDGE SAINDON: So, Counsel, if I could ask a follow-up on
17 this. I'm looking at Figure 2 of Conroy, and I think this might be a good
18 example for doing a hypothetical, I suppose. So, in Conroy, we have the
19 time block T that we're currently in. And let's assume that every time block
20 is some fixed size. I think the challenge patent says one millisecond, but it
21 doesn't matter. There's some time interval, and Conroy finds itself in the
22 middle of that time interval in Figure 2, we'll say, where T is shown. And
23 so, I think what I'm hearing from you is what Conroy is doing, is while it's in
24 block T, it's trying to figure out what to do in T plus delta. And then --

25 MR. FAHMI: That's correct, yes.

1 JUDGE SAINDON: Okay. And then in your patent, what you're
2 trying to do is you're in T, and you're changing T. Well, for what remains,
3 obviously you're in T, so it's -- you can't change what just happened, but
4 you're just reallocating the current, whatever granularization you have you're
5 allocating there. Is that what you would say you're doing?

6 MR. FAHMI: I'm not sure that that equation 1 is describing a
7 reallocation. I think it's more trying to compute what power is actually
8 being used at that time.

9 JUDGE SAINDON: So, Counsel, I guess my question then, I
10 understand a budget as a spelling out of some limited resource to be used.
11 And so, a calculation of what energy I'm using would be useful for figuring
12 out if I'm over or under budget or what my budget should be. But I don't see
13 that as the budget itself. So, maybe I'm not understanding here.

14 MR. FAHMI: Yeah, I agree that there is some power limit
15 threshold that you are trying to stay within. But that's denoted by a separate
16 variable in this equation, Your Honor. It's denoted by power sub-limit,
17 which is the limiting constraint, I guess, on what the budget could be. So,
18 the instantaneous power consumption, (INDISCERNIBLE) can be higher or
19 lower than this power limit threshold. And I think that's what you're trying
20 to compute.

21 So, the term that's used is power budget. It's defined immediately
22 above as the power headroom available to the processor for a given time
23 interval. So, it's some amount of power that I guess could be in excess of
24 this threshold that's described in the expression labeled as equation 1. And I
25 think this is also where the distinction that I noted earlier with respect to

1 Finkelstein comes in, the power budget that we're concerned with is the
2 power headroom available to the processor as opposed to just power
3 headroom of a particular domain.

4 JUDGE SAINDON: So, Counsel, I guess what I'm struggling with
5 here is the fact that Conroy uses next and the challenge patent says current.
6 So, those are clearly different words, but I'm trying to understand, setting the
7 words aside, the words are describing something. And that's really what
8 we're ultimately trying to determine is whether what the words are
9 describing are different as opposed to just the words being different. And
10 so, I don't know if maybe Figure 2 of Conroy was not a good way to try to
11 point out the difference between the two. So, I'm just -- I'm just struggling
12 then with what the difference is, besides the words, but as far as what they're
13 doing seems like they are calculating the energy that is available to be used.
14 Whether you call that current or next, it's still in the future, I think, as I'm
15 understanding this. But again, I'm hoping for some clarification here.

16 MR. FAHMI: Yeah, I think you're mistaken about that, Your
17 Honor. I think with respect to Conroy, it's clearly in the future. With
18 respect to the '833 patent, it is what it says. It is the present time interval. I
19 understand that it's a bit difficult to describe current as something other than
20 what it is, but, you know, perhaps it's the present evaluation or present time
21 interval. That, to me, is what that expression is saying, and, you know, do I
22 wish there were a figure or something that showed it in the patent? Sure.
23 But, you know, we can't rewrite the patent at this point, and I think we just
24 have to go with what it says.

25 I mean, the patent does seem to be -- to have an understanding of

1 interval-based computations. It uses what I think is fairly common
2 nomenclature in terms of the subscripts. I mean, it refers to E of n minus 1
3 as a budget carried forward from the previous evaluation instant, so that will
4 be the preceding evaluation instant, and therefore, E of n is called the
5 current, and I take that to be the present evaluation instant. It's not the
6 situation in Conroy where you're looking at some current plus Delta
7 intervals, implying some future time. Honestly, I don't think there's anything
8 else in the '833 patent that's going to make the situation more clear. I did
9 look while you were having your discussion with Mr. Lewis, and this was
10 the best I could locate.

11 JUDGE ANDERSON: So, is that your argument, Counsel, that --
12 is that the evidence that supports your argument?

13 MR. FAHMI: That and the testimony of Dr. Brogioli, who
14 basically confirmed what I'm trying to articulate here, Your Honor, yes.
15 Any other questions on this point, Your Honors?

16 If not, I think that just leaves us with the Conroy-Finklestein
17 combination, and I think with respect to that combination, the important
18 point is that we tried to make in our response is that even if the person of
19 ordinary skill would make that combination, and we think they wouldn't for
20 the reasons that were given, but even if they were to make that combination,
21 you don't arrive at the invention recited. As you noted, when speaking with
22 Mr. Lewis, the arguments really, other than a discussion about the user-level
23 software, all of the arguments really rely on Conroy, and so the same reasons
24 as to why Conroy doesn't teach the limitations of the claim would apply with
25 respect to the Conroy-Finklestein combination. So, even if you make the

1 combination, the, you know, Finklestein just ends up as an additional
2 module, and the power allocation practices or policies of Conroy still apply,
3 and they have the same failings as we've just discussed.

4 I'd be happy to take any other questions that the Board might have,
5 otherwise I'll cede the floor to Mr. Lewis.

6 JUDGE SAINDON: So, I do have a couple questions for you, or
7 at least see if you want to elaborate on further. We discussed briefly with
8 respect to Conroy-Finklestein the "independent" claim construction. I guess
9 the first question I have is, I understood that to only be an issue with respect
10 to Conroy-Finklestein, not the Finklestein alone. Do you agree with that?

