Trials@uspto.gov
571-272-7822

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AXON ENTERPRISE, INC., DEDRONE HOLDINGS, INC., and SKYDIO, INC.,
Petitioner,

v.

AIRSPACE SYSTEMS, INC.,
Patent Owner.

IPR2025-00525 (Patent 10,713,959 B2)
IPR2025-00530 (Patent 10,249,199 B2)
IPR2025-00629 (Patent 10,514,711 B2)

Record of Oral Hearing
Held: August 25, 2026

Before: MICHAEL R. ZECHER, BARRY L. GROSSMAN, and SCOTT C. MOORE, *Administrative Patent Judges*.

APPEARANCES:

ON BEHALF OF THE PETITIONER:

CHAD WALTERS, ESQ.
ELLYAR BARAZESH, ESQ.
Baker Botts L.L.P.
2001 Ross Avenue, Suite 900
Dallas, TX 75201
(214) 953-6500
chad.walters@bakerbotts.com ellyar.barazesh@bakerbotts.com

SASHA G. RAO, ESQ.
Nixon Peabody
1 Embarcadero Center, 32nd Floor
San Francisco, CA 94111
(415) 984-8345
srao@nixonpeabody.com

ON BEHALF OF THE PATENT OWNER:

SUHRID WADEKAR, ESQ.
MATTHEW VELLA, ESQ.
MICHAEL SAUNDERS, ESQ.
AMANDA L'ESPERANCE, ESQ.
Prince Lobel Tye L.L.P.
One International Place, Suite 3700
Boston, MA 02110
(617) 456-8000
swadekar@princelobel.com mvella@vellapatentservices.com
msaunders@princelobel.com
alesperance@princelobel.com

The above-entitled matter came on for hearing on August 25, 2026, commencing at 1:00 p.m.

1 P R O C E E D I N G S
2 - - - - -
3 JUDGE ZECHER: All right. Good afternoon. My name is Judge
4 Zecher. I have to my right Judge Grossman, and joining us from Denver,
5 Colorado, Judge Moore. This is a consolidated hearing for IPR2025-00525,
6 IPR2025-00530, and IPR2025-00629. I would like to start the hearing by
7 taking a role call to see who's here for the parties. When you do come
8 speak, please come up to the lectern so Judge Moore can hear you on the
9 microphone. Let's start with Petitioner, Axon Enterprises, Inc. et al.
10 MR. WALTERS: Good afternoon, Your Honor. For Petitioners,
11 this is Chad Walters of Baker Botts, and with me is my colleague, Ellyar
12 Barazesh. And also, we have Counsel for Skydio, who is a Petitioner in the
13 2025-00629 IPR, Sasha Rao of Nixon Peabody.
14 JUDGE ZECHER: Thank you very much. Can we have
15 appearances for Patent Owner? I believe it's Airspace Defense Incorporated.
16 MR. WADEKAR: Yes, Your Honor. Thank you, Your Honors.
17 My name is Suhrid Wadekar. I'm representing Airspace Defense. And with
18 me is my colleague, Michael Saunders, and also are with me my colleagues,
19 Matt Vella and Amanda L'Esperance. Thank you.
20 JUDGE ZECHER: Thank you very much. So, we set forth -- we
21 issued an Order setting forth oral argument for these proceedings in the ‘525
22 case. That is Paper 39. In that Order, we gave each party 90 minutes of
23 total argument time. We suggested the parties use 25 minutes of their time
24 for the ‘525 case, 25 minutes for the ‘530 case, and 40 for the ‘629 case.

1 The parties can, of course, divide that up differently. That was just a
2 suggestion from us.
3 But as far as the time goes, I have two timers up here. I'm going to
4 start at the 90-minute allotment and I'm going to count down. So, however
5 you guys want to do your bifurcation of time, it's up to you, but this will be
6 your total time starting here, going down. So, if you want to take more time
7 for the '525 case or '530 case, that leaves you less time for the '629 case.
8 One thing we want to talk about real quick before we turn the floor over to
9 the parties for argument -- Judge Moore, I believe, has a question regarding
10 an administrative matter in the '629 case.
11 JUDGE MOORE: That's right. Okay. While reviewing the
12 records, we noted that in the '629 case, there was a motion to seal that was
13 filed by the parties. Let me find the date. It was filed in July, along
14 practically the same time as the preliminary response. So, on July 23rd, it
15 looks like. And that motion to seal related to Exhibit 2001, which is an
16 Army contract.
17 Now, this exhibit was cited several times in the preliminary
18 response. That document is obviously no longer at issue and was replaced
19 by the Patent Owner response, but this under seal exhibit was also cited once
20 in the Patent Owner response, which talks about it being an Army contract
21 for $3.5 million from the Defense Innovation Unit. And I just wanted to
22 pose the question to the parties about how we should handle this.
23 So, we haven't ruled on that motion to seal yet. Before we could
24 rule on the motion to seal, if you wanted it to be granted, we would have to

1 have a redacted version of Exhibit 2001 filed that was publicly available,
2 because currently, you're citing information about an exhibit that is sealed,
3 and you're citing that in a public document.
4 So, we would have to have a publicly available version of Exhibit
5 2001 filed before we could grant a motion to seal. And what you would
6 basically have to do is go through that and redact only the confidential
7 information and leave everything else, including everything you've cited in
8 the papers, unredacted. If the parties want us to go forward in that manner,
9 we could, but you'd have to file that first.
10 So, I just wanted to raise that issue so that you could consider how
11 you wanted to go forward. I guess alternatively, you could withdraw the
12 exhibit and file a corrected response and a corrected preliminary response
13 that delete the references to it, but I just wanted to raise this because the
14 under seal filing kind of created a little bit of an administrative issue for us,
15 and probably for you, as well, because the way the record stands now is
16 going to have to change. We can't have an under seal exhibit and then have
17 citations to the substance of that exhibit in briefs. So, you can consider that
18 and let us know how you want us to proceed, but I just wanted to raise that
19 issue at the outset.
20 MR. WADEKAR: Thank you, Your Honor. Would you like us to
21 give you an answer now, or is it okay if I discuss this with my colleague and
22 give the answer sometime, I mean, before the close of today's proceedings?
23 Would that be okay or --
24 JUDGE MOORE: That's absolutely okay. That's why I wanted to

1 raise it at the outset, so you would have time to consider it.
2 MR. WADEKAR: Okay. Thank you, Your Honor.
3 JUDGE MOORE: Thank you.
4 JUDGE ZECHER: Okay, let's go ahead and move forward here.
5 We'll turn the floor over to Mr. Walters and Petitioner. As I said earlier, you
6 can present the cases as you see fit. We've, of course, suggested some time
7 allotments, but if you need more time, less time, your call.
8 MR. WALTERS: Your Honor, we had understood that we would
9 proceed with our opening, their response, our rebuttal, their surrebuttal on
10 each consecutive IPR, starting with the '959 or the '525.
11 JUDGE ZECHER: Okay.
12 MR. WALTERS: Is that --
13 JUDGE ZECHER: That's fine.
14 MR. WALTERS: Okay.
15 JUDGE ZECHER: I guess from a clock perspective, I mean, I
16 have 90 here. I, of course, can -- I can adjust this and we could just do 25
17 and 25 and 40. What would you guys prefer because I'm not wedded to that.
18 So --
19 MR. WALTERS: Why don't we just do 90?
20 JUDGE ZECHER: Okay.
21 MR. WALTERS: And then we'll just figure it out. Figure it out
22 on our own.
23 JUDGE ZECHER: Okay, great. So, whenever you're ready to
24 begin, I'll go ahead and start the clock.

1 MR. WALTERS: May it please the Board. For the IPR on the
2 '959 patent, I would like to focus on some of the disputed issues, and I'm
3 currently on Slide 12. And these disputed issues are with respect to
4 substitute Claim 22, which is the only claim at issue. Moving to Slide 14.
5 I'd like to start with the lack of written description support for the secure
6 identifier term as claimed. Now, the claim requires that the secure identifier
7 be sent up to the aircraft, be received by a radio module, and to include a
8 specified excitation.
9 Moving to Slide 15. There's no disclosure of a secure identifier
10 being sent up to the aircraft, let alone one comprising a specified excitation.
11 Now, Patent Owner relies on general optical embodiments that are not
12 described as secure identifiers and that are obviously not received by a radio
13 module because they're optical.
14 Moving to Slide 17. All the disclosures Patent Owner relies on
15 relate to receiving a physical beam via a photo sensor or light array. And
16 those disclosures are shown in our Slides 18 and 19. Moving to Slide 20.
17 Patent Owner then points to a general disclosure that the identification box
18 and ground device can have a duplex communication and can exchange
19 information through light or RF. But moving to Slide 21, there is no
20 disclosure in the specification of receiving at the aircraft a secure identifier
21 comprising a specified excitation, let alone that a specified excitation could
22 be a radio communication.
23 Moving to Slide 22. Patent Owner is making a leap of
24 impermissible obviousness in saying that because the patent says that the

1 aircraft and ground device can exchange information through light or RF,
2 that the light beam disclosures disconnected from any discussion of a secure
3 identifier, could be both used as a secure identifier and support specified
4 excitation in RF communication.
5 Moving to Slide 23. And notably, the Board already construed
6 secure identifier as a credential that can be used to securely verify the
7 identity of a device. And when it did so, it concluded that both the 153
8 provisional and the 071 application failed to provide support for the term.
9 Patent Owner is not challenging the Board's construction on this. Instead,
10 Patent Owner is suggesting that because it added limitations to the claim,
11 stating that the secure identifier comprises a specified excitation, relying on
12 light embodiments, that now the term is supported by the 153, provisional
13 application.
14 The Board already found that the light embodiments disclosed in
15 the provisional did not support the term secure identifier, and we do not
16 believe this makes sense. The term secure identifier did not have support in
17 the provisional application with the original claim language, and how can it
18 be subsequently supported through a narrowing amendment?
19 Another way of looking at it is that secure identifier had a
20 particular meaning. Patent Owner narrows the term so that it also comprises
21 a specified excitation, but one still must show support back in the
22 provisional for the secure identifier, as originally claimed. An example, say
23 the claim required a car and the amendment was a car comprising a steering
24 wheel. You would still have to show support in the original disclosure for a

1 car. For that reason, Your Honor, we do not believe secure identifier has
2 written description support.
3 I'd like to now turn to the indefiniteness of the term low-altitude
4 aircraft. Moving to Slide 28. So, substitute Claim 22 requires a low-altitude
5 aircraft. This is a term of degree with no objective boundaries. Patent
6 Owner says the meaning is clear, but it never actually tells us what the
7 meaning is and does not identify its boundaries. Moving to Slide 29.
8 JUDGE MOORE: Doesn't Patent Owner assert that it's 500 feet or
9 below?
10 MR. WALTERS: I'm not sure what Patent Owner's position is.
11 We show in Slide 30 the portion of Patent Owner's reply on this issue, they
12 state that the specification describes small UASs, unmanned aerial systems,
13 as aircraft up to 25 pounds flying up to 500 feet of the low-altitude airspace.
14 And then it says the meaning is clear.
15 Here they just cite to a portion of the specification. This portion of
16 the specification only relates to small unmanned aerial systems, aircrafts up
17 to 25 pounds, and it says up to 500 feet of the low altitude airspace. So, I
18 don't know if their position is that it's low altitude airspace, which is not
19 defined, or up to 500 feet.
20 JUDGE GROSSMAN: That's the argument against it, or due to
21 aircraft means?
22 MR. WALTERS: Our position is that it's indefinite.
23 JUDGE ZECHER: Because it's a term of degree or because it's not
24 described sufficiently in the specification? I mean, I know that kind of goes

1 hand in hand with the written description type argument, but --
2 MR. WALTERS: It's a term of degree and the specification does
3 not provide any objective boundaries for what it could mean. Moving to
4 Slide 32. Patent Owner also cites 14 CFR 91.119C. This relates to
5 minimum safe altitudes, and it says that in other than congested areas, the
6 minimum altitude is 500 feet. Subsection B of that same regulation, which
7 is not cited by Patent Owner, states a minimum of 1,000 feet above the
8 highest obstacle within 2,000 feet.
9 Moving to Slide 33, we don't know if Patent Owner's position is
10 aircraft flying below 500 feet, based on the specification describing small
11 UASs up to 500 feet of the low altitude airspace, above 500 feet or above
12 1,000 feet. We don't know if their definition changes based on whether the
13 aircraft is in a congested or non-congested area or not. Moving to Slide 35,
14 Patent Owner's expert adds to the confusion. At one point he says up to
15 14,000 feet or up to 18,000 feet.
16 Moving to Slide 36, he also says that an airplane could be a low-
17 altitude aircraft, depending on the type of plane. He says it has a minimum
18 altitude of 500 feet, despite the specifications saying that small systems go
19 up to 500 feet. Moving to Slide 37, he also says that the meaning changes
20 depending on what city you are flying over. This clearly demonstrates
21 indefiniteness. We do not know what a low-altitude aircraft is. Now, based
22 on Patent Owner's slides, it appears to now rely on whatever the FAA says,
23 but the FAA is not mentioned anywhere in the patent or in Patent Owner's
24 briefing. There's no objective boundaries provided.

1 JUDGE ZECHER: Isn't the proper inquiry here what it means in
2 light of the '959 patent, not necessarily based on these regulations or what its
3 expert says?
4 MR. WALTERS: I believe that's true. I also believe that one
5 could look to -- based on what the '959 patent -- there could be external
6 sources to look at. The '959 patent doesn't cite to anything in that regard.
7 JUDGE ZECHER: So, where do these regulations come in? Who
8 introduced those? Patent Owner?
9 MR. WALTERS: Yes.
10 JUDGE ZECHER: Yeah.
11 MR. WALTERS: Do you have a question?
12 JUDGE GROSSMAN: No, I don't.
13 MR. WALTERS: Thank you. I would like to now turn to the
14 issue of the broadening the subject matter, through the revised motion to
15 amend. Moving to Slide 41. We contend that the amendments
16 impermissibly broaden the claim when they remove a term. They change
17 received radio signal to receive a radio signal, and this is broadening, Your
18 Honors.
19 Moving to Slide 42. Now, the preliminary guidance stated that
20 removing the word received does not change the meaning of the phrase. But
21 respectfully, Your Honors, we contend that it does change the meaning. It
22 no longer requires that the signal be one that has already been received. The
23 specification of the '959 patent is replete with various signals that have been
24 received by components in the drone.