11 MR. FAHMI: I do agree, Your Honor, yes.

12 JUDGE SAINDON: Okay. And we, of course, talked about the
13 claim limitation, you don't have to provide any further, you can rest on your
14 briefs, but if you wanted to respond, I'd be interested in anything you have to
15 say there. And then I have one more question on Conroy.

16 MR. FAHMI: Yeah, as to the construction of independent, let's
17 see, this is our slide number 4. As we explained in our response, the word
18 independent shows up in several locations in the specification. And Dr.
19 Brogioli went through each of those usages and indicated that when the
20 person of ordinary skill reads the use of those terms in context, what they
21 decide is that independent is being used to mean separate. And I think Mr.
22 Lewis agreed that independent doesn't require difference. It allows for
23 different voltage settings, but those don't have to be different. And I think
24 that was the point we were trying to get across with the construction term
25 that while the voltages and frequencies may be different, they don't have to

1 be different. And I think the parties are agreed on that point.

2 JUDGE SAINDON: Okay. Let's see, the other question I had for
3 you, so we did not get to with Petitioner the Conroy Claim 13. This is the
4 issue with the first storage and second storage, and what is a storage versus
5 what is a memory. I guess I'm having a hard time understanding that
6 argument. I understand on some level, if you're going to go buy a computer,
7 they'll market memory and storage. And it usually means RAM and hard
8 drive space, respectively, but we're not talking about those kind of marketing
9 usage of the term. And when I, you know, these are processors, we're
10 talking about storage and memory. I feel like they're synonyms. I'm having
11 a hard time saying one is one thing and not the other in the context of these
12 more closer to the hardware discussions by somebody of ordinary skill in the
13 art. So, I was wondering if you could speak to, is there a difference between
14 storage and memory, or is it really not those words being different, it's just
15 what the prior art is teaching is different from what's claimed?

16 MR. FAHMI: Yeah, I think it's more the latter, Your Honor. I
17 don't think anyone would disagree that memory is a form of storage and I
18 don't think we've tried to make that argument. What we've said is that the
19 claim is very specific and that the first power sharing value is stored in the
20 first storage and second power sharing value is stored in a second storage.
21 But in Conroy and I have an excerpt from Conroy in our slide number 13,
22 Conroy describes all of the power distribution cables being stored in a
23 memory, so one memory, one storage, and that's different from the claim,
24 and the petition doesn't offer any reason for modifying Conroy to go from
25 one to more than one, at least in the -- not that I saw on the petition.

1 JUDGE SAINDON: I understood Petitioner's argument to be that
2 the different values, I have -- a memory is a collection of individual storage
3 units, that those individual storage units, once you get down in there, the
4 different addressable locations, those are first and second storages. Maybe
5 they are controlled by some higher level thing that is called the memory, but
6 the individual values are stored separate in separate addressable locations,
7 that's what makes them first and second. Is that not what you understood?

8 MR. FAHMI: Well, I certainly didn't see that in the petition, Your
9 Honor. I don't ever recall seeing anything in the petition about having
10 differently addressable locations. I mean if we're going --

11 JUDGE SAINDON: Maybe they use different cells in a table, I
12 don't remember, that's kind of a technical takeaway I took from it. But yeah,
13 maybe they didn't use that language.

14 MR. FAHMI: Yeah, I certainly didn't see that, Your Honor. I
15 mean, the '833 patent itself talks about tables when it talks about the power
16 sharing value, but it's particular about how those values are stored in
17 different configuration registers. This is in column 4. So Table 1 begins at
18 about line 12 or so, and immediately above it, it indicates that, you know,
19 this table is carved up into two different configuration registers. And that's
20 distinct from the concept of, you know, a single memory in Conroy. I mean,
21 if you want to get down to the value or to the level of individual storage
22 elements, which the claims don't, but the '833 patent does go as far to say
23 that, you know, we're talking about 5-bit values immediately below the table
24 there. And, yeah, I suppose each one of those bits would be stored in an
25 individual cell of -- or, you know, individual transistor that comprises a

1 configuration register. But I certainly don't recall the petition ever getting
2 down to that level of minutia. The claim, I don't think, gets to that level of
3 minutia, and Conroy certainly doesn't either.

4 JUDGE PESLAK: Counsel, this is Judge Peslak. On page 61 of
5 the petition, I think it does say Conroy describes an example where these
6 power settings are stored in registers. So, are you -- is it Patent Owner's
7 position that if they're stored in different registers that's not different
8 storage?

9 MR. FAHMI: No, Your Honor, that's actually a mistake in the
10 petition about what's actually being stored in the register. This is addressed
11 on our slide 15. So, Conroy describes an example not where the power
12 settings from those tables are stored in registers. What Conroy is describing
13 is that throttle settings that are determined by particular sensors, which
14 report to a microcontroller, are stored in the registers. So, this is not the
15 power settings from the table that's being used to map to the claims. This is
16 simply a different thing. And in fact, I think in our response, we indicated
17 that, you know, the fact that Conroy appreciates the difference here as to
18 what gets stored where is really support for our position that when Conroy
19 says the power settings that are stored in tables which are stored in a
20 memory, you know, Conroy appreciates these distinctions. And so, a
21 memory being a single memory as opposed to multiple storages.

22 JUDGE SAINDON: Counsel, later on on petition 61, Petitioner
23 says a person of ordinary skill in the art seeking to implement the teachings
24 of Conroy would have found it obvious to use registers to store the various
25 power settings depicted in 7, 21, and 22. So, to your point that 7, Figure 7

1 that is, is what explicitly says a register but isn't the throttle. Well, it's, it
2 does have throttle settings but it's not the ones that Petitioner was talking
3 about earlier, doesn't this here make clear that it's at least a statement of it
4 would have been obvious to use the registers here?

5 MR. FAHMI: Yes, and Dr. Brogioli again rebutted that in his
6 testimony, Your Honor, and said that the person of ordinary skill would not
7 adopt that type of a solution and would instead simply adopt the table
8 approach because it was the simpler and more straightforward approach, and
9 that testimony was again not rebutted by anything from Dr. Horst in reply
10 and don't recall it coming up in deposition either.

11 JUDGE SAINDON: Going through my notes to see if I had any
12 other questions for you. I do not. Anything further from the panel?

13 JUDGE PESLAK: Not for me.

14 JUDGE ANDERSON: Oh, nothing from me.

15 JUDGE SAINDON: Okay. So, Patent Owner, you may continue
16 with other arguments if you wish. Otherwise, we'll reserve the rest of your
17 time.

18 MR. FAHMI: Yeah, I think at this point, Your Honor, if there's no
19 other questions from the panel, we'll just reserve the remainder of our time.

20 MR. LEWIS: Okay. Your Honor, can you see me?

21 JUDGE SAINDON: We can. Yes, and you have 10 minutes.

22 MR. LEWIS: All right. Starting with the last column first, Patent
23 Owner says that the separate storage limitation is not met because the
24 Conroy reference talks about a table having a single memory, a one memory
25 in their parlance. That is exactly the same way that the '833 has described it.

10 So, when Dr. Brogioli says a person having ordinary skill in the art
11 would not have done it this way, that's exactly the way that the '833 patent
12 says to do it. The idea of separating the storages does not mean it has to be
13 in a completely different memory unit. And I think that Judge Saindon is
14 correct in his question about it being more reflective of the addressing of the
15 power sharing values being to two separate addresses. And that's how you
16 meet the limitation of separate storages.

38

1 as blocks of time with a width and they're centered on on t_n minus one t
2 times Δt_n minus t_n Δt_n minus one Δt_n minus two Δt et
3 cetera, et cetera, and I think you guys noted that there might be a mistake in
4 the labeling of this figure itself.

5 But it's clear from the figure that the time intervals are with Δt ,
6 and it's clear from the specification that the last of the past time intervals is
7 labeled t . And so, the current one is t plus Δt , and that's what we see on
8 the far right column. That's the only one that's dynamically determined as a
9 power budget for the time t plus Δt . All the other ones are in the past.
10 And this one is directly, it's not sometime in the future, it's immediately
11 after, immediately after the previous time intervals, each up with Δt
12 marking back from t . That's the last time interval before the present time.

13 So, Conroy is disclosing the same thing that is claimed in the '833
14 patent regarding the current time interval being the t plus Δt . It's not
15 sometime in the future, it's the time immediately after the last one that was
16 in the past, which is the current.

17 Your Honors also asked me to look for further motivations to
18 combine, or if there's any arguments that we had listed beyond the
19 arguments on pages 77 and 78 for a Conroy plus Finkelstein. And the
20 answer there, Your Honors, it is in the Horst declaration being in paragraph
21 236, which is near the end of page 131, where he describes that a POSITA
22 would implement the teachings of Conroy, and we found it obvious to make
23 a person second sharing policy values controllable by user software in
24 Finkelstein, because Finkelstein discloses a power budget between person
25 second domains, because it also discloses user and/or application defined

1 preferences to describe how to distribute power budget between the first and
2 second domains, and that a POSITA would have been motivated to combine
3 the teachings of Conroy with the teachings of Finkelstein, in order to provide
4 the exact limitation, the user ability to arrange or adjust the settings recorded
5 in Conroy's power distribution tables, which are also used to describe how to
6 distribute power budget between the first and second domains.

7 And I believe that the last issue that you asked me to review again
8 is regarding Finkelstein and what is the constraint K. That is -- the
9 description of it is admittedly thin, I apologize for that, Your Honors, but it
10 is stated that K is the user or application defined preferences that describe
11 how the budget E_k is distributed amongst power planes and how they may
12 determine. That is Finkelstein at paragraph 34.

13 And I think lastly, unless there are further questions, I do want to
14 refer back to the discussion about dynamically allocating a power budget for
15 the processor between the first and second domains. Perhaps I'm not
16 understanding the Patent Owner, but I have noted that he keeps dropping the
17 end of that limitation. So, he stops at "logic to dynamically allocate a power
18 budget for the processor" and says that the E_k formulas don't do that. But
19 that's not the limitation. The limitation is to "dynamically allocate a power
20 budget for the processor between the first and second domains." That's
21 exactly what the E_k formulas are doing. When we figure out the unused
22 power budget, that E_{k_i} times W_{k_i} minus the E_{high_i} , that's the surplus that
23 can be redistributed amongst the power planes. That's the limitation. The
24 first logic to dynamically allocate a power budget for the processor between
25 the first and second domains. The E_{high_i} representing the amount that's

1 being used, can't get rid of that. But subtract that from the amount that's
2 budgeted and you get a surplus. That surplus is what is being distributed
3 between the first and second domains. At least first and second, it might be
4 more. But that's the dynamic allocation for a power budget between the first
5 and second domains. The emphasis is not for the processor, it's on between
6 the first and second domains.

7 I ask the Board if there are any further questions on these points.

8 JUDGE SAINDON: Yes, I have one question on the point you
9 were just making. So, I understand how you're reading Claim 1, I believe.
10 What my question is whether that's consistent with Claims 2 and 5,
11 depending from Claim 1. Claim 2, I think, is very clearly what you are
12 saying, the between, focus on the word between, what comes after. But
13 looking at Claim 5, this makes me think that Claim 1 is all along
14 “dynamically allocate a power budget for the processor between the first and
15 second domains” means take the whole pie, divide it up among the two. Not
16 take a bit and divide it among the two, which I think is more of what Claim
17 2 is getting at. So anyway, I just was wondering if you could square those
18 three claims and whether that sheds any light to us as to how to read Claim
19 1.