1 As an example, various components of drone operation logic 1400,
2 which is described with respect to Figure 14. Receive radio signals, one
3 such component is the digital signal processor 1426. Patent Owner's expert
4 acknowledged that it receives signals from main controller 1404. So, it's
5 clear to us that the new language broadens the claim by removing the
6 requirement that the radio signal at issue is one that has already been
7 received.
8 JUDGE MOORE: So, you're reading the previous limitation as the
9 previously received radio signal?
10 MR. WALTERS: That's correct. Your Honor, I'm going to turn it
11 over to my colleague, Mr. Barazesh, to handle the prior art arguments for
12 this IPR. But before I did so, I wanted to address an issue with respect to
13 new Federal Circuit case law that came out in the last couple of weeks. On
14 August 10th, the Federal Circuit issued an opinion in *Dental Monitoring SAS*
15 *v. Align Technology*. That's case 2025-1752. And the Federal Circuit held
16 that even for post-AIA patents, that the Dynamic Drinkware precedent that
17 was previously applied to pre-AIA patents, applied to post-AIA patents.
18 And the issue there is that for reference to be entitled to its
19 provisional filing date, you not only have to show support -- if you're relying
20 on a portion of reference, you have to show support in the provisional, but
21 you also have to show that the provisional supported at least one claim of the
22 nonprovisional reference. When we filed this IPR and up until August 10th,
23 the precedent for post-IA patents was the Penumbra decision. It's a PTAB
24 decision that was precedential at the time. And we view the Federal Circuit

1 decision as overruling the Penumbra decision.
2 So, this is relevant to one reference that we are relying on in our
3 opposition to the revised motion to amend. It's the Beard reference, which is
4 one of our alternative grounds. We have other grounds that do not rely on
5 Beard. In relying on existing precedent at the time, we did not show in the
6 original petition where Beard's provisional supported a claim and it's non-
7 provisional. We contend that it does, and we would request the opportunity
8 to present that to the Board in some form.
9 I know we're in a unique situation since the law just changed after
10 all briefing is complete and shortly before this hearing. So, one option
11 would be to present a claim chart in the next few days that shows support,
12 wherein the Beard provisional supports a claim in the Beard non-provisional,
13 so that the Beard reference is entitled to its provisional filing date.
14 JUDGE MOORE: Counsel, have you raised this with Patent
15 Owner before today?
16 MR. WALTERS: We have not, Your Honor. This issue just arose
17 to us last week. We've been talking about how to handle it. We thought we
18 might see something from the PTAB overall, with respect to the precedential
19 Penumbra decision, but we have not, but we're all here.
20 JUDGE ZECHER: Well, isn't the time period for requesting
21 rehearing in *Dental Monitoring* still open at the Federal Circuit? I believe it
22 is.
23 MR. WALTERS: That's probably true --
24 JUDGE ZECHER: Yes.

1 MR. WALTERS: -- Your Honor.
2 JUDGE ZECHER: I don't think we've seen a mandate yet, so you
3 probably won't see anything from the PTAB --
4 MR. WALTERS: Okay.
5 JUDGE ZECHER: -- until the mandate issues.
6 MR. WALTERS: Okay.
7 JUDGE ZECHER: But thank you for bringing this to our
8 attention. We'll have to discuss this post-hearing to see a path forward.
9 MR. WALTERS: Thank you, Your Honor. Okay.
10 MR. BARAZESH: Okay. Good afternoon, Your Honors. May it
11 please the Board. Ellyar Barazesh, Counsel for Petitioners. As my
12 colleague mentioned, I'm going to cover the prior art grounds that Petitioners
13 presented for the '959 patent. I'm going to focus on the main disputed issues
14 here. Happy to answer any other questions, though, that Your Honors might
15 have.
16 So, I have Slide 44 up here. And just to level set, Slide 44 lays out
17 the various prior art grounds that Petitioners presented in the opposition. In
18 Grounds 5B through 8B, we've taken the Beard, Taveira, and Gong-based
19 grounds of the petition and combined them each with the Viggiano and the
20 Hayes references. And then for Grounds 9B through 12B, we have taken
21 -- we further combined with the Friend or Foe reference. The concepts
22 associated with the disputed issues relate to each of these grounds.
23 Turning to Slide 56. So, I'm going to just skip there. Bear with
24 me. I'm going to first cover Patent Owner's argument regarding the change

1 in behavior claim element. So, Slide 56 shows Element 22F, which says in
2 part that the specified excitation causes the first low-altitude aircraft to
3 change a behavior thereof. In the grounds, Viggiano teaches that an
4 authentication challenge is transmitted to an aircraft. That challenge causes
5 the aircraft to change behavior because the aircraft is triggered to prepare
6 and transmit a challenge response.
7 Patent Owner disagrees, stating that such a response is a default
8 expected behavior, not a changed behavior. But Petitioners disagree, and we
9 demonstrated in the opposition that the aircraft is not transmitting a response
10 to the challenge before receiving the challenge. It only transmits a response
11 to a particular challenge after receiving that challenge. So, this process of
12 transmitting response after receiving a challenge is a change in behavior of
13 the aircraft. Let's turn to Slide 57.
14 JUDGE ZECHER: When I was looking through the '959 patent on
15 this issue about behavior, it talks about operational behavior, and is that kind
16 of the tie-in, the change in behavior. It's received and its operation changes
17 based on the receipt of something?
18 MR. BARAZESH: That's our understanding, Your Honor.
19 JUDGE ZECHER: Okay.
20 MR. BARAZESH: Okay. It's that we think that the prior art
21 teachings of Viggiano map very closely to what the '959 patent describes
22 and also claims, and it's that back and forth relationship.
23 JUDGE ZECHER: Because the change in behavior is kind of a
24 broad scope here, right? I mean --

1 MR. BARAZESH: Our opinion, we believe that it is. And we
2 think that the Viggiano reference's teachings to the combinations really meet
3 that limitation clearly. Slide 57 is Patent Owner's expert testimony during
4 his deposition. He agrees with Petitioner's position here. He was asked if a
5 device being authenticated only sends a response upon receiving a challenge.
6 He said, that's correct. He also agreed that a device being authenticated does
7 not -- if a device being authenticated does not receive a challenge, it would
8 not send a response. So, for at least these reasons, Petitioners believe that
9 we've met this claim element with our combinations.
10 The next point I'm going to cover is regarding Patent Owner's
11 arguments of the enabling disambiguation claim element. So, I apologize
12 for skipping around a little bit, but let's go to Slide 51. Element 22E shown
13 on Slide 51 says that the specified excitation enables disambiguation of the
14 first low-altitude aircraft from other detected low-altitude aircraft. We
15 believe that the combinations teach this concept. Viggiano teaches that a
16 challenge provides an excitation to the aircraft, the aircraft transmits a
17 response, and then that response is used by an authenticator to authenticate
18 the aircraft's identity through Viggiano's taught message authentication code
19 comparison.
20 And in that process, a message authentication code 38, which is in
21 the aircraft's response, is compared to a message authentication code 58
22 that's generated by the authenticator. Viggiano explains in paragraph 15 that
23 it's determined whether the code 38 matches the code 58. And in the
24 combinations, if this comparison fails and it's a consecutive failure, then an

1 alert issues and that triggers modification of the user interface as taught by
2 the Hayes reference.
3 So, moving to the Hayes reference now. Hayes teaches user
4 interface modification involving the UAV that failed authentication being
5 disambiguated from other UAVs. And how does that happen? In Hayes,
6 there's a user interface showing all detected UAVs, which in our
7 combination includes the first UAV that's failed authentication. Hayes
8 teaches that its user interface is modified by removing all of the other
9 detected UAVs, so only that failed authentication UAV is displayed.
10 Now, Patent Owner argues that Viggiano's challenge does not
11 enable this disambiguation, but its arguments are based on this erroneous
12 view that the combinations involve some absence of response or some
13 failing to respond to a challenge or not broadcasting anything. But those
14 arguments don't actually address the combinations that we presented. All of
15 our combinations utilize a challenge response that's transmitted to an aircraft
16 and don't involve this lack of response the Patent Owner points to. So, we
17 believe Patent Owner's arguments fail in that regard.
18 The last point I'm going to make is regarding the element 22I. So,
19 we can move to Slide 58. Element 22I requires to disambiguate the first
20 aircraft from the other detected aircraft, based on the changed behavior of
21 the first aircraft, and I'm paraphrasing a little bit. And in the combinations,
22 as we've already discussed, the modification of the user interface occurs to
23 more clearly display the aircraft that failed authentication. And that's
24 happening based on the triggered challenge response that results in the failed

1 authentication of the aircraft.
2 Patent Owner argues against that, but as we already discussed,
3 there is that relationship in our combination between a response, failed
4 authentication, then changing the user interface. Patent Owner also has an
5 argument about a distinction between isolating and disambiguating, saying
6 the combinations teach isolating and that's not disambiguating. But this
7 argument the Patent Owner presents appears to provide -- appears to be an
8 unsupported, overly narrow definition of disambiguate that's requiring
9 simultaneous display of a first aircraft and other aircraft at all times and
10 throughout disambiguation.
11 There's no support for that definition. Patent Owner hasn't even
12 proposed that as a formal construction or argued that it's correct, so it should
13 be disregarded. But nonetheless, in our view, the combinations still teach
14 that. The combinations teach the user interface having multiple detected
15 aircraft displayed simultaneously, including the first aircraft, and then upon
16 the failed authentication, having the first aircraft disambiguated from the
17 others.
18 My last point, turning to Slide 65, Patent Owner presented a
19 definition of disambiguate. There's a question whether this definition is
20 even relevant because it deals with differences between words and phrases.
21 But setting aside that issue, as we've already -- I've already discussed, the
22 combinations in our view show a difference between the aircraft that failed
23 authentication and all the other aircraft that have not through the process that
24 the prior art combinations teach. So, in our view, the combinations actually

1 align with Patent Owner's own definition. And with that, I'm going to
2 reserve the rest of the time for rebuttal.
3 JUDGE ZECHER: Thank you. Counsel, just let me know when
4 you're ready and I'll start the clock. But as we indicated, we'll start with the
5 90 minutes and count down.
6 MR. SAUNDERS: Okay. Will do, Your Honor. This is Michael
7 Saunders, Principal Counsel for Patent Owner. One moment. All right,
8 thank you, Your Honor. May it please the Board. I'll first start with the
9 issue of written description, and we're going to turn to the 153 provisional.
10 Counsel made an argument regarding the Board's prior findings. Obviously,
11 those findings regarding the provisional were preliminary and subject to
12 revision in the final decision.
13 Additionally, Counsel made an argument along the lines of it
14 doesn't make any sense to have a narrowing amendment somehow create
15 written description when a broader claim wouldn't have been having written
16 description. I disagree with that characterization as a matter of law.
17 Obviously every claim, the written description is analyzed based on the full
18 scope of the claim. You could have a claim to A, B, or C lack written
19 description, and you could have a narrower claim to A or B have description.
20 There's no principle that narrowing a claim cannot have the effect that a
21 prior decision on this issue, on the institution decision, should be revisited in
22 light of the scope of the claim as it exists in the proposed substitute claim.
23 Turning to the disclosures of the '959 provisional application on
24 Slide 2, the first issue is the dispute. Written description for limitations 22E

1 and 22F. Those essentially recite that we have the aircraft's radio receiving
2 specified excitation from remote portable detection system, using a secure
3 identifier comprising the specified excitation. In response to excitation, the
4 aircraft changes the behavior, and that excitation enables disambiguation of
5 one aircraft from the other.
6 And what do we see in the provisional? Well, first of all, we see
7 that provisional discloses an aircraft's behavior. Is changed in response to an
8 excitation. And that is in the context of the light embodiment, but we submit
9 we are not seeing distinct embodiments. We are seeing variations. And we
10 see that in this lower portion section here. We see the disclosure that there
11 can be light or RF, and we believe the reasonable interpretation of that is
12 there are embodiments that can communicate via light. Or embodiments
13 that communicate via RF, or either, both. And we have to read the
14 disclosures and the rest of the provisional in light of that disclosure that there
15 can be RF-only embodiments.
16 Turning to Slide 3, we see the actual disclosures in the figures
17 showing systems that have overlapping communication structures that can
18 communicate either via RF or IR. Moving on to Slide 4, we see the
19 component diagrams that show the same disclosures. We see the disclosures
20 that have components that can create two-way communication either via
21 light or RF. Sorry, I may have said IR previously, I meant light.
22 So, we have to read the other disclosures in light of this RF-only
23 embodiment. And reading the other disclosures, what we can see is that then
24 interpreting that in light of the RF-only embodiment, a POSITA would

1 (INDISCERNIBLE) distinct embodiments that would require a motivation
2 to combine in the context of what it means to be obvious. Rather, just like
3 any kind of prior art where the Board encounters it and there's disclosures
4 about variations within non-distinct embodiments, it's not obvious. It's just
5 reading the disclosure for all that it teaches in connection with each other.
6 Turning to Slide 6 and the issue of a secure identifier. And so --
7 JUDGE MOORE: Counsel, one second. If you wouldn't mind
8 going back to that last slide for a second. Limitation 22F of your substitute
9 claim requires utilizing this secure identifier comprises receiving by the
10 radio communications module the specified excitation. In the example you
11 just provided, that doesn't occur, I don't believe. What you seem to be
12 describing is that a light sensor receives the excitation and that this
13 subsequently changes the data that's transmitted by the RF module, but it
14 doesn't seem to describe the excitation itself being received by the RF
15 module. Am I reading that correctly?
16 MR. SAUNDERS: You're reading that section correctly. The
17 Patent Owner's argument is that we have to read that disclosure in light of
18 the separate disclosure, which is in that second segment we have down
19 below that says that there's an RF-only embodiment. So, immediately
20 apparent to POSITA in the RF-only embodiment, we're going to replace all
21 of the communications that are happening via light with RF. There's not --
22 JUDGE MOORE: Are there any examples in the specification of
23 an excitation being sent via RF signal?
24 MR. SAUNDERS: Well, obviously, any transmission -- our

1 position -- any transmission via RF would be an excitation, and there are
2 examples of transmissions via RF. I believe the examples are generally --
3 JUDGE MOORE: But the specification only uses the word
4 excitation when describing a light signal transmission. Isn't that right?
5 MR. SAUNDERS: I believe that's correct.
6 JUDGE MOORE: Okay. And I won't belabor this, but obviously
7 you're attuned to the difference between obviousness and showing adequate
8 written support by the specification. So, what we have to conclude here is
9 that the inventor had possession of the concept of an excitation signal
10 functioning as a secure identifier. Isn't that right?
11 MR. SAUNDERS: I mean, we do have to show possession of the
12 claim as written in the substitute claim. And I will get up to the secure
13 identifier aspect in my next slide if Your Honor has no more questions on
14 this slide.
15 JUDGE MOORE: No more questions. You can proceed.
16 MR. SAUNDERS: So, turning to the secure identifier issue. So,
17 as Counsel correctly noted, Patent Owner is not disputing the Board's
18 preliminary construction as to what a secure identifier is. But Petitioner's
19 argument has been essentially that we need to look for exact wording that
20 appears in the claims and check the specification, check the provisional, and
21 see if that exact wording appears. That is how they have presented their
22 arguments, and that's not the legal standard. There's no requirement that the
23 exact wording of the claims appears in the provisional to have room
24 description support.