20 MR. LEWIS: Right. I think what is happening here is Claim 5 is
21 adding the temporal dimension, the time domain. Claim 5 talking about the
22 first logics to turn the power budget. Now we're adding location for the
23 current time interval based on at least part of the power budget cared for.
24 And I apologize, I think that -- I think we're getting hung up on is that I
25 described the general case of E_k and not En_k , which is described in the

1 library of formulas in the '833 patent, I'm sorry, the Finkelstein reference.
2 So, we see it in paragraph 28 where we describe E to be sub-N as opposed to
3 superscript K. The sub-N is describing a time slice. We see that, again, in
4 other places within the reference in columns, I'm sorry, paragraphs 28
5 through let's say, 41, describing now slicing it up based on time as opposed
6 to just based on the constraint, the situation, the K. So, that is how the
7 Finkelstein is meeting the limitation here. And to be clear, Finkelstein and
8 the '833, they're describing the same structures because remember, the
9 Finkelstein reference is the same invention, at least some of the inventions
10 are the same. Figure 7 of, I think it's Figure 7 of Finkelstein is the same as
11 Figure 8 of the '833 patent. And if it's not, then I've got them backwards.
12 Yes, Finkelstein Figure 7 is a serif font version of '833 Figure 8, with some
13 very minor differences that aren't germane here.

14 The formulation of the total power budget is using different
15 variables in the '833, but it's describing the same thing. If I can point you to
16 the '833 patent.

17 JUDGE SAINDON: Counsel, you can give us this cite, but we're
18 over time.

19 MR. LEWIS: If you look at the '833 patent on column 4, the last
20 two formulas describing the -- a fraction of policy over the sum of all
21 policies, the same way that the Finkelstein reference is describing a budget
22 for a particular domain as a slice of the entire budget.

23 And I will rest with the rest on the briefs and I thank you for your
24 time.

25 JUDGE SAINDON: Thank you. Panel, any questions? I know

1 we're over time, but if you have any.

2 JUDGE ANDERSON: No questions.

3 JUDGE PESLAK: No questions.

4 JUDGE SAINDON: Okay. Thank you. Okay. Patent Owner,
5 you have the floor.

6 MR. FAHMI: Thank you, Your Honor. Let me take these points
7 in the same order that Mr. Lewis presented them. He started with a
8 discussion of the separate storages in Conroy and directed your attention to a
9 sentence in column 8 of the '833 patent that said, I think it was beginning at
10 about line 59 of column 8 that said Figure 6 showed an example in which
11 values were stored in the PCU, and said that supported the argument that
12 somehow one memory is separate storages. He didn't bother to go and read
13 the very next sentence in column 8 that says, although shown at this location
14 in the embodiment of Figure 6, understand that the scope in the present
15 invention is not limited in this regard, and the storage of this information can
16 be in other locations such as configuration registers. So, the patent itself
17 distinguishes embodiments, and what we've indicated is that the claim is
18 referring to the embodiment of separate storages, not a single storage. So, if
19 anything, the '833 patent itself supports the idea of separate storages, which
20 is not found in Conroy.

21 The second issue that Mr. Lewis discussed with you was the
22 current time versus next time issue, and he indicated that Conroy delta is not
23 indicating a future time. Yeah, I agree with him that the delta is just an
24 interval, and what indicates the future time is the T plus delta. And I think if
25 you take a look at paragraph 101 in Conroy, that this issue of what is T plus

1 delta is resolved because it's referred to as a subsequent time interval. So,
2 it's not the present, it's not the current time interval. It is something coming
3 later.

4 There was then a discussion about the Conroy plus Finkelstein
5 combination, and I think if the petition is seeking to rely on the teachings of
6 Finkelstein or the power distribution as opposed to Conroy, then the same
7 failings of Finkelstein that we discussed with respect to Claim 1 would
8 apply, and in particular that is the idea that the petition is relying upon the
9 distribution of an unused budget for a power plane rather than the processor.
10 And the question came up as to what the variable K in that expression for
11 use of K really means, and that's a per constraint power budget as opposed to
12 a per processor power budget. And I think that's made clear in paragraph 31
13 of Finkelstein where we're told that there can be a set of energy budgets, E_n
14 of K. So, there can be a number of different constraints, K, and each one of
15 those can be separately allocated.

16 And then finally, Your Honors, I agree with the Board's
17 interpretation that Claim 1 is describing allocation of, I think the expression
18 was the whole pie, the power budget for the processor, rather than merely
19 some overhead per power plane. And so that's where the distinction with
20 Finkelstein arises.

21 I'm happy to take other questions. Otherwise, we will rest on the
22 papers and the arguments presented today.

23 JUDGE ANDERSON: No questions from me.

24 JUDGE PESLAK: No questions.

25 JUDGE SAINDON: Counsel, I have just one question. Going

1 back to the Claim 1 being a whole pie, I'm looking at the '833 patent column
2 3. We were talking around this formula before. Around line 21, we read
3 “package power budget, which is a metric that measures power headroom
4 available to the processor.” And then later, we get the definition of E sub N
5 being the energy budget, and E N minus 1 being the energy budget carried
6 forward. So, I just want to make sure I understand the whole pie concept,
7 you know, when it talks about the power headroom, that's the whole pie, or
8 is this talking about something different?

9 MR. FAHMI: No, I think you're right, Your Honor. That is the,
10 well, as it says, the power headroom available to the processor for a given
11 time interval. That's the pie.

12 JUDGE SAINDON: Okay. And is that an excess, or is that just, I
13 mean in some ways, headroom, there's some amount of excess inherent in
14 that, but I just want to make sure I'm understanding the difference between
15 the, what was it, W times E minus E high, you know, that is some excess,
16 and then the power headroom that's being talked about in the '833 to make
17 sure that those are truly different concepts.

18 MR. FAHMI: Yeah, I think the difference is one is the headroom
19 available to the processor, and the other is the access available to the power
20 plane. So, it's a different quantity that's being evaluated.