1 Rather, the task is to take the Board's construction of secure
2 identifier and apply that to the provisional. Is there something in the
3 provisional matching the Board's construction that would be apparent to one
4 of skill in the art as possessed in the provisional application? So, we're
5 going to look at the Board's construction, which requires a secure identifier,
6 recites it's a credential that can be used to securely verify the identity of a
7 device such as an airborne object or Ground-based transmitter. Obviously,
8 that also raises the question of what does the Board's construction mean by
9 credential. And we submit it's -- as we've cited this example here, it's
10 something that proves that you are who you claim to be.
11 And then applying that understanding to the disclosures of the
12 provisional, we see an example in the context of the example of a change in
13 behavior. And in particular, it says that we have a transmission that causes a
14 change in behavior of the aircraft. That change in behavior allows a data-to-
15 vehicle association. And that change of behavior is detected and causes the
16 aircraft to be shown in distinguishable form.
17 So, we would submit that those disclosures satisfy the Board's
18 construction of secure identifier, even though the word secure identifier did
19 not appear in that claim. The reason is because one of skill in the art would
20 recognize that a transmission causing a change of behavior of just the one
21 aircraft is a credential because it proves the aircraft is who it is claiming to
22 be. It securely verifies the aircraft's identity with the portable ground unit.
23 JUDGE MOORE: Counselor, I'm having to struggle a bit to
24 understand where the secure aspect of this is. It seems like all you have is

1 verifying that the light is at a certain wavelength. How --
2 MR. SAUNDERS: Well, it's secure because -- oh, sorry.
3 JUDGE MOORE: No, go ahead.
4 MR. SAUNDERS: It's secure because --
5 JUDGE MOORE: I mean, how do we know? How do we know
6 that it's not spoofed, right? Because your patent talks a lot about that type of
7 thing. How is a wavelength a credential --
8 MR. SAUNDERS: Well --
9 JUDGE MOORE: -- I guess is what the question would be.
10 MR. SAUNDERS: So, regarding the word secure, we think that
11 that is broader than the issue of spoofing, which relates to a different term,
12 but it is secure in the context of this example because it is saying that that is
13 sufficient. It is teaching that that is sufficient to identify the aircraft. It is
14 distinguishable above it. Now, obviously, secure depends on the context,
15 and you could always have additional security. But in the context of what
16 this discloses, it's saying that this example of a specific wavelength of light
17 that's not known to everyone is sufficient to be secure. Now, could one --
18 JUDGE MOORE: Doesn't the specification distinguish between
19 secure identifiers and, for example, the N number on the back of an aircraft
20 or something like a license plate? And don't the number on an aircraft or a
21 license plate also identify those vehicles?
22 MR. SAUNDERS: So, in the context of the full specification,
23 there is the example of the SSID secure identifier example. I'm focusing on
24 the provisional disclosures instead.

1 JUDGE MOORE: Okay.
2 MR. SAUNDERS: I would still submit that a wavelength of light
3 that's a specific wavelength that's not known is not the same as something
4 that anyone can just read on the ground. And so, that would be something
5 that is still different. And although, I mean, second-guessing this after the
6 fact, one could think of more secure examples, this is the example that the
7 Patentee chose of disclosing how we can identify a particular aircraft in a
8 secure manner to show that it's distinguished from other examples. And we
9 submit it's not appropriate to second-guess the Patentee's own choice for
10 how to implement that. The question is, is this the Patentee trying to -- are
11 they disclosing something that they submit is an example of something that
12 is securing it and causing it to establish that association? And we submit it
13 is.
14 Turning to the next issue about indefiniteness and the low-altitude
15 aircraft. We submit that this is an issue that has been overly complicated.
16 The specification gives a very clear example of this 500-feet line in the air.
17 And Counsel made an argument that said Patent Owner introduced the issues
18 of regulations. Patent Owner cited one regulation that confirms that 500 feet
19 is a line in the air that the FAA also establishes as a line that normally
20 aircraft are not going below this.
21 This specific patent we're talking about is concerned about drones
22 which are operating at a lower level. We were not trying to open this up to
23 analyzing all of the FAA's various rules. That was something that was done
24 in the deposition that Petitioners took of Patent Owner's expert, which I'll

1 just note did actually not opine about these regulations at all.
2 So, we would submit that all this testimony about this is testimony
3 where they're trying to get the expert to conjecture about what the
4 regulations mean, which was outside the scope of his declaration. But if we
5 actually look at what he testified about, we just see he's simply confirming
6 his understanding that the FAA governs the rules for where the altitude
7 airspaces are. That's a commonsense understanding. Counsel really
8 presents no reason why that's wrong. Rather, they attempt to take arguments
9 out of context. So, going on to Slide 8 here, we can see what --
10 JUDGE GROSSMAN: Before we leave that slide, so it's true that
11 the FAA regulation, and I think the testimony, talks about airspace, not
12 about aircraft. So, a low-flying airspace is defined in different ways based
13 on the area over which you are flying. Isn't that correct?
14 MR. SAUNDERS: So, that specific regulation that we cited, I
15 think it's something like 91.119, that's talking about the minimum level that
16 you can fly at normally, right? And --
17 JUDGE GROSSMAN: For any plane, anything, that's what they
18 want. If you're flying over a crowded city, it's one height. And if you're
19 flying over some national park of 1,000 acres with no people in it, then it's a
20 different height.
21 MR. SAUNDERS: There are various heights set in that rule. I
22 would admit, that our position is that the FAA's regulations are not
23 indefinite. If they're trying to create an issue of indefiniteness based on
24 interpreting the FAA guidelines or the fact the FAA guidelines vary, that

1 does not create an issue of indefiniteness. We submit the concept of a low-
2 altitude airspace is not a concept that's indefinite, and the bottom 500 of that
3 is not indefinite.
4 JUDGE ZECHER: Well, hold on, let's be clear. We're talking
5 about a low-altitude aircraft, right? This is the term we have to consider for
6 indefiniteness, correct?
7 MR. SAUNDERS: Yes.
8 JUDGE ZECHER: We're not looking at whether or not the
9 regulations are indefinite on airspace.
10 MR. SAUNDERS: That's --
11 JUDGE ZECHER: It's aircraft.
12 MR. SAUNDERS: I was referring to low-altitude airspace
13 because that's what the specification says when it talks about these small
14 UASs. It's the language we have at the top of this slide -- these aircraft
15 weighing up to 25 pounds and flying up to 500 feet of the low-altitude
16 airspace.
17 JUDGE GROSSMAN: You refer to the slide -- and just make sure
18 our record's clear, you're talking about --
19 MR. SAUNDERS: Sorry.
20 JUDGE GROSSMAN: -- your Slide 7 that --
21 MR. SAUNDERS: Yes.
22 JUDGE GROSSMAN: -- you're saying provides that definition of
23 airspace, but doesn't your claim is irrelevant to airspace? What you're
24 talking about is a low-flying aircraft, and in some ways every single aircraft

1 that takes off and lands at some point goes from zero up and then goes from
2 up to zero when it lands. So, every aircraft is capable of being at some
3 point, or is, a low-flying aircraft. And what we're looking for is, at least I
4 think would be helpful, is to know what does the patent mean when it uses
5 the term low-flying aircraft. The airspace is irrelevant. The FAA rules is on
6 airspace, but that's not what your claim term is. You chose a term that says a
7 low-flying aircraft, and what I think would be helpful is to know what is a
8 low-flying aircraft.
9 MR. SAUNDERS: It's that 500-foot level in the air, under the
10 500-feet level.
11 JUDGE GROSSMAN: And how do we know that?
12 MR. SAUNDERS: Well, looking at the specification, as we say,
13 that's the example they're giving, this 500-feet cutoff. We also cited the
14 FAA regulations to point out that that's not something that's out of thin air.
15 There's also an example that is generally there that 500 feet is a cutoff. And
16 below that is something that's exceptionally low, and that's consistent with
17 the example that's in the specification.
18 JUDGE ZECHER: Do we have to factor in that it weighs less than
19 25 pounds, or it's just the airspace?
20 MR. SAUNDERS: I would say the language of the phrase low
21 altitude is not language that provides a textual hook to refer to weight.
22 JUDGE ZECHER: So, just the airspace and the altitude?
23 MR. SAUNDERS: That's our position, is the air, the 500 feet.
24 And basically, when it says 500 feet of low altitude airspace, it's saying 500

1 feet of the bottom, right? So, the bottom 500 feet is just going up 500 feet.
2 There's a high altitude airspace that's above it, which isn't really relevant
3 because we're only caring about the bottom of it, not the top of the low
4 altitude airspace. And I have a slide that can explain that a little bit. But
5 does Your Honors have any other questions on this slide?
6 JUDGE GROSSMAN: Before we leave this slide, you've got a
7 provision from the spec quoted at the top of your slide. It's number 7, and it
8 refers to the UAS industry needs an identification system for small UASs.
9 These aircraft weighing up to 25 pounds and flying up to 500 feet. So, what
10 it's referring to is small UAS aircraft. And it says the industry needs an
11 identification system to identify them, but it's not saying that that's what a
12 low-flying aircraft is. It says that when something is at a fairly low altitude,
13 could be a large airplane, it could be a small airplane, you need to be able to
14 identify it at that low-flying altitude.
15 MR. SAUNDERS: We would submit, Your Honor, that
16 indefiniteness under *Nautilus* doesn't require something that would meet the
17 standard of lexicography, right? This doesn't say definition, but it would be
18 sufficient under *Nautilus* to provide guidance to one of skill in the art. So,
19 even though it's not worded in the language of lexicography.
20 JUDGE GROSSMAN: So, that's it? That's all the evidence that
21 we should need to figure out what a low-flying aircraft is, is --
22 MR. SAUNDERS: Well --
23 JUDGE GROSSMAN: -- that paragraph that is cited on your Slide
24 7?

1 MR. SAUNDERS: We would submit that's sufficient, particularly
2 in light of the evidentiary showing. And I understand on this specific issue,
3 that Petitioners do bear the burden of proof on the issue of indefiniteness,
4 and they have not really submitted any extrinsic evidence that shows that
5 this term is indefinite. They have not submitted any intrinsic evidence of a
6 conflict or contradiction within the intrinsic evidence. All they've relied on
7 is essentially deposition testimony from an expert who did not even opine on
8 this, on regulations, and they're relying on testimony about regulations the
9 expert did not opine about.
10 JUDGE ZECHER: So, just to be clear, you don't think we need to
11 go outside the specification to determine whether or not this term's
12 indefinite? We don't need to look at the expert testimony? You don't need
13 to go to the regulations? That paragraph alone tells us?
14 MR. SAUNDERS: We think this would be sufficient to
15 demonstrate definiteness.
16 JUDGE ZECHER: Okay.
17 MR. SAUNDERS: We think our expert testimony also supports it,
18 but we think that paragraph is sufficient. Turning to the next slide, just
19 briefly, this is an example of how Counsel's kind of mischaracterized the
20 testimony about -- from the expert of 14,000 or 18,000. Again, the expert's
21 deposition, we look at it, all he's saying is the FAA is providing the numbers
22 for this airspace. He didn't opine about the issue. He's not expected to
23 memorize FAA regulations that he's not opining about. That doesn't create
24 an issue of indefiniteness for an expert to just simply note, hey, the FAA has

1 rules about this. I don't remember the exact numbers. It may be one, it may
2 be another.
3 Turn to Slide 9. So, this is Exhibit 2035 that was at the same
4 deposition. We can see here the example of what the FAA does. They have
5 this high-altitude airspace Class A, and they have the lower-altitude airspace
6 Class E that goes all the way down to the ground in some places, and they
7 force the drones to be at the bottom of that Class E. You can see that this
8 400 level, that they're forcing the drones to be under. So --
9 JUDGE MOORE: Counsel, is the expert a licensed pilot?
10 MR. SAUNDERS: I don't believe so. He's got a computer
11 science, kind of background rather than pilot background. So, he did not
12 opine about this regulation.
13 JUDGE MOORE: I'll just note that I am a licensed pilot, and this
14 -- the National Airspace System is quite complicated. I'll just leave it at that.
15 MR. SAUNDERS: Yeah, we would certainly -- we're not trying to
16 bring in all of the FAA regulations. That wasn't certainly our intent. But to
17 the extent that --
18 JUDGE MOORE: Understood, understood.
19 MR. SAUNDERS: -- Petitioner's argument is that this is indefinite
20 because of testimony about regulations, we would submit that it's not
21 appropriate to reach a conclusion that the regulations are indefinite. And
22 certainly, Petitioners haven't tried to make that showing. They've just kind
23 of showed testimony guessing about what the regulations mean from experts
24 that didn't opine about it.