21 I agree with you that in both there does seem to be some type of
22 excess. But I read headroom I think the same way you're reading it is that
23 that is some excess over a particular baseline, whatever that is. I don't think
24 we're necessarily told in this paragraph what that baseline might be, but it's
25 clear that it's for the entire processor.

1 JUDGE SAINDON: Okay, I understand. Okay. I don't have any
2 further questions. So, I think unless you have any other statements you'd
3 like to make we can move on to the next case.

4 MR. FAHMI: No, I appreciate the Board's time and like I just
5 said, we'll rest on our papers from here.

6 JUDGE SAINDON: Okay, thank you. So, let's slide over to the
7 1345 case. I think -- so we started with 45 minutes and we stole 10 minutes
8 approximately. So, Petitioner, we'll give you 35 minutes.

9 MR. HUGHES: All right. Thank you, Your Honors.

10 JUDGE SAINDON: I don't know if we'll need that much, but we
11 can start with that. So, begin when ready.

12 MR. HUGHES: Okay. Just to check, do Your Honors or Patent
13 Owner need a break before, or is everyone ready to proceed right into this
14 one?

15 JUDGE SAINDON: Ready to go.

16 MR. HUGHES: Okay. All right. Thank you, Your Honors. We
17 are here now for IPR2023-01345 regarding U.S. Patent Number 10,705,588.
18 As you can see on slide 2, what we're going to go through today is an
19 overview of the petition, including the grounds presented, an overview of the
20 challenge '588 patent, a discussion of the prior art references, and then a
21 discussion of the single dispute between the parties in this proceeding, which
22 is whether our reference to Shakkarwar discloses or renders obvious a
23 limitation in the claims of mapping selectable frequencies of graphics
24 processing circuitry with selectable frequencies of an interconnect.

25 Slide 4 shows the grounds presented in the petition in the

1 summary. As you can see, there was Ground 1, which was that Claims 1
2 through 4, 7 through 11, and 14 to 20 are unpatentable over a reference to
3 White. Ground 2 is that Dependent Claims 5 through 6 and 12 to 13 are
4 unpatentable over White in view of our reference to Shakkarwar. Ground 3
5 is that Claims 1 through 4, 7 to 11, and 14 to 20 are unpatentable over
6 Nussbaum. And then Ground 4 is that those Dependent Claims 5 through 6
7 and 12 to 13 are unpatentable over Nussbaum in view of Shakkarwar. Now,
8 Claims 5 through 6 and 12 and 13 are in red on this slide. Those are the only
9 claims for which Patent Owner challenged the assertion set forth in the
10 petition that the claim should be found unpatentable. Patent Owner did not
11 challenge that Ground 1 White renders unpatentable Claims 1 through 4, 7
12 through 11, and 14 to 20. And Patent Owner similarly did not challenge
13 Ground 3 that Nussbaum renders unpatentable those claims.

14 Going on to slide 6, we have an overview of the '588 patent here.
15 And the '588 patent discloses a system containing at least two processing
16 cores, a graphics engine, and an interconnect. And the cores, graphics
17 engine, and interconnect can be dynamically controlled to operate at
18 different frequencies.

19 At slide 7, we have Claim 1 of the '588 patent which is
20 representative of the independent claims therein. And this generally recites
21 an integrated circuit, or as we can see on the lefthand side a processor that
22 includes a first core operable at a first voltage and a first frequency, a second
23 core operable at a second voltage and frequency, graphics processing
24 circuitry operable at a third frequency, and an interconnect that's operable at
25 a fourth frequency, and that interconnect couples the graphics processing

1 circuitry to a memory.

2 Going on to slide 8, we now have at the bottom on the lefthand
3 side here Claim 5, which is one of those dependent claims that's in dispute.
4 And you can see we've highlighted the mapping limitation there. But Claim
5 5 depends on Claim 4, which depends on Claim 2, which depends on Claim
6 1. So, as we have on the righthand side of the slide, Claim 5 overall requires
7 first power management circuitry to cause the first and second cores to
8 operate at those first and second frequencies, second power management
9 circuitry for the graphics processing circuitry to operate at the third
10 frequency, and then the disputed mapping of selectable frequencies of the
11 graphics processing circuitry to those of the interconnect.

12 Going on to slide 9, we have here on the righthand side Figure 4
13 from the '588 patent, and this is a general description of the system that's
14 depicted in the '588 patent. You can see that the system includes a graphics
15 engine 420, CPU cores 410a through 410n, an interconnect 430, and then a
16 power control unit or PCU 455 that we can see on the upper lefthand side of
17 the figure there, and that PCU can cause the components, including the
18 graphics engine cores, and interconnect to dynamically operate at different
19 frequencies.

20 We're now going to go on to discuss the prior art references. The
21 first reference is White, which, as you may recall, was used in Grounds 1
22 and 2 of the petition. And White, like the '588 patent, is related to
23 independently controlling frequencies or voltages of different components of
24 a processor system. And just like Claim 1 of the '588 patent, White
25 discloses independently controlling frequencies or voltages of logic cores, a

1 graphics controller, which we can see at 1108 in the middle of Figure 8 of
2 White, that's on the left-hand side here, and also an interconnect, which in
3 this case is the common bridge and AGP bus that connects the graphics
4 controller to the memory 1104, as we can see at the top of the figure here.
5 Now, White further indicates that that processor that you see in this figure
6 contains multiple logic cores, which would include the first and second core
7 from the claim.

8 The next reference, which you may recall was in Grounds 3 and 4,
9 is Nussbaum. And again, like the '588 patent, Nussbaum discloses power
10 allocation control circuitry that independently adjusts the frequency and
11 voltage of multiple processing cores. Like we can see Core 0 through Core
12 N on Figure 1, which is annotated on the lefthand side of the slide, a
13 graphics processing unit, or GPU 103, and then again, Nussbaum discloses
14 the interconnect coupling that GPU 103 to a memory, in this case, the
15 DRAM that we see on the righthand side. And the interconnect here is the
16 north bridge that we see in the middle of the figure.