1 JUDGE MOORE: I understood. Just seeing this gave me
2 flashbacks from long ago taking various examinations.
3 MR. SAUNDERS: And so, we would submit that there's really no
4 reason articulated by Petitioner why this 500-foot cutoff is indefinite.
5 JUDGE GROSSMAN: Would you agree, though, that there's a
6 difference between aircraft and airspace?
7 MR. SAUNDERS: Well, as we submit that the concept we've -- in
8 the specification is tying the aircraft to the bottom of the low altitude
9 airspace.
10 JUDGE GROSSMAN: And it's any aircraft it's tying -- it doesn't
11 refer to the type of aircraft. It says that a low airspace is considered to be
12 500 feet, and there's no FAA regulation that they cite. There are several
13 regulations at the FAA that talk about minimum safe altitudes, and those,
14 again, are the ones we've talked about earlier. If you're flying over a city, it's
15 different. If you're flying over something that has a skyscraper building, the
16 low airspace is defined differently. It's not 500 feet, it's 1,000 feet over the
17 skyscraper. And so, the FAA regulations make a very clear distinction. It
18 depends on where you are as to what is airspace, and I guess my question
19 really goes back to that one clause in your (INDISCERNIBLE) reference.
20 MR. SAUNDERS: Yeah, it's tying the concept of small UAVs to
21 a bottom 500, right? That's what the concept -- so small UAVs such as those
22 going up to 500 feet, that's the example that's disclosed in the specification.
23 That certainly seems sufficient to provide guidance to one of skill in the art.
24 JUDGE GROSSMAN: Is there any disclosure in the specification

1 other than that one paragraph that was on your Slide 7?
2 MR. SAUNDERS: I believe that's the only disclosure the parties
3 have identified.
4 JUDGE GROSSMAN: So, that's not really an embodiment of
5 your invention. That's just talking about the background and setting the
6 scene for the kinds of, I guess, environments where you intend the low-
7 flying aircraft to be.
8 MR. SAUNDERS: I mean, I certainly would submit we would
9 read all the embodiments in context of that statement, that although not
10 using the words lexicography is certainly instructive of what type of aircraft
11 that they're talking about.
12 JUDGE MOORE: Counselors, suppose I have a drone that can
13 -- has a maximum altitude of 600 feet. Could that drone fall within the
14 scope of claim 22?
15 MR. SAUNDERS: An aircraft that is -- sorry, the example is the
16 aircraft has a maximum altitude of 600 feet?
17 JUDGE MOORE: 600 feet above ground level. My drone can go
18 up 600 feet. Is that a low-altitude aircraft? Weighs less than 25 pounds,
19 maximum altitude is 600 feet.
20 MR. SAUNDERS: I mean, that sounds like it may not be, that it's
21 going above 500 feet. I mean, the other example thing I noticed in the
22 context of this claim as a whole, it is -- we already have a first aircraft. In
23 the interest of time, I do want to kind of rest on our papers on this issue and
24 just briefly address the prior art arguments, and in particular, the

1 combinations involving Viggiano and Hayes. And I'm going to go to Slide
2 16 here. And in particular, the argument about Viggiano and whether or not
3 the challenge system satisfies the requirements of claims.
4 In particular, what Viggiano teaches, we have two or more
5 consecutive failed responses that cause a disambiguation. And so, that is not
6 matching up with the claim, which recites a single excitation that's causing a
7 disambiguation. And more importantly, there's not a change in behavior of
8 the craft that matches up with the rest of the claim. In the claim, it's the craft
9 that has the change of behavior is the one that is later disambiguated.
10 Whereas in their example, the aircraft that fails to respond to the challenges
11 is the one that is disambiguated.
12 JUDGE ZECHER: Counselor, what's a change of behavior in the
13 context of your claim?
14 MR. SAUNDERS: It is a broad term. I think obviously the one
15 example in the specification is the -- there's an example of a change in data
16 transmitted. So, it is transmitting one particular identifier and that changes
17 to a different identifier, and that would be an example of a change of
18 behavior, but I do think it is a broad term.
19 JUDGE ZECHER: It does say operational behavior in the claim
20 -- change its operational behavior -- excuse me, in the specification, column
21 3.
22 MR. SAUNDERS: Yeah, I think given the example that's in the
23 specification, that that's an example of a change in operational behavior.
24 The identifier of an aircraft is an important part of its operation. We would

1 submit that there is aircraft that is being disambiguated.
2 Going on to Slide (INDISCERNIBLE). Additional problem,
3 because on the bottom, all of the aircraft successfully respond to the
4 challenge. Well, those are the aircraft that did change their behavior under
5 the theory. Those are all the aircraft that did respond to the challenges.
6 Those aircraft are getting hidden, and we no longer have a plurality of
7 aircraft in the user interface. We just have one aircraft, and that's the one
8 aircraft that did fail to change its behavior because it didn't respond
9 adequately to the challenges.
10 And certainly, when we have a claim about a user interface of
11 plurality of aircraft, removing all the aircraft except one, we would submit,
12 is not consistent with disambiguating one aircraft in a claim that still says at
13 the end of 22I, the other detected low aircraft of the plurality. So, we would
14 submit that Petitioner's proposed combination does not satisfy the claim.
15 And in the interest of time --
16 JUDGE MOORE: Counselor, why can the response of that aircraft
17 -- you say it didn't change its behavior because -- and then you say that it
18 responded, but not adequately. Why is a response that's inadequate, why can
19 that not be a change in behavior? Well, it's a response.
20 MR. SAUNDERS: So, I guess part of this is an issue of a lack of
21 clarity, I think, on Petitioner's theory and what they put in their opposition.
22 On page 10 of their opposition, they mentioned determined to transmit a
23 challenge response. So, certainly our understanding is that consistent with
24 what Viggiano teaches, that one of the things that sets off the alert is not

1 sending a response.
2 So, when we saw that in their papers, that was our understanding,
3 is they're articulating a combination where the aircraft that creates the alert is
4 one that's not sending a challenge response, because it's -- that's the aircraft
5 that is determined -- there was a determination made, and the aircraft that is
6 not responding to the challenge in the example of Viggiano is the aircraft
7 that's causing an alert.
8 If there was a different selection from Viggiano among the
9 different embodiments, I think they would need additional motivation to
10 articulate that from selecting among the different disclosures of Viggiano,
11 why they're selecting an example that involves a particular way of
12 responding, and combining that with the other references. And I submit that
13 was not something adequately disclosed in their opposition. And unless the
14 Board has any other questions, in the interest of time, I'll reserve the
15 remainder.
16 JUDGE ZECHER: Thank you, Counselor. Petitioner, the floor is
17 yours. You can either decide to provide some rebuttal, or we can move on to
18 the next case.
19 MR. WALTERS: Thank you, Your Honor. I'd like to address two
20 issues. First, with respect to the written description support for the secure
21 identifier limitation. So, what I'm showing here is Patent Owner's Slide 2.
22 And this paragraph, from the provisional states at the bottom of the slide, the
23 identification box light emitters 3 and light sensor 4 create a two-way
24 communication system. Similarly, the ground device camera 22 and light

1 beam emitter 23 also create the same kind of communication.
2 Now, Patent Owner highlights same kind of communication based
3 on the header of that paragraph to suggest that it's the information exchanged
4 via RF. But the second sentence there is talking about another light
5 communication between the ground device camera 22 and light beam
6 emitter 23. Later, that portion says that the same ID box 2 and Ground
7 device 21 can exchange information through light or RF, but it never says
8 the same information is exchanged through both means.
9 And even if it meant that it's the same information, there's still no
10 disclosure for -- in the provisional -- for the light embodiments being a
11 secure identifier. And I'd also like to note, again, going back to this sentence
12 that we're looking at that ends with, create the same kind of communication
13 from the provisional. In the interest of time, I will not put up our slide, but
14 on our Slide 20, we have the corresponding paragraph from the non-
15 provisional. And the corresponding sentence there says, similarly, the
16 ground device camera 22 and light beam emitter 23 of the ground device 23
17 also create a two-way communication. It does not even say in the
18 nonprovisional that it's the same kind of communication. So, again, we don't
19 believe there's support for exchanging both information through light or RF.
20 And then finally, Your Honor, turning to the low altitude issue.
21 Again, the specification must provide the objective boundaries of the term,
22 and we do not believe it does. The portion, the sentence that they cite says,
23 for related art UAVs and/or -- excuse me, for related art small UASs, e.g.
24 aircraft up to 25 pounds. It's talking about related art UASs. It doesn't say

1 that it's the low-altitude aircraft, as claimed.
2 Judge Moore, you raised an issue with respect to drone flying up to
3 600 feet, which suggests some type of capability argument. I understood
4 Counsel to say a drone that could go to 600 feet might not be a low-altitude
5 aircraft. We don't know if it's one that has to be capable of going up to 500
6 feet. An airplane, when it's flying below 500 feet, could be a low-altitude
7 aircraft under that definition. And again, we don't know what their position
8 -- their position does not seem clear to the brief -- from the briefing, to us.
9 We asked their expert, what is a low-altitude aircraft? Not once
10 did he say it's an aircraft flying up to 500 feet. That's some of the confusion
11 that we had from the briefing. It never actually says what the objective
12 boundaries are. He never provided an objective boundary. Their expert is
13 the one that brought up the FAA and suggested 14,000 feet, 18,000 feet, and
14 also, it was on their redirect of their own expert that the FAA diagram came
15 into evidence. So, we do not believe the spec provides any objective
16 boundaries.
17 JUDGE ZECHER: Counsel, on the related art citation, are you
18 saying we can't read that to determine the bounds of a low-altitude aircraft,
19 or is that completely divorced, just because it doesn't use the term low-
20 altitude aircraft?
21 MR. WALTERS: Our position is the specification must provide
22 objective boundaries for the term low-altitude aircraft. When I read for
23 related art small UASs, I look at it as something different -- related art
24 components that are not the subject of this -- of the claims of this patent.

1 That's how I view it. I'm not suggesting you can't read it and incorporate it
2 into your thinking, but I don't think it's clear. I don't think the specification
3 provides objective boundaries for what a low-altitude aircraft is when it says
4 for related art, small UASs, particularly when it says flying up to 500 feet of
5 the low-altitude airspace.
6 JUDGE GROSSMAN: You refer to some testimony from their
7 expert that provided the boundaries of the 14,000 feet, 18,000 feet. Those
8 boundaries, are they airspace or referring to actual aircraft?
9 MR. WALTERS: I don't know, Your Honor. I think he was -- his
10 responses to me suggested that he was referring to low-altitude aircraft.
11 That defines what a low-altitude aircraft was -- an aircraft that goes up to
12 14,000 feet or up to 18,000 feet. My recollection of the testimony is that we
13 did not get into low-altitude airspace in that context.
14 JUDGE GROSSMAN: Are you aware of any evidence in the
15 record that tries to draw some connection between the word what a drone is
16 and a low-flying aircraft, or is the record absent from anything
17 (INDISCERNIBLE)? I didn't see any evidence about drones, but at times
18 this afternoon -- and I don't know if there's a definition of what a drone is,
19 and if you're aware of something in the record that tells us what a drone is,
20 that would be helpful to identify it.
21 MR. WALTERS: I'm not aware of anything offhand, Your Honor.
22 Unless there are no other questions, we'll reserve the rest of our time.
23 JUDGE ZECHER: Thank you. Patent Owner, you're welcome to
24 provide some surrebuttal, if you have any.

1 MR. SAUNDERS: Nothing further from Patent Owner.
2 JUDGE MOORE: Okay.
3 (HEARING PAUSED)
4 JUDGE ZECHER: Thank you. All right. Petitioner, we can move
5 on to the next case, the '530 case.
6 MR. WALTERS: Thank you, Your Honor. Again, for this IPR, I
7 plan to focus on some of the disputed issues, and Slide 13 provides an
8 overview of the disputes. I'd like to start with the first issue identified there,
9 whether there is written description support for receiving a second identifier
10 from a computing system that is remote, relative to the discrimination
11 system.
12 Moving to Slide 15. The claim is directed to a discrimination
13 system that includes, one, an identifier transmission system, and two, an
14 identification system with an identification receiver that receives a second
15 identifier that functions as a second factor from a computing system that is
16 remote, relative to the discrimination system.
17 Moving to Slide 16. Nowhere does the specification support
18 receiving a second identifier from a system remote from the discrimination
19 system. So, this slide shows -- we've illustrated a diagram of a
20 discrimination system, as claimed. All the boxes within the discrimination
21 system on this slide are parts of the claim. And so, for a second identifier
22 functioning as a second factor to be received from a computing system
23 remote relative to this discrimination system, it would have to be received
24 from something outside of this box.

1 Moving to Slide 18. There's only one portion of the specification
2 for transmission of a second identifier functioning as a second factor
3 identifier as claimed, and that source is the identifier transmission system
4 itself. If we go back to Slide 16, the identification transmission system is
5 part of the discrimination system, so that portion of the specification does
6 not provide written description support for the term.
7 Moving to Slide 22. There's only one use of the word remote in
8 the specification that Patent Owner points to for support. This sentence
9 says, the dynamic aerial system identifier can be generated onboard the
10 aerial system 100, generated remotely, e.g. at a remote computing system, et
11 cetera, updated in flight, or generated by any other suitable system. So, this
12 discusses where an aerial system identifier can be generated, not transmitted
13 or received, but more importantly, it uses the word remote in the context of
14 remote from the aerial system 100. It contrasts generated remotely from
15 generated onboard the aerial system. So, this cannot support remote from
16 the discrimination system as claimed.
17 Moving to Slide 26. There's no support for receiving any
18 identifier, let alone a second identifier remote relative to the discrimination
19 system. The patent itself does not describe anything outside of the
20 discrimination system. It is all about the discrimination system. Everything
21 in Figure 1 -- Figure 1 illustrates the discrimination system, and everything
22 in Figure 1 is part of the discrimination system. There's no description
23 anywhere of anything being remote from that system, let alone receiving
24 anything -- receiving a second identifier, as claimed, from something remote

1 from the discrimination system.
2 I'd like to move to the written description position for provide the
3 authenticated identifier. That's Slide 27. So, limitation 10A(2) recites, to
4 provide the authenticated first identifier of the aerial system identifier signal
5 to the permission module. Moving to Slide 28. The specification does not
6 provide written description support for providing an authenticated first
7 identifier to the permission module.
8 Moving to Slide 29. Now, Patent Owner relies on the disclosure of
9 sending a raw or processed signal to the permission module, but this does
10 not disclose providing an authenticated first identifier to the permission
11 module. There's no disclosure in the specification that the process signal is
12 an authenticated first identifier.
13 Moving to Slide 30. And separately in a portion 21 columns later
14 in the patent, the specification states that determining an identifier can
15 include verifying its authenticity, but there's no tie between these portions
16 and still no disclosure of providing the authenticated identifier to the
17 permission module.
18 Your Honors, I'd like to now turn to the indefiniteness of the term
19 preemptively enabled. Slide 35. So, limitation 10G recites, wherein the
20 disruption system is preemptively enabled based on the received aerial
21 system identifier signal, the issue is that based on the specification, it's
22 unclear what it means to be preemptively enabled. Patent Owner does seem
23 to agree with us, and we agree that preemptive enabled means something
24 different than just being enabled. We just don't believe it's clear from the

1 specification what that means.
2 So, moving to Slide 36, looking at Figure 5, you have steps 500
3 and 501 that go directly to enabling the disruption system and bypassing step
4 502 through the dotted lines. 502 asks whether the aerial system has
5 permission. So, I'd like to focus first on their bullet in the bottom left of that
6 slide.
7 Patent Owner states that a POSITA would understand from the
8 dotted lines that the general flow can be short-circuited, such that the
9 disruption system is preemptively enabled, i.e. the check for condition 502
10 can be omitted if condition 501 is met. So, Patent Owner here is suggesting
11 that when you bypass 502 and go directly to enablement, then that is
12 preemptively enabled. And if you look at the top bullet on that slide on the
13 left, Patent Owner also states in its reply, and this is at page 5, that the
14 specification clearly delineates a non-preemptive enablement of a disruption
15 system, e.g. based on a UAV being deemed not permitted and after a less
16 aggressive option and a preemptive enablement.
17 So, in Figure 5, that's clearly step 502. If it is deemed not to have
18 permission at 502, then it proceeds directly to enablement at 503. Patent
19 Owner says that is not preemptive enablement. But the indefiniteness issue
20 -- and now we're on Slide 37 -- the indefiniteness issue arises when you look
21 at the specification, because it teaches differently.
22 So, the specification states at column 36, and it's column 19 of the
23 patent, as depicted in Figure 5, the disruption system 105 may thus be
24 preemptively enabled if certain conditions are met, e.g. aerial system

1 detected without an identifier 500, identifier is received, but is invalid, 501,
2 identifier is valid but is not permissioned, 502.
3 So, if you look at the specification, it explicitly describes
4 determining at step 502, there is no permission and then enabling the system.
5 It's describing that too as preemptive enablement. So, if you enable the
6 disruption system after determining that it doesn't have permission at 502,
7 then what is being preempted? And again, Patent Owner's position is for
8 preemptive enablement, step 502, would be bypassed. So, we don't know
9 what it means to be preemptively enabled. Patent Owner uses Figure 5 to
10 suggest one thing, but the specification is explicit that even direct
11 enablement through 502, when you have no permission, that's also
12 preemptive enablement. And so, based on the specification, we don't know
13 what it means. If proceeding directly from 502 to 503 is an example of
14 preemptive enablement, as it states, then we don't know what preemptive
15 enablement actually means.
16 JUDGE ZECHER: Isn't it the specification that's controlling here,
17 not really Patent Owner's explanation? So, in other words, it gives us
18 examples of what it says is preemptively enabled. It lists them, i.e., right,
19 that's what would create the boundaries for us to understand what that term
20 means.
21 MR. WALTERS: Yes, Your Honor, but I think our point is that
22 even if you look at 502, going direct to 503, they're saying that's preemptive
23 enablement, but there's nothing being preempted there. Preemptive
24 enablement must mean something different than enablement. We all agree

1 with that. Patent Owner agrees on that. And if we're going from 502 to 503,
2 then there's nothing being preempted.
3 JUDGE ZECHER: So, it's only in that example, but if you're
4 going from 501 to 503, you would agree that it's preemptively enabled?
5 MR. WALTERS: We believe that's -- the specification says that's
6 an example, but just because we can have an example of preemptive
7 enablement doesn't mean it's not indefinite. Indefiniteness requires the
8 objective scope and the boundaries of the term.
9 JUDGE ZECHER: Doesn't it require us under *Nautilus* to
10 determine it with reasonable certainty?
11 MR. WALTERS: Yes, Your Honor. And we would contend that
12 there's no reasonable certainty when the specification describes nothing as
13 being preempted when you go from 502 to 503. There's nothing else in the
14 specification that suggests what preemptive enablement means.
15 JUDGE ZECHER: So, it's that specific example?
16 MR. WALTERS: Yes, Your Honor.
17 JUDGE ZECHER: That's really what you're honing in on.
18 MR. WALTERS: That specific example is creating the ambiguity,
19 is creating the indefiniteness issue.
20 JUDGE ZECHER: Okay.
21 MR. WALTERS: Your Honors, I would now like to turn to the
22 prior art arguments. Moving to Slide 51. I plan to address only the disputed
23 issues, starting with Grounds 7B and 9B based on Jarrell. Moving to Slide
24 52. Now, limitation 10D requires receiving a first identifier and receiving a

1 second identifier functioning as a second factor identifier. In the
2 Whitmarsh-Jarrell combination in this ground, the first identifier is the MAC
3 address of the UAV that the identification receiver receives. And the second
4 identifier, functioning as a second-factor identifier, is the valid MAC address
5 identifier relevant to the UAV that is on the list of valid MAC address
6 identifiers received from a remote control center.
7 Moving to Slide 53. Here we show Jarrell's disclosure that it may
8 compare received registration or license identifiers with identifiers on the
9 stored list. That's at the bottom of the portion -- of the leftmost portion text
10 from Jarrell. And in the rightmost portion, it says to authenticate or validate
11 the identifier of the UAV. Now, Patent Owner's only argument is that the
12 list is not a second identifier, but it's clear from our opposition, it's in
13 multiple pages, including at the top of page 14, that it is the valid MAC
14 address identifier located on the list that's the claimed second identifier.
15 Patent Owner actually never addresses that it is the valid MAC address
16 identifier on the list that's the second identifier.
17 Moving to Slide 55. Patent Owner also argues that Jarrell does not
18 disclose a second factor because it must be something you know, something
19 you have, or something you are. And Patent Owner's whole premise here
20 appears to implicate a particular authentication process that was known in
21 the art as multifactor authentication, but that term or process is nowhere in
22 the patent, and Patent Owner's only support is its expert's declaration citing
23 extrinsic evidence.
24 Moving to Slide 56, the only portion in the patent on the second

1 factor states that it can be used as a secondary authenticator to prevent
2 tampering and/or identifier production. Your Honors, we contend that's
3 exactly what Jarrell does. Moving to Slide 57. It prevents tampering. If the
4 UAV had a tampered MAC address, then it would not be authenticated
5 because it would not match the UAV's proper valid MAC address that is on
6 Jarrell's list.
7 Moving to Slide 60. Patent Owner also argues there's no
8 verification of authenticity in the combination, but that's exactly what Jarrell
9 discloses, that the communication station, upon receiving the registration or
10 license identifier, may communicate with a remote center to authenticate or
11 validate the registration or license identifier of the UAV.
12 Moving to Slide 62, I'd like to address Grounds 7C and 9C that
13 include Pasko in the combination. Moving to Slide 68. Patent Owner
14 argues that Pasko compares UAV account information in order to determine
15 whether the UAV is authenticated, but it does not authenticate an identifier.
16 This argues the reference individually, because in our combination, and it's
17 in our opposition at pages 11 and 14 to 16, the UAV's MAC address is
18 determined as associated with a properly government-registered UAV in
19 good standing account through authentication comparisons to verify the
20 authenticity of the MAC address as the one associated with a UAV that is
21 properly registered.
22 Patent Owner also makes the same multi-factor authentication
23 argument that we addressed earlier, and we contend that's improper for the
24 reasons that I previously discussed. And unless there are any other

1 questions, Your Honors, I will reserve the rest of my time. Thank you.
2 JUDGE MOORE: Just one question, Counsel. So, obviously the
3 issue here, one of the primary issues here, is whether matching a MAC
4 address to a list of MAC addresses verifies the authenticity of the first MAC
5 address and whether that requires something more than just verifying that it
6 appears on a list. If you could speak to that for a moment.
7 MR. WALTERS: Sure, Your Honor. And this is explicitly from
8 Jarrell. It says that it makes the comparison to authenticate or validate the
9 registration or license identifier of the UAV.
10 JUDGE ZECHER: Can you tell us what slide you're on there?
11 MR. WALTERS: I'm sorry, Slide 60. And Slide 53 actually has
12 more disclosure. The bottom of the left-hand column, it says it may
13 compare received registration or license identifiers with identifiers on the
14 stored list. And in the next column, we show in some examples, it is done to
15 authenticate or validate the registration or license identifier of the UAV. We
16 believe it's clear from Jarrell.
17 JUDGE ZECHER: Thank you.
18 MR. WALTERS: Thank you, Your Honor.
19 MR. SAUNDERS: Thank you, Your Honors. So, starting with
20 Slide 4 of Patent Owner's presentation, I want to address the written
21 description issue for limitation 10D. Counsel made a lot of arguments
22 focused on this remote limitation. What we can see is, as the council
23 admitted, that there's disclosure of remote computing system. And what we
24 submit is that Petitioner's interpretation of this disclosure is simply not

1 reasonable in light of the remainder of disclosures of the specification, but
2 just for quick note, we see in this disclosure we have various ways of
3 generating an ID, one of which is dynamic. And within those dynamic IDs,
4 it says it can be generated remotely, but it goes on to say, for example, at a
5 remote computing system. We submit the reasonable interpretation that in
6 light of the rest of the specification is a system that's not part of the aerial
7 discrimination system. Going on to --
8 JUDGE ZECHER: Counsel, doesn't this focus on the generation
9 of the identifier and not necessarily the reception?
10 MR. SAUNDERS: Well, we would submit the correct
11 interpretation of this claim term is not about transmission, that from does not
12 require received directly from, which seems to be what they're interpreting.
13 They do make an argument about this limitation, saying that it's coming
14 from UAV and not the remote computing system. We submit the reasonable
15 interpretation of from does not have a requirement in here that it be directly.
16 And although the example in the specification, the species in the
17 specification, is one way of implementing it, is relaying it through the drone.
18 The drone is just simply relaying it through. That's still an example where it
19 is coming from the remote computing system and therefore, provides written
20 description support.
21 JUDGE MOORE: Yeah. Counsel, this isn't really an example of a
22 drone functioning as a mere relay between a remote transmitter and a
23 receiver. This is a situation where at some point in the past, the receiver or
24 the remote system may have provided information that went into the

1 identifier, and subsequently, the identifier is transmitted from the drone to
2 the ground system. Isn't that different than a mere relay?
3 MR. SAUNDERS: Well, it is stored on the drone for being later
4 sent to that. So, as part of the dynamic embodiments, the identifier can be
5 dynamically updated and is dynamically updated by a remote computing
6 system, in this one variation. And in that example, as soon as it gets that
7 from the remote computing system, that is what it transmits from then on
8 until it gets a new dynamic identifier. So, again, we would say that this is
9 coming from the remote computing system. It is the origin of the new
10 identifier. And then we'd also submit there's no requirement in the claim
11 that the transmission be direct as the origin of the identifier is the remote
12 computing system.
13 JUDGE MOORE: But in this case, there is no transition by a
14 remote computing system to the ground station at all. The remote
15 computing system doesn't know the ground station even exists, which makes
16 it a little bit more difficult to say that that's a transmission from a remote
17 system to the ground station as a relay or whatever. The remote station
18 doesn't even know when or if that's going to be used or requested, or
19 transmitted.
20 MR. SAUNDERS: I would certainly submit in this embodiment
21 that it's talking about a remote computing system, that it's configured, that
22 it's going to know that that's a valid identifier, and therefore that it's going to
23 be configured in a way that's based on at least knowing that there's a remote
24 computing system. But our position is that the claim term does not require

1 that from be directly from. It's that simple. The origin of the identifier is a
2 remote computing system, and that is sufficient species to support a genus
3 claim from that does not require direct or indirect in narrowing that origin
4 requirement.
5 JUDGE ZECHER: So, you would have us read this as a second
6 identifier received indirectly from a computer?
7 MR. SAUNDERS: Directly or indirectly. We think that the
8 example of indirectly is a species that's sufficient to interpret it to be directly
9 or indirectly.
10 JUDGE ZECHER: But there's no support of directly?
11 MR. SAUNDERS: Yeah, that's true. I mean, that's why we're
12 saying the species example is sufficient to understand one way of getting the
13 identifier from a remote computing system to a drone, right?
14 JUDGE ZECHER: So, you're saying the species supports the
15 genus? Is that what --
16 MR. SAUNDERS: Yes.
17 JUDGE ZECHER: -- you're saying?
18 MR. SAUNDERS: Turning to Slide 5, the argument from Counsel
19 was that, in fact, there's no reason to suspect the remote computing system is
20 in fact remote from the aerial discrimination system. Again, we submit
21 that's an unreasonable interpretation. First of all, just the word remote in the
22 context that it appears, we were talking about various systems that have
23 processors, and now we're talking about a new system not previously
24 referenced, and we're calling it remote. So, that's already one indication that

1 it is remote from the aerial discrimination system, but that's further
2 confirmed here from Figure 1, because Figure 1 is the identification of all of
3 the components of the aerial discrimination system in the preferred
4 embodiment, and we don't see the remote computing system.
5 So, the fact that the remote computing system is mentioned and it
6 is not one of the structures identified in Figure 1-110 is sufficient support for
7 the fact that the remote computing system is in fact remote from the aerial
8 discrimination system, in addition to the fact that it uses the word remote
9 itself.
10 Turning to Slide 6. So, Counsel made a number of arguments
11 about second identifier and the conjunction between second identifier and
12 remote. This is another example of them attempting to characterize
13 something as obviousness, characterize it as distinct embodiments. These
14 are variations, so we have a portion of the specification that says, here are
15 various ways for providing the identifier to the drone that's going to be used
16 and sent to the ground system, one of which is the dynamic method with the
17 remote computing system.
18 We have another disclosure that says we can have one or two
19 identifiers. Those disclosures are not distinct embodiments. They have to
20 be read in conjunction with each other, and therefore, in the example, the
21 implementation with two identifiers, that can be -- either identifier would be
22 implemented in the ways that are described previously, which include the
23 example of a remote computing system providing the identifier. It's the goal
24 in written descriptions to read all of the disclosures in context with each