17 The next reference is Shakkarwar. And like those, Shakkarwar is
18 also about distributing power management and controlling the frequencies
19 and voltages of different components within a processing system. We can
20 see Figure 3 of Shakkarwar on the lefthand side of slide 13, and it includes,
21 like the claims, a graphics controller, in this case 305, a data controller or
22 bus that formed the interconnect between that graphics controller 305 and a
23 system memory 303. And we can see that we have the data controller and
24 then some bus lengths, including 314 and 311, and those are what connect
25 that system memory to the graphics controller. And finally, Shakkarwar

1 discloses adjusting the bus rate or the frequency of the interconnect based on
2 the bandwidth requirements of the graphics controller.

3 Going on to slide 14, what does Shakkarwar's system do? Well,
4 it's a method of managing power consumption. And one of the things that it
5 does at step 401, as seen in Figure 4, is it monitors for system processing
6 conditions that may change. And one example of this that it gives is when
7 you may have 3D graphics applications running. So, it may monitor the
8 bandwidth of a component at step 401, such as that graphics circuitry, to see
9 if there's increasing or decreasing requirements for the bandwidth of that
10 component. At step 402, it detects a change in processing conditions.

11 Again, as we see in the example here, it could detect a change in the graphic
12 circuitry's required bandwidth, such as when a 3D graphics application that
13 it describes is started. Then at step 403, it determines a desired characteristic
14 based on the change. Here, it would be determining a new bandwidth
15 required for the graphic circuitry's data connection or interconnect, and it
16 does this based on a lookup table that contains clock speeds, which are
17 frequencies of the various components.

18 Then at step 404, it checks to see if the determined bandwidth of
19 the interconnect should be modified. It looks at the current bandwidth of the
20 interconnect and sees if that's sufficient or if it needs to be modified to meet
21 the new determined bandwidth.

22 And finally, at step 405, it's going to adjust the data rate or
23 frequency of that interconnect, such as by increasing its frequency, if, for
24 example, additional bandwidth may be required.

25 Now, we're going to get into the single dispute between the parties

1 here, as we can see on slide 15. That is whether Shakkarwar discloses or
2 renders obvious a mapping of selectable frequencies limitation.

3 Going on to slide 16, we can see this limitation, which is in, for
4 example, Dependent Claims 5 and 12, which each recite a mapping of
5 selectable frequencies of the graphics processing circuitry to selectable
6 frequencies of the interconnect.

7 Going on to slide 17, Shakkarwar does exactly this. Shakkarwar
8 discloses these claims selectable frequencies. First, as we can see at the top
9 of the slide, Shakkarwar describes selecting clock levels or frequencies of
10 the graphics controller. For example, at column 5, lines 25 to 30,
11 Shakkarwar indicates that components, including the graphics controller
12 305, have clock levels for those devices, and further that these are alterable
13 based on bandwidth requirements for communicating and processing
14 information. So, as those requirements change, the clock level of this
15 graphics controller will be altered or selected to be the appropriate level for
16 the processing that's going to be required.

17 Shakkarwar also describes selectable clock rates or frequencies of
18 the communication bus and it does this in multiple places, including as we
19 see at the bottom of the slide in the abstract where it indicates that the clock
20 generator and a communication bus are operated at variable clock rates.
21 And again, this is to ensure bandwidth requirements are satisfied for
22 communicating and processing the information.

23 Going on to slide 18, Shakkarwar discloses when that claim to
24 mapping is performed. In particular, Shakkarwar illustrates an association
25 between the graphics controller and the interconnect frequencies which are

1 those data connections between the graphics controller and the other
2 components. Shakkarwar in column 6, including at lines 49 to 52, gives an
3 example. When an application that is known to use 3D graphics is open the
4 system software can determine if the bus rate between the data controller
5 which was 302 and the graphics controller 305 is high enough to support the
6 graphics requirements. Right there there is a relationship between the two.

7 Now, selecting to open a 3D graphics program increases the
8 graphics controller frequency and bandwidth requirements, and this is going
9 to cause an associated increase or required increase in the interconnect bus
10 rate frequency as well. So, when graphics circuitry frequency increases,
11 Shakkarwar indicates that a determination of a required interconnect bus rate
12 or frequency is also going to be made.

13 We go on to slide 19. Shakkarwar further discloses what this
14 mapping is. In particular, Shakkarwar describes using a lookup table that
15 lists devices and components clock speeds or frequencies that are required to
16 process a given amount of information. We see this for example at column
17 7, lines 5 to 10, where Shakkarwar indicates that upon detecting a change in
18 processing, which could be for example that 3D graphics application being
19 implemented, the method determines bandwidth for an associated data
20 connection based on the active components. And it says, for example, a
21 lookup table may include a list of clock speeds and/or voltage levels
22 required to process information for these specific devices and groups of
23 devices. Now, those components and devices mentioned here include the
24 graphics controller 305 and the data controller 302, which as we saw forms
25 part of the interconnect before the graphics -- between the graphics

1 controller 305 and that memory.

2 Going on to slide 20, Petitioner's expert Dr. Horst explained how
3 this is the claimed mapping, and Shakkarwar teaches this mapping
4 association between the frequencies of the data controller and interconnect
5 302 and the graphics controller 305. In particular, as Dr. Horst explained,
6 Shakkarwar thus teaches determining the appropriate bandwidth for a data
7 connection to a module, such as the graphics controller 305, utilizing a
8 lookup table that includes a list of appropriate clock speeds. And it also
9 considers other active components, such as the data controller 302, which,
10 along with the data connection, is also part of that interconnect and its clock
11 speeds. And as Dr. Horst said, a POSITA would have understood that
12 Shakkarwar teaches to map selectable frequencies of the graphics processing
13 circuitry to selectable frequencies of the interconnect using those lookup
14 tables.

15 JUDGE SAINDON: Counsel, if I could jump in here.

16 MR. HUGHES: Yeah.

17 JUDGE SAINDON: This is Judge Saindon. So, your -- I'm
18 looking at slide 20.

19 MR. HUGHES: Okay.

20 JUDGE SAINDON: The expert's declaration here, paragraph 140,
21 there's a statement that we have a lookup table that we have clock speeds.
22 And then a conclusion that you would have understood to map frequencies
23 of the GPU to the frequencies of the interconnect. I read this, and I get an
24 impression that there's a jump in logic here and I'm wondering if you could
25 explain it to me. If we have a lookup table of appropriate clock speeds for

1 all kinds of different devices, I'm missing how that is the same thing as a list
2 of GPU clock speeds and a list of corresponding interconnect clock speeds.
3 You know, in my view, a mapping is -- there's a relationship that is defined
4 by the map.

5 MR. HUGHES: Yes, Your Honor. And what we have is, you
6 know, in that table, we do have the active components, which include the
7 graphics processing circuitry and the interconnect tables. If we look at, for
8 example, column 5 of the Shakkarwar reference at about lines 25 to 30, like
9 we talked about, the reference indicates that there's a clock voltage control
10 and that's providing the operating characteristics of the different
11 components. And those include the graphics controller 305 and the data
12 controller 302. And at that section, it again tells us that clock and voltage
13 levels of these components are alterable based on the bandwidth
14 requirements. So, that's what we have in this table is those clock speeds of
15 these components, including the graphics controller and that data controller
16 as well.

17 Now, as we can see at column 7, lines 5 through 10, I can go back
18 to that. What we're doing with that information that includes those clock
19 speeds is, like it says here, it's being used to determine that bandwidth. And
20 bandwidth, there's a direct relationship between this bandwidth and
21 frequency. So, this bandwidth is directly proportional to the frequency or
22 the data rate for that bus. So, what this is telling us here is when I want to
23 determine the bandwidth or the frequency that's needed for this data
24 connection, I'm looking at these active components in the table and I'm
25 looking at their clock speeds which are their frequencies.

1 And I, you know, Your Honor, here there's no dispute that those
2 clock speeds are in fact frequency. The patent itself indicates that clock
3 speed is in fact data rate in column 2. And as I'll go on to show here, Dr.
4 Horst at paragraph 140 of his declaration explained that frequency and clock
5 speed are in fact synonymous as used herein. And even even Shakkarwar
6 the reference indicates that this clock speed is in gigahertz which is the
7 measurement of frequency.

8 Now, Daedalus' expert, Dr. Brogioli, agreed with this. When he
9 was asked at deposition what is, for example, the frequency of a processing
10 core, part of his answer was it's kind of the clock speed the thing is running
11 at. So, I don't think there's any dispute here that these clock speeds in the
12 table are the frequencies of those components. And in fact, Dr. Brogioli
13 admitted that that lookup table includes or helps to determine the frequency
14 of the bus. He stated, even in his declaration, at paragraph 41, like we can
15 see at the top of slide 23, that Shakkarwar determines a frequency to change
16 the bus to by using a lookup table that may include a list of clock speeds
17 required to process information.

18 Now, he admitted again that this lookup table would have rows and
19 entries of values in there. Now, even going on, he also knows --

20 JUDGE SAINDON: Counsel, if I could jump in here. So, my
21 question isn't really the relationship between clock speed and frequency and
22 voltage. I'm not too concerned there. What I'm wondering is, when I read
23 Shakkarwar, I see a list of clock speeds. And what I don't know if I see is a
24 list of clock speeds of a GPU that correspond to clock speeds of an
25 interconnect. I just see lists of both, but none mapping one to the other.

1 MR. HUGHES: So, if we go to, again, you're looking at, for
2 example, column 7, lines 5 to 10, what this is doing is the lookup table has
3 that list of clock speeds for the active components. As we mentioned, those
4 could include the data controller and the graphics processing unit. So right
5 there, there's a relationship between the two because we're determining the
6 bandwidth required for the data connection. And even that determination of
7 the bandwidth required for the data connection, that is a determination of
8 frequency.

9 So, what are we doing here? We're determining the frequency
10 needed for that data connection based on the active components, and we're
11 going to the lookup table. So, I'm trying to determine the frequency of the
12 data connection, which is which is part of the interconnect there, and to do
13 that I'm going to this lookup table and checking against the clock speeds or
14 frequencies of the active components. So, there we have our mapping.
15 What is the bandwidth or the frequency that I need for this data connection?
16 Well, to do that I go to the lookup table and I check against the
17 corresponding clock speeds of the active components, and that's what's
18 going to give me my mapping for my required frequency to get the
19 bandwidth that I need.

20 JUDGE SAINDON: So, Counsel, I guess maybe to the extent the
21 Shakkarwar has something more specific, I'm having a hard time following.
22 I get that there are clock speeds. It's maybe like a menu of available clock
23 speeds. How do we get from, okay, we found this clock speed for the GPU,
24 now we need this clock speed for the interconnect? I understand you can
25 calculate these, because ultimately, this is what every processor is doing.

1 But what the claim is requiring is a mapping from one to the other. So, I'm
2 trying to find that specific limitation.

3 MR. HUGHES: So, we have that where, as we can see right here,
4 what this method needs to do is determine the bandwidth for the associated
5 data connection. So, we don't have the frequency that relates to this
6 bandwidth yet. We don't have that frequency for the data connection. So
7 what do we need to do? Well, we need to figure out what that is. So, we go
8 to this lookup table, which has our clock speeds. If I check against the clock
9 speed that I need for the graphics processing unit, that's my mapping. That's
10 giving me the bandwidth or the frequency that I need for this inner connect.
11 So, that's where the relationship comes in, is that I need to determine this
12 bandwidth, which is a determination of the required frequency there. To do
13 it, I'm checking this table and I'm checking against the clock speeds. I'm
14 looking for, for example, my graphics processing circuitry is being
15 implemented to run that program. What's the clock speed for that program?
16 That's in the table. That's mapping and giving me my determination of my
17 required bandwidth for the inner connect.