1 other for all they teach. The only bound that cannot be crossed is combining
2 distinct embodiments, and we submit that this is not an example of
3 combining distinct embodiments.
4 Turning quickly to the 10E(2) written description issue. This is an
5 issue that seems pretty clear. On the right here, we see Figure 6. We see
6 that there's a pathway for that identifier to come into the ground system
7 through 608, the wireless communication, or in the written description
8 chipset 608. There's a pathway through the processor to the permissions
9 module. That pathway is in the figures is further confirmed with the written
10 description. On the left, we see that 608 is interpreting the signal into the
11 aerial system identifier 310. And more importantly, we see that as part of
12 that process at Section 4.3, that can include verifying the authenticity.
13 So, we're now saying there that we -- one way of taking that signal
14 in is -- and part of that process of determining that signal is authenticating
15 that signal and authenticating the identifier. So, already, we have receiving
16 the signal and it can be authenticated. And we see next that the next step is
17 to provide it to the permission system.
18 In particular, the specification teaches that Section 4.4 follows
19 immediately after 4.3. So, after authenticating the identifier, comes the
20 section for permissioning. We know from the figures and the other parts of
21 this specification that the permissions module is the component that does
22 that permissioning. Turning to Slide 9, then we see further explanation for
23 this that ties it together. In particular, column 9, we see the disclosure of a
24 raw or processed signal that is sent from chipset 608, which we saw earlier,

1 to the permissions module.
2 So, reading process signal in connection with what we just saw
3 before, where it talks about ways of processing that signal through
4 authenticating it when it's received and thereafter by sending to the
5 permissions module, that step of processing is getting the identifier out of
6 the signal and authenticating it in the example that's in 4.3. And so, reading
7 that in conjunction with here provides full support for the limitation that we
8 provide an authenticated first identifier to the permission module.
9 Going on to 10 for definiteness. Again, this is an issue that
10 Petitioner bears the burden of proof. We submit that they have not met that
11 burden. Our expert did analyze the ordinary meaning of preemptively. He's
12 analyzed here talking about preventing something from happening, forestall
13 or preclude. And then we can see how that ties into the disclosures in the
14 specification, which are consistent with it. We've highlighted the examples
15 in the figure on the right, which are also present on the left, and particularly,
16 we have the example of no identifier, invalid identifier, skipping steps.
17 Now, Counsel made a lot of point about that third example that's in
18 the written description but not the figure, where the identifier is valid but is
19 not permissioned. That is simply because the figure is not purporting to
20 include all potential steps in that figure. In fact, we see elsewhere in the
21 specification examples of additional steps that can be taken as part of the
22 process between identifying a drone as being there and ultimately taking a
23 disruption step. Those examples are -- our experts cited and analyzed
24 Exhibit 2002, 37, 9 through 18. So, examples of other steps that can be

1 preempted are a notification or warning the user.
2 Now, are those steps illustrated in Figure 5? No, they're not, but
3 those are other steps one of skill in the art, reading the term preemptively
4 enabled, reading the examples that are given would know, okay, well, 502,
5 we could have additional steps that in those examples, that if we're going to
6 have a notification, we could skip the notification step if it's been
7 -- identifier is valid, but is not permissioned. Simply because those steps
8 aren't included in the figure doesn't render this term indefinite. In fact --
9 JUDGE ZECHER: Mr. Saunders, this is the only use of
10 preemptively enabled in the specification, right?
11 MR. SAUNDERS: I believe that's correct.
12 JUDGE ZECHER: Okay. And you're saying that even though it's
13 listing this as examples, and I believe there's three listed here, the last one
14 still may have additional steps, even though we don't see anything in the
15 figure or the corresponding description describing that?
16 MR. SAUNDERS: So, it's the steps that are skipped. So, in
17 Figure 5, we see for those first two listed examples, some examples of steps
18 that may be skipped.
19 JUDGE ZECHER: Well, and yeah, the first two, you're skipping
20 502, right?
21 MR. SAUNDERS: Yes. So, the first two, you're skipping 502,
22 and the first one, you're skipping 501 as well.
23 JUDGE ZECHER: Right.
24 MR. SAUNDERS: Right?

1 JUDGE ZECHER: Correct.
2 MR. SAUNDERS: And so, their argument seems to be, well, what
3 could it possibly -- we cannot figure out any way that this could make sense,
4 given that there's the third thing in this list, and that's simply not a faithful
5 reading of the rest of the disclosure specification, which say there are many
6 steps that you can take along the way of before you disrupt -- you make the
7 decision to disrupt the UAV.
8 And so, reading that in context of the example of identifier is valid
9 but is not permissioned, we could understand that as an example of
10 something where you could be preemptively enabling it by skipping other
11 steps. And Figure 5 simply does not illustrate every possible step that could
12 be taken, and that the specification specifically discusses as potential steps.
13 JUDGE ZECHER: I guess it's just hard to envision that you're
14 skipping a step here in Figure 5, particularly in the example when you go
15 from 502 to 503, they're numbered sequentially. There's no steps in between
16 them. So, how are we supposed to envision that there are some steps that are
17 being skipped?
18 MR. SAUNDERS: They're just steps not illustrated in the figure.
19 JUDGE ZECHER: Okay.
20 MR. SAUNDERS: And that's consistent with the ordinary
21 meaning of preemptively enabled. I mean, that's another problem with their
22 argument is these are ordinary words of English language, right? So, it has
23 to be an extraordinary case that somehow the specification is so confusing
24 that ordinary words of English language become indefinite. And we submit

1 that they have not raised that case.
2 And just quickly on Slide 12, our expert went into detail and
3 explained why the ordinary meaning of preemptively enabled makes sense
4 with those other examples that are in the specification. So, the meaning of
5 the word forestall or preclude is consistent with skipping steps. And so, he
6 says that we could skip other steps and he identifies the steps that are not in
7 Figure 5, but are elsewhere in the specification of things that can be skipped.
8 And so, that's fully consistent with -- in the Figure 5, you could skip other
9 steps. That is consistent with the ordinary meaning of preemptively enabled.
10 Simply the fact that Figure 5 doesn't illustrate everything that is in the
11 written description does not make a term indefinite.
12 JUDGE ZECHER: But bottom line, what you're saying is
13 preemptively enabled is not indefinite because it's reasonably certain to tell
14 you reading the specification that you're just skipping a step?
15 MR. SAUNDERS: Yes.
16 JUDGE ZECHER: Okay.
17 MR. SAUNDERS: Turning to Slide 13, we'll go to the
18 obviousness grounds on Jarrell. So, Counsel made an argument about the
19 issue of whether they identified a list in Jarrell or an identifier in Jarrell as
20 being the second identifier. This is a clip from their own brief. We would
21 submit this is clearly equating the list in Jarrell with the second identifier,
22 but Counsel also made a statement that we did not have other arguments
23 other than characterizing their positions list. That's not accurate either.
24 In addition to the second factor argument, I believe one of Your

1 Honors mentioned the issue of whether the MAC address itself is
2 authenticating MAC address. That's page 8 of Patent Owner's reply. So, we
3 had additional arguments, but we submit that this is clearly stating in their
4 opposition that they're equating a list with the second identifier, and their
5 attempt in their surreply to change the read is an improper attempt. Their
6 obligation is to make their grounds clear. If the second identifier identified
7 in their opposition is a list, they have not disputed in their sur-reply that a list
8 is not an identifier because it does not identify a particular UAV.
9 So, turning to the multifactor issue, again, this is an issue that
10 Counsel characterized it as we're reaching to some unsupported place. But
11 as we explained, and our expert explained, the concept of multifactor
12 authentication is a concept that has a well-known meaning, although it was
13 not well used as it is nowadays. I'm sure Your Honors are all aware of
14 getting a requirement to get a number on your phones and enter that in, in
15 addition to password. The concept is certainly very well known now, but it
16 had established meaning at the time. This Exhibit 2009 is an official U.S.
17 Government document from NIST explaining multifactor authentication.
18 The other aspect that we would submit --
19 JUDGE ZECHER: Counsel, why isn't there any discussion of
20 multifactor authentication in your specification? I know how you're trying
21 to read this, but I mean, you're trying to tie it to that, yet I don't see anything
22 about that in the specification.
23 MR. SAUNDERS: Well, the answer is that the spec gives many
24 different potential ways of implementing the identifiers, and one of those is

1 the example of a second identifier. And of the second identifier --
2 JUDGE ZECHER: Aren't we talking about authenticating the
3 identifier, right? We're authenticating the first identifier using the second,
4 correct?
5 MR. SAUNDERS: Yes.
6 JUDGE ZECHER: That's the language in the claims.
7 MR. SAUNDERS: Yes.
8 JUDGE ZECHER: Okay. So, does it show authentication, an
9 example being multi-factor authentication?
10 MR. SAUNDERS: Well, it is about the interpretation of the word
11 second factor that is both in the specification and in the claims. And the
12 question also is reading the claims, what is the alternate interpretation of the
13 second factor. What we would submit is that Petitioners basically read this
14 limitation acting as a second factor out of the substitute claim. They
15 essentially treat it as equivalent to the fact that there is a second identifier
16 and that the second identifier authenticate the first identifier. That is
17 separate limitations that are also recited in the claim.
18 JUDGE ZECHER: So, you're talking about the limitation of
19 claim, the second identifier functioning as a second factor identifier?
20 MR. SAUNDERS: Yes.
21 JUDGE ZECHER: Is that what you're saying? We've got to take
22 that in context and read it into how we verify?
23 MR. SAUNDERS: Yeah, you have to read that in the context of
24 -- the claim also mentions that there is a second factor is going to

1 authenticate the second -- sorry, the second identifier is going to authenticate
2 the first identifier and the fact the claim already recites two different
3 identifiers, and then there's an additional language here that it functions as
4 second factor.
5 We submit that one of skill in the art would read that just as they
6 would read the specification as invoking that well-known concept. And they
7 really don't have substantive evidence from their expert or really substantive
8 analysis on this issue of what this means. They kind of skip over this
9 limitation in their analysis and treat it the same as the rest of the limitations
10 about having a second factor and having that second factor authenticate the
11 first factor, but it's a separate claim limitation. They don't adequately
12 support their position why this, as opposed to those other limitations, is
13 rendered obvious. And they certainly don't offer a contrary interpretation for
14 what this means. Going on --
15 JUDGE MOORE: Counsel, I understand. Quick question about
16 that. Your argument about -- so you're treating this -- you're obviously
17 discussing multifactor authentication and treating the second factor as
18 something that can be used to cryptographically or something like that,
19 identify the first identifier. But I note that in the challenged patent, the only
20 discussion I saw of a second factor identifier is just something separate,
21 right? Like you could have an RF signal and it says -- for example, in one
22 embodiment, the first identifier transmission system can be a Wi-Fi chipset,
23 while the second identifier transmission system can be an optical signal
24 generator, for example, a blinking LED. So, your patent itself seems to be

1 giving examples of a second factor identifier that don't fall within the scope
2 of what you're saying the claims are limited to.
3 MR. SAUNDERS: I don't believe that portion of specification
4 Your Honor referenced actually characterized that as a second factor. I
5 believe that the portion of specification that refers to second factor uses
6 essentially the language that appears in the proposed substitute claim. And
7 that's the language we submit, that it's not talking about factor other places.
8 It's talking about factor at that one place in specification. That's what's
9 telling us, use this well-known concept that's established in the art, not used
10 as widely as it is now, but sufficiently that one of skill in the art would know
11 the meaning of the term.
12 So, very briefly, there's no analysis from them applying this
13 understanding of second factor, no dispute from them that if that's the
14 appropriate interpretation, it's not satisfied. So, just quickly, the other
15 grounds for why their combinations don't satisfy. Jarrell is authenticating
16 the UAV. They presented a quote here that says it's authenticating, but it is
17 just simply comparing one identifier to either a list or another identifier in
18 the list and just checking that they're the same.
19 There's nothing that's actually making sure the identifier is
20 authentic. It's just assuming whatever the drone gave it is authentic. And
21 when we read the specification, we see it's concerned with identifier
22 reproduction. That is what it means by authenticating. One with skill in the
23 art would understand Jarrell talking about authenticating is simply
24 authorizing the UAV. The UAV has told me they're this identifier. That

1 identifier is an authorized identifier for a drone that's allowed to operate. It's
2 not the same concept of authenticating one identifier against another
3 identifier, which is something that is going to deal with an inauthentic
4 identifier, such as a cloned or stolen identifier.
5 Pasko has essentially the same issue we see. Again, it's simply
6 identifying whether the drone itself has been authorized to use the system.
7 It's not identifying one identifier with another. Pasko suffers the same issue
8 with respect to second factor. We discussed with Jarrell. And then lastly,
9 the Viggiano-Gong reference. This is a new problem distinct from the
10 others, but essentially, we have here Patent Owner's expert who's citing their
11 theories, and their theories really fail to satisfy the requirement that the
12 second identifier come from something that's -- the computing system's
13 remote relative to the discrimination system.
14 In particular, in this example, both of the alleged identifiers are
15 originating at the drone. They just happen to be sent through two different
16 transmitters on the drone. That does not satisfy the claim because, as we
17 saw back in Figure 1, and it's also recited in the claim itself, that the
18 identifying transmission system on the drone is part of the aerial
19 discrimination system. And so, this is not an example of something that is
20 coming from a source that is separate from the aerial discrimination system.
21 It is coming from the drone. That is where it originates. And both of the
22 examples are coming simply through two different transmitters does not
23 satisfy this limitation. Unless the Court has -- or the Board has any other
24 questions, I'll reserve the remainder of my time.

1 JUDGE ZECHER: Thank you. Petitioner, you can either present
2 some rebuttal or we can move on to the third case.
3 MR. WALTERS: Your Honor, I'd like to make just a few points.
4 First of all, with respect to the issue of remote from the discrimination
5 system, again, the portion that we cited in the specification states that the
6 identifier can be generated irrespective of that issue onboard the aerial
7 system 100 -- that's the aircraft -- comma, generated remotely, e.g. at a
8 remote computing system, and then updated in flight or when connected to a
9 predetermined communication connection type.
10 The use of the word remote in that context is remote from the
11 aerial system 100, which is the aircraft. It's not the discrimination system
12 itself. So, we don't believe that portion provides support for remote from the
13 discrimination system. The Patent Owner chose to use, or the Applicant
14 chose to use the word preemptive in the claim.
15 As Your Honor has noted, the only use of the word, the term
16 preemptive enablement is with respect to that Figure 5. If preemptive is
17 going to mean something, something needs to be preempted and it must be
18 something different than just enabled, preemptive enablement must be
19 something different than enablement. And if you read the specification in
20 Figure 5, when you count 502 as a step of preemptive enablement, there's
21 nothing being skipped and there's nothing suggested in the patent that
22 something is being skipped when you go from 502 to 503. And then finally,
23 Your Honor, I'd like to briefly address the issue --
24 JUDGE ZECHER: Counselor, do you dispute that for context of

1 indefiniteness here or definiteness, that it's simply just preemptively enabled
2 skipping a step? I mean, can we ascertain that's what it means in light of this
3 patent?
4 MR. WALTERS: Your Honor, I don't know. Maybe perhaps with
5 respect to 501 and 500 and 501, because you're skipping 502, but when it
6 gives you an example of 502 as preemptive enablement, it never tells you
7 that it's skipping a step. It goes directly from 502 to 503. So, we would
8 contest that.
9 JUDGE ZECHER: So, it just comes down to that third example?
10 MR. WALTERS: That's correct, Your Honor.
11 JUDGE ZECHER: Okay.
12 MR. WALTERS: Your Honor, briefly on the issue of the second
13 identifier in Jarrell being the list, Patent Owner slide suggested that it is the
14 -- that we said the list of the valid MAC address identifiers was the second
15 identifier in that portion on their Slide 13. They're quoting from our
16 opposition. We cited the whole phrase of what we were looking at and then
17 cited the whole claim term. In that phrase was a list of valid MAC address
18 identifiers that includes a valid MAC address identifier relevant to the UAV.
19 We included the valid MAC address identifier on the list in that portion.
20 And if you look at our -- I don't have this on a slide, but if you look
21 at our opposition at page 14, at the top, it says, where a match between the
22 MAC address of the UAV and the valid MAC address identifier relevant to
23 the UAV, (the second identifier), located on the list. So, there it's clear it is
24 the identifier that is on the list that we said was the second identifier.

1 Similar circumstance occurs on opposition, top of page 17. We
2 said where a match between the MAC address of the UAV (first identifier)
3 and the valid MAC address identifier relevant to the UAV (the second
4 identifier) located on the list authenticates the MAC address of the UAV.
5 With that, Your Honor, if there are no further questions, we will reserve the
6 rest of --
7 JUDGE ZECHER: Yeah, I do have additional questions. So, this
8 language, the second identifier functioning as a second factor identifier.
9 How do you view that limitation that was added? Do you view that as
10 bringing in this concept of multi-factor authentication here?
11 MR. WALTERS: We do not, Your Honor. The multi-factor
12 authentication is not mentioned anywhere in the specification. It's only
13 submitted through the expert's extrinsic evidence. The only use of second
14 factor in the specification says the second identifier is a second factor to
15 authenticate, and that's what we think the claim requires to authenticate.
16 And we've shown where in the art that's disclosed.
17 JUDGE ZECHER: Thank you.
18 MR. WALTERS: Thank you, Your Honor.
19 MR. SAUNDERS: Nothing further from Patent Owner. Rest this
20 --
21 JUDGE ZECHER: No surrebuttal. All right. Thank you, Patent
22 Owner. We've been going at it pretty good here for quite a while. I think it's
23 a good opportunity to take a break. Why don't we do a five-minute break?
24 That way everybody can recollect their thoughts and come back with

1 hopefully clear heads. Let's go off the record.
2 (Whereupon the above-entitled matter went off the record at 2:54
3 p.m.)
4 MR. SAUNDERS: I am here.
5 JUDGE ZECHER: Great. Looks like we have all the parties. The
6 public line, I was told, remained open, so I think we're good to go.
7 Petitioner, please come up to the lectern. We can start the '629 case. You
8 can begin when you're ready.
9 MR. WALTERS: Thank you, Your Honor. One thing I forgot to
10 raise in the previous IPR, the 00530, was the *Dental Monitoring* issue
11 Federal Circuit case that just came out. It is applicable to that IPR, as well.
12 And it's the Whitmarsh reference, where we're relying on the Whitmarsh
13 provisional. The Whitmarsh provisional has clear verbatim support for a
14 claim in Whitmarsh, but that issue does apply to that IPR, as well.
15 JUDGE ZECHER: So, just so I'm clear, you have the Beard
16 reference for the '525 case and the Whitmarsh for the '530 case?
17 MR. WALTERS: That's correct, Your Honor.
18 JUDGE ZECHER: Okay. Thank you.
19 MR. WALTERS: Moving to the '711 patent, it also applies to the
20 Falk reference of the 530.
21 JUDGE ZECHER: Okay. So, Whitmarsh and Falk?
22 MR. WALTERS: Yes. Moving to the '711 patent, starting at
23 claim -- it's Slide 24. The only original claim at issue is dependent Claim
24 12, and the only issue in dispute on that claim is the term autonomously

1 navigating the reference aerial vehicle towards the received geographical
2 location. The combination of Beard and Laufer teach this limitation under
3 both sides' interpretation of that term.
4 Moving to Slide 28. Patent Owner's argument against the
5 combination rests entirely on its construction of the term autonomously
6 navigating the reference aerial vehicle, which Patent Owner says is making
7 navigation decisions by the reference aerial vehicle by itself without outside
8 control.
9 Moving to Slide 29. Patent Owner claims that its construction is
10 the plain and ordinary meaning. That seems suspect to us because Patent
11 Owner has proposed three separate constructions for the term throughout the
12 IPR. Moving to Slide 34. The basis for Patent Owner's construction is
13 Patent Owner's definition of the word autonomous. First of all, there's
14 nothing in the claim itself that supports limiting autonomously navigating to
15 performance on the vehicle without any outside control.
16 Moving to Slide 36. The specification also does not include that
17 definition. There's nothing in the specification that says autonomous means
18 without any outside control. Moving to Slide 39. Now, the portion Patent
19 Owner points to at column 9 states, in some embodiments, the CPU is
20 configured to receive flight instructions from a remote command center,
21 another embodiment of the CPU, is configured to autonomously fly UAV
22 301. This says nothing about how the UAV flies autonomously. It also does
23 not describe the UAV making any navigation decisions, which is part of
24 Patent Owner's construction. It does not say what navigation decisions are

1 or that such decisions are made by the UAV itself without outside control.
2 The patent does not tell us what it means to make a navigation
3 decision, nor has Patent Owner. If that's what autonomous was intended to
4 mean, then one would expect the specification to say so when it uses the
5 word. Now, what the specification does --
6 JUDGE MOORE: Doesn't the specification effectively say there
7 that autonomous navigation is navigation in which flight control instructions
8 are not received from a remote command center?
9 MR. WALTERS: From a remote command center. We contend
10 the remote command center is where a human is.
11 JUDGE MOORE: What's the basis for that?
12 MR. WALTERS: Our Slide 46. The specification describes
13 problems with human control. It states that human control may be
14 challenging in circumstances where a trained human user is unavailable or
15 unable to react quickly enough to perform a desired flight maneuver. And
16 that's consistent with the extrinsic definitions.
17 First of all, on Slide 48, I'll point to Patent Owner's extrinsic
18 dictionary definitions. They are both irrelevant and not supportive. First,
19 they're too late as they're well after the effective filing date of the
20 application. And moving to Slide 49, Patent Owner's own Cambridge
21 definition -- this is Exhibit 2012 -- states an autonomous machine or system
22 is able to operate without being controlled directly by humans.
23 Moving to Slide 50. The correct interpretation of autonomously
24 navigating the reference aerial vehicle towards the received geographical

1 location is navigating the reference aerial vehicle towards the received
2 geographical location without human control. Moving to Slide 51. Now,
3 Petitioners identify a dictionary from the correct time period. This is Exhibit
4 1031 that defines autonomous in the vehicle context as navigated and
5 maneuvered by a computer without a need for human control or
6 intervention.
7 And Patent Owner makes an issue of this saying under normal road
8 conditions, but the human issue applies to both autonomous cars and
9 autonomous drones. Cars are traditionally controlled by humans and
10 autonomous cars are not. Drones are traditionally controlled by humans and
11 autonomous drones are not. Without human control is the plain meaning.
12 Moving to Slide 52. Now, when Patent Owner's own expert
13 brought up the word on his own, he brought up the word autonomous in his
14 deposition. He described different levels of autonomy and said, as you
15 increase the autonomy, you take the human more and more out. We also
16 asked him, were there people in 2015 that had the opinion that complete
17 autonomy meant there is no human involved? Answer, yeah, this goes back.
18 It is not only 2015. Again, that also supports that without human control is
19 the plain and ordinary meaning.
20 Moving to Slide 53. All of Patent Owner's patentability arguments
21 are based on its construction. So, there's no dispute that the Beard-Laufer
22 combination teaches autonomously navigating without human control
23 through Laufer's autopilot commands. But even under Patent Owner's
24 construction, the combination still renders Claim 12 unpatentable.

1 Moving to Slide 58. First, Patent Owner only focuses on Laufer
2 individually and not the combination with Beard. It only argues that
3 Laufer's controller is not on board the UAV, which is not a requirement of
4 the claim. Moving to Slide 59. Second, the combination teaches that
5 Beard's UAV uses Laufer's autopilot commands to control itself toward the
6 received interception location.
7 Moving to Slide 60. So, recall that the limitation is autonomously
8 navigating towards the received geographical location. And as our expert
9 illustrated and described, a POSITA would have understood that during the
10 time period in which the UAV uses the autopilot commands, it is making a
11 navigation decision by itself without any outside control. At time T0, it
12 receives autopilot commands, it makes navigation decisions using those
13 commands from time T0 to TN, at which time it would receive new
14 autopilot commands. Patent Owner never disputes this.
15 JUDGE MOORE: What decisions is it making, Counsel? It's just
16 following the autopilot commands. Is it making its own decisions?
17 MR. WALTERS: Sure, Your Honor. I'll give you an example.
18 The autopilot command could be head south. The aerial, the drone has to
19 figure out, oh, I'm heading east at 90 degrees. I need to figure out how to
20 head south, so I need to make a navigation decision to turn 90 degrees
21 clockwise so that it could head south. That's an example of a navigation
22 decision it would be making on its own. It could also change speed.
23 JUDGE MOORE: Okay, I understand that. So, how about the
24 situation where the ground station says, UAV, turn right 90 degrees, descend

1 500 feet, and the UAV turns right 90 degrees and descends 500 feet, did that
2 UAV autonomously navigate --
3 MR. WALTERS: It could be --
4 JUDGE MOORE: -- or did it just follow instructions received
5 externally?
6 MR. WALTERS: As our expert opined, it could be making
7 navigation decisions. It would have been obvious for it to make a navigation
8 decision. If you say descend 500 feet, maybe it realizes, oh, I'm at 2,000
9 feet. I need to go to 1,500 feet in order to descend 500 feet.
10 JUDGE MOORE: That's not a decision, though. That's just a
11 calculation, right? It's --
12 MR. WALTERS: We would contend that's a navigation decision.
13 Your Honor, as we show on Slide 61, when discussing its autopilot
14 functionality, Laufer states the set of autopilot aircraft commands can
15 include, for example, a yaw command, pitch command, and/or motor speed
16 commands. This means that UAV would be controlling its yaw, pitch, and
17 speed according to the autopilot commands without any outside control.
18 Moving to Slide 62. We asked Patent Owner's expert, is changing
19 speed in response to a speed command a navigation decision? He answered
20 yes. Question, is changing pitch in response to a pitch command a
21 navigation decision? Answer, it's a possibility. Even if Patent Owner is
22 correct about its construction, about how Laufer operates, the UAV is, at a
23 minimum, on its own, changing speed in response to a speed command.
24 Patent Owner's expert has acknowledged that's a navigation decision which

1 would meet their construction.
2 Now, Your Honor, I'd also like to raise -- and I don't have this on a
3 slide, but in the last deposition of our expert, Dr. Singhose, Patent Owner
4 used an older research paper, co-authored by Dr. Singhose, directed to
5 formation flying by spacecraft. This is Exhibit 2034. Now, Patent Owner
6 alleged it supported its construction of autonomous. The abstract had a
7 sentence that read, one of the difficulties with formation flying is that
8 satellites must be autonomous and able to generate and correct their own
9 orbit and attitude profiles without continual guidance from the ground. It
10 does not say without any guidance from the ground. It said without
11 continual guidance.
12 In addition, as Dr. Singhose testified -- and Patent Owner did not
13 cite this testimony in its surreply -- the paper discusses the satellites
14 communicating with each other for navigation. He testified that -- and this
15 is at Exhibit 2033, pages 58 to 60 of his testimony -- there's parts of this
16 controller on the satellite, but all of the satellites have to be communicating,
17 because Satellite A has to know where Satellite B and C are so that it can
18 adjust its position appropriately and keep in formation with. So, Satellites
19 A, B, and C all stay in the formation that you desire. So, Patent Owner
20 suggested this exhibit supported its definition of autonomous, but it actually
21 contradicts it because even here, there's outside control of the satellite
22 because the satellites are collectively staying in formation with each other.
23 JUDGE MOORE: Counsel, so just to be clear, your definition of
24 autonomous is -- autonomously navigating is any navigation without human

1 control?
2 MR. WALTERS: Correct.
3 JUDGE MOORE: Is that right?
4 MR. WALTERS: Yes, Your Honor.
5 JUDGE MOORE: So, a UAV -- and just take a hypothetical.
6 Suppose I have a UAV. This is an old school -- it's an old school remote-
7 controlled aircraft like you might have had 30, 40 years ago with no
8 computer on board. And say I've got a ground-based computing station that
9 has telemetry, whatever, and it manipulates every control system on that
10 aircraft. It controls everywhere the aircraft goes. The aircraft has no
11 processor of its own. Would that aircraft autonomously navigate? There's
12 no human involved.
13 MR. WALTERS: I would expect there to be a human on the
14 ground.
15 JUDGE MOORE: No, it's a computer on the ground. The
16 computer flies the aircraft, but the computer is located on the ground.
17 There's no processor or anything on the aircraft. The computer just watches
18 and sends signals that manipulate a servo motor that turns the control
19 surfaces on the aircraft.
20 MR. WALTERS: I could imagine --
21 JUDGE MOORE: No decisions are made on the aircraft. There's
22 no computing capability. Imagine like 30 or 40 years ago, a remote-
23 controlled aircraft that you would have manipulated with joysticks, but it's
24 controlled by a computer on the ground.