18 JUDGE SAINDON: Okay. I think I understand now.

19 MR. HUGHES: And we can see that, and I'll go to that here. And
20 just to clarify, like I was saying here, even Daedalus does not dispute that
21 the clock speeds of the computational components, like that graphics
22 processing circuit, are within that lookup table. We can see that, for
23 example, on this slide at page, their sur-reply at page 5. So again, the parties
24 in agreement, this table has the clock speeds, including for the graphics
25 processing circuitry. And as we saw here, slide 23, Dr. Brogioli is even

1 indicating that using that table, which includes that list of clock speeds, that's
2 what you're doing to determine a frequency to change the bus to. So, there's
3 the mapping, there's the relationship.

4 Now, Patent Owner argues that Shakkarwar lacks the mapping of
5 frequencies to frequencies because it describes only a table that includes
6 clock speeds and/or voltage levels to process information specific -- or
7 information for specific devices. But this isn't the case. Part of that
8 processing of information for the devices, as we saw, is based on what their
9 monitor characteristics are. What are their clock speeds? That's what's in
10 the table. Where we have that graphics processing circuitry being activated,
11 it's going to be at a certain clock speed. That table is giving us this relation.
12 It contains the frequencies for devices or components, including the
13 interconnects in the graphics circuitry. And using that lookup table, that's
14 how they determine bandwidth can be achieved or can be determined for
15 those data connections.

16 And we have here on slide 26, Patent Owner also argues that
17 Shakkarwar lacks the mapping of frequencies to frequencies because it
18 monitors bandwidth and not frequency. But bandwidth is directly
19 proportional to frequency and as Dr. Horst explained, in fact, you know,
20 again frequency, clock frequency, and clock rate are synonymous and
21 bandwidth is the product of frequency and the width of the connection.

22 Now, with the fixed width connection, bandwidth would increase
23 in direct proportion to frequency. So, when we have a fixed bandwidth, we
24 have the fixed number of lines, which is something that Shakkarwar
25 contemplates. The thing that we're changing or determining here for that

1 required bandwidth is in fact what frequency do I need to set this at.

2 And with that, Your Honors, I would reserve the rest of my time
3 for rebuttal unless you have any further questions.

4 JUDGE SAINDON: I do not.

5 MR. HUGHES: Thank you, Your Honors.

6 JUDGE SAINDON: Any question from the panel?

7 JUDGE PESLAK: I don't.

8 JUDGE ANDERSON: None from me, just to make the record
9 clear.

10 JUDGE SAINDON: Patent Owner, you can begin when ready.

11 MR. FAHMI: Thank you, Your Honor. Our position in this case,
12 I think, is pretty straightforward. Let me show you slide number 11 in our
13 demonstratives. So, our position is that Shakkarwar describes a table and
14 that table lists clock speeds and/or voltage levels required to process
15 information for specific devices, but there's no teaching or suggestion that
16 the table includes the mapping of frequency to frequency required by the
17 claims. The Petitioner's reply describes this mapping as an association
18 between frequencies. That's page 4 of their reply. There's nothing in
19 Shakkarwar that indicates any frequency to frequency association. At best,
20 Shakkarwar simply indicates that once a bandwidth for a data connection has
21 been established, for example, for the graphics processing unit, it requires a
22 certain bandwidth, then you consult the table to obtain the clock speed for
23 the interconnect. There is no indication that there's any mapping of
24 frequency to frequency as specified by the claim. And the Petitioner can't
25 point to anything in Shakkarwar that discusses such an association.

1 That's really our case, Your Honor, that they haven't shown the
2 requirements of Claims 5 and 12. They haven't indicated any modification
3 of Shakkarwar that a person of ordinary skill would make. And so, as to
4 Claims 5 and 12, their case falls short. And Claims 6 and 13 that depend
5 from 5 and 12 respectively would also not have been shown to be
6 unpalatable. But I'm happy to take questions if there's anything you'd like
7 me to elaborate on.

8 JUDGE SAINDON: Counsel, I do have a question regarding the
9 other claims. Are those claims conceded, 1 through 4, 7, 8 through 11, 14
10 through 20?

11 MR. FAHMI: Well, we haven't provided any arguments in
12 response to the Petition, Your Honor. It is still their burden to demonstrate
13 unpatentability, but we did not set forth any arguments.

14 JUDGE SAINDON: Understood. I have no further questions.
15 Does the panel? Hearing none?

16 JUDGE ANDERSON: No, Your Honor.

17 JUDGE ANDERSON: You are Your Honor.

18 JUDGE SAINDON: Okay. So, let's go back to, unless Mr. Fahmi
19 had any other statements, we'll go back to Petitioner.

20 MR. FAHMI: Yeah, nothing further, Your Honor.

21 MR. HUGHES: Unless Your Honors had any additional
22 questions, Petitioner will rest on the papers.

23 JUDGE SAINDON: I do not have any. Okay. Seeing noes from
24 the rest of the panel. Okay. Well, thank you for your time today. We
25 appreciate the arguments that we heard. It was a very helpful discussion. I

IPR2023-01335 Patent (8,775,833 B2)

IPR2023-01345 (Patent 10,705,588 B2)

1 ask that the parties stay on the line to answer any spelling questions or
2 clarifications from the court reporter. Otherwise, we are adjourned. Thank
3 you.

4 (Whereupon the above-entitled matter went off the record at 3:18
5 p.m.)

IPR2023-01335 Patent (8,775,833 B2)
IPR2023-01345 (Patent 10,705,588 B2)

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