1 MR. WALTERS: We would contend that's autonomously
2 navigating, Your Honor.
3 JUDGE MOORE: The aircraft is autonomously navigating, even
4 though all the computations are performed -- that control the aircraft are
5 performed on the ground and not on board the aircraft itself?
6 MR. WALTERS: Yes, Your Honor.
7 JUDGE MOORE: Okay. Thank you.
8 MR. WALTERS: Unless there are additional questions, I'd like to
9 turn to the substitute claims. Moving to Slide 74.
10 JUDGE MOORE: And Counsel, just one quick clarification
11 before you go on. There was no obviousness challenge to substitute Claim
12 37; is that correct?
13 MR. WALTERS: That's correct, Your Honor.
14 JUDGE MOORE: Okay. Thank you. Go ahead.
15 MR. WALTERS: Substitute Claim 37 requires making a selection
16 for a current image based on what was selected for the immediately
17 preceding image. There's no written description support for image-by-image
18 decision-making based on the immediately preceding image and the current
19 image. Now, in its reply at page one, Patent Owner states that the neural
20 network selection does not depend on the neural network used for the
21 immediately preceding frame, but this is clearly incorrect based on the claim
22 language.
23 37E(3) states, when the second neural network was selected and
24 applied to the immediately preceding image, the selection comprises

1 selecting and applying the first neural network upon certain conditions.
2 37E(4) states, when the first neural network was selected and applied to the
3 immediately preceding image, the selection comprises selecting and
4 applying the second neural network upon certain conditions.
5 So, contrary to what Patent Owner argued, both of these steps are
6 explicitly conditioned on which neural network was applied to the
7 immediately preceding image. Moving to Slide 75. Patent Owner's expert
8 agreed in his deposition. Question, this E3 limitation only applies when the
9 second neural network was selected and applied to the immediately
10 preceding image, correct? Answer, that's correct. He testified the same for
11 the E4 limitation.
12 Moving to Slide 76. As shown on this slide, the specification only
13 describes switching between processing scheme groups. Moving to Slide
14 77, there's no support for these specific requirements that the selection of a
15 neural network for a current image depends on whether the first or second
16 neural network was applied to the immediately preceding image.
17 I'd like to move to the range limitation. Moving to Slide 81. So,
18 limitation 37E(3) requires a range defined by the first threshold and a second
19 threshold greater than or equal to the first threshold. Moving to Slide 82.
20 The specification generally references a low threshold in a range, but there's
21 no support for a first and second -- a range defined by a first and second
22 threshold, let alone support for a range defined by a first and second
23 threshold that could be equal to each other.
24 Moving to Slide 83, Patent Owner argues without support in the

1 specification that the range can be a point or a single threshold. Even if it
2 could, the claim still requires support for a range defined by two thresholds
3 where they can be equal to each other. We asked Patent Owner's expert in
4 his deposition when trying to invalidate this limitation whether a prior art
5 reference needed to show both a first threshold and a second threshold, and
6 he confirmed it did. If a prior art reference needs to show two thresholds to
7 invalidate, then the specification surely needs to show the same to provide
8 written description support.
9 Moving to Slide 84. Now, Patent Owner tries to piece together
10 separate portions of the specification that discuss different potential
11 thresholds, such as a low threshold or an activation number, but none are
12 disclosed as two separate thresholds that can be equal and that define a
13 range.
14 Your Honors, I'd like to turn to the enablement issue with the term,
15 speed adjustment factor. Slide 94. So, substitute Claims 21, 36, and 37 all
16 require determining a speed adjustment factor. Moving to Slide 95, there's
17 no direction or guidance as to how one would determine a speed adjustment
18 factor in the specification.
19 Moving to Slide 96, the specification mentions adjusting a factor
20 used to control a speed. It discusses a scalar that multiplies a speed
21 adjustment factor, but there's no guidance for how to determine a speed
22 adjustment factor. Moving to Slide 98. The only thing in the specification
23 that Patent Owner has pointed to are equations 7 and 8 of Figure 10. And
24 you can see on the slide that they include these constants A, B, and C.

1 Moving to Slide 103. But these constants are unknown. There's
2 nothing in the specification about what these could be. The patent even says
3 they could be the same value or different values, but we don't know what
4 they could possibly represent. Moving to Slide 104. Patent Owner actually
5 states that no specific examples are provided because they would not help a
6 POSITA. And moving to Slide 105, Patent Owner's expert elaborates on
7 this and says, "choosing the specific constants of the equations is an
8 optimization problem that would vary substantially from one vehicle to
9 another and from one usage scenario to another."
10 He also says that any equation constant values provided would not
11 be applicable or even meaningful to RAVs at large. This is in paragraph 122
12 of Exhibit 2036. Moving to Slide 106, in his next paragraph, he says that the
13 equation constants selection can be readily accomplished when the specifics
14 about the RAV size, weight, shape, maximum speed, maximum altitude, et
15 cetera, and the specifics about the environment of operation, e.g. type of the
16 GPU, nature of the terrain, e.g. mountainous, wooded, urban, et cetera, are
17 known and taken into account. The use of this information in choosing
18 specific curves constant values would be highly beneficial, and may even be
19 invaluable.
20 Moving to Slide 107. In his deposition, he identified different
21 variables stating that the constants may depend on mass, distribution of the
22 mass, and the kinematic and dynamic model of the drone. The problem here
23 is that there's no guidance or direction, or even example in the specification
24 as to how any of this would be used, even in the equations provided, to

1 determine a speed adjustment factor. None of the specific RAV
2 characteristics provided by the expert are even in the specification. And
3 even disregarding the lack of guidance in the specification, this IPR has been
4 going on for months. And in that month's timeframe, neither Patent Owner
5 nor its expert ever provided a single example of how you would use these
6 equations to determine a speed adjustment factor.
7 Moving to Slide 110. Addressing the other one's factors for
8 enablement, there's clearly no working examples and the quantity of
9 experimentation would be enormous. So, there's clearly lack of enablement
10 for determining a speed adjustment factor. Unless Your Honors have
11 additional questions, I'd like to turn it over to my colleague to handle the
12 prior art arguments.
13 MR. BARAZESH: All right. Thank you, Your Honors, and good
14 afternoon again. Ellyar Barazesh for Petitioners. I'm going to cover the
15 prior art grounds that Petitioners presented for the '711 patent. I'm going to
16 focus on the main disputed issues. So, Slide 141, which we have up, we lay
17 out the prior art combinations presented in the opposition. Grounds 23
18 through 27 are based on a Beard reference. This is a different Beard from
19 the other IPRs that we've talked about that has the *Dental Monitoring* issues.
20 So, just want to make that clear.
21 JUDGE ZECHER: So, no *Dental Monitoring* issue here?
22 MR. BARAZESH: No, no.
23 JUDGE ZECHER: Okay.
24 MR. BARAZESH: No issue in this one. And then Grounds 28

1 through 35 are based on the Pierce reference as the primary reference. So,
2 turning to Slide 147, the first point I'm going to cover is regarding Patent
3 Owner's argument that Pierce does not teach a drone implementing onboard
4 neural networks. We believe the Patent Owner's argument is wrong and it's
5 contradicted by the clear disclosure of the Pierce reference.
6 Paragraph 42 of Pierce says that a drone system 600 may be drone
7 102 that is described by Pierce. Paragraph 45 of Pierce says that drone
8 system 600, which may be drone 102, includes an object tracking module
9 615. It also describes that that drone system, which may be drone 102,
10 includes other onboard drone components, such as a GPS velocity detector,
11 camera, and a laser tracking module.
12 And then paragraph 45 of Pierce explains that captured images
13 may be input into various neural networks and/or computational systems,
14 which may be implemented by object tracking module 650. So, our view is
15 that the disclosure of Pierce contradicts Patent Owner's argument on that
16 point.
17 The next point I'm going to cover, turning to Slide 148, Patent
18 Owner has an argument regarding three step reconfiguration. So, in the
19 Beard grounds, which utilize Pierce's teachings of performing onboard
20 object identification and tracking using neural networks onboard the drone,
21 Patent Owner argues that Beard's non-GPU processor would need to go
22 through what it calls a three step reconfiguration to implement Pierce's
23 teachings.
24 This argument ignores Pierce's clear teachings of a non-GPU

1 processor implementing the taught neural networks for object identification
2 and tracking. And the other point here is that there's no requirement in the
3 claims or the specification that the processor implementing the claimed
4 functionality is on a GPU. We believe that the prior art teaches processors
5 implementing this functionality, and that's clear from the combinations we
6 presented.
7 We also just wanted to point out that Patent Owner's own
8 specification talks about a generic digital signal processor that is
9 implementing the image processing of the '711 patent. That's in Exhibit
10 2019, which is the underlying application, the '711 patent, paragraphs 134,
11 135, and 159. Another note -- so, for at least those reasons, we believe
12 Patent Owner's argument on this point also fails. Also want to note, as I
13 mentioned earlier, grounds 28 through 35 utilize Pierce as the primary
14 reference. So, there's no combination for this aspect of Beard in those
15 grounds.
16 The next point I just want to touch on briefly is on Slide 154. It's
17 the Khan and Kumar teachings. This is in regard to Claim 21. Patent Owner
18 has arguments saying that these teachings would not apply. They're
19 duplicative. Our view is that Patent Owner is not appreciating the
20 combinations, which we've clearly articulated in the opposition and that it's
21 relying on a bodily incorporation argument of specific details from these
22 references, rather than looking at what the teachings are from these prior art
23 references and how they're combined as we presented.
24 Khan teaches classification by model type involving shape and

1 appearance features. Kumar teaches the use of bounding boxes in image
2 processing. And as we explained, the combinations would have identified
3 bounding boxes outlining features of target objects, and by performing
4 detecting of a target, the features would have been used to classify a target as
5 a particular type. This is demonstrated in the opposition and supported by
6 Dr. Singhose.
7 The last point I'm going to just touch on here is on Slide 155
8 regarding Claim 36. This is the claim subject to the Ning based grounds.
9 So, Patent Owner has an argument regarding the cost of Ning's YOLO
10 neural network being less than the LSTM neural network's cost. And on this
11 point, we want to note that they cite to over 70 pages of expert declaration.
12 We believe that's an improper incorporation by reference to kind of end
13 around the page limits on this point.
14 But regardless, our view is the Patent Owner actually never shows
15 how the YOLO has a lower cost, and the specification contradicts its
16 argument. There are examples in the specification of the high-cost
17 algorithms and the low-cost algorithms. An example of a YOLO is given in
18 the specification as a high-cost algorithm. And as we explained in the
19 opposition, an LSTM -- or a neural network is also -- fits in the examples
20 provided by the specification as a medium and low-cost algorithm. This is
21 in the opposition of pages 19 through 21. And so, we believe that Ning's
22 teachings on this point teach the 2 different neural networks that are required
23 by Claim 36.
24 We also believe the Patent Owner's argument regarding these

1 costs, it seems to hinge on an argument that the neural networks are
2 combined in some way. Those neural networks are separate. Ning explains
3 that in column 4, lines 55 to column 5, line 3, at least. And Figure 3 shows
4 how the output of a YOLO might be connected to the input of the LSTM.
5 They're still separate.
6 The other point I just wanted to touch on is that there's an
7 argument that the LSTM is not analyzing an image, but it's analyzing data of
8 the image to implement its tracking of an object. That's the reason why that
9 neural network is functioning. It's to perform object tracking. And with
10 that, I think we're going to reserve the rest of the time for rebuttal. Thank
11 you.
12 JUDGE ZECHER: Thank you. Patent Owner, you have 38
13 minutes and 31 seconds left.
14 MR. WADEKAR: I'm ready, Your Honor. Your Honors, may it
15 please the Board. I will now discuss the '711 patent. Thank you for this
16 opportunity. In this presentation, I will refer to the demonstrative Exhibit
17 2109. This is Slide 1. The claims of this patent recite the term reference
18 aerial vehicle, but for brevity, I will use the term drone.
19 Slide 2. The research that is described and claimed in the '711
20 patent was funded by the DOD. The outcome of that research, a drone, was
21 accepted as an exhibit at the Smithsonian. What were the reasons for the
22 funding and the Smithsonian acceptance? This was the first computer
23 vision-based fully autonomous drone. No such drones existed before. The
24 computer vision-based autonomous navigation was made possible by three

1 innovative features. The three substitute claims are directed to these three
2 features. A central theme to these features, as we will see, is the
3 orchestration of a multifunction machine learning, that is ML model,
4 onboard a drone, and are the selective use of multiple neural networks
5 onboard a drone. This we do not see in any cited references.
6 Slide 3. Before we get to the solutions, let us consider the two
7 main problems the '711 patent solved. First, couldn't a human control a
8 drone? No, because a trained human is not always available, and even when
9 available, may not be able to react quickly enough. Second, couldn't the
10 drone then be controlled remotely from a sophisticated computer or a flight
11 controller? No, because the communication can be unreliable, may be lost,
12 and may even be jammed, which is what we see happening in Ukraine. In
13 that case, the mission cannot be completed.
14 We will skip Slide 4. Slide 5. The inventors and a few others
15 recognized that the solution included applying ML models to the images
16 captured by the drone's camera for target detection and location
17 determination. The inventor's solution, however, was not just the
18 application of an ML model to the drone's camera images. They derived a
19 multifunction ML model that implemented all of the functions required to
20 accurately determine a target's location.
21 Specifically, it was known that the use of a target's -- I'm sorry, an
22 object's physical size can improve the location determination. But the
23 conventional ML model featured only one function, providing a bounding
24 box and not the size. The tightly coupled multifunction ML model of Claim

1 21 provided the other required functions, as well, a bounding box around
2 detected target features, which can be used in detecting a target classification
3 to obtain the target's physical size. This allowed for accurate determination
4 of the target's distance, which in turn enabled near-stage autonomous
5 navigation.
6 Slide 6. The inventors also recognize that the compute budget for
7 implementing computer vision onboard a drone is very limited. What that
8 means is that the time available for image-based analysis is very, very short,
9 yet the analysis must be accurate. The inventors address this by employing
10 not one but at least two neural networks. One variant of this solution, which
11 is covered by Claim 36, is to apply two different neural networks for two
12 different functions. A more accurate, robust, but slower neural network
13 highlighted in red is used for the function of initial object detection, which
14 can be a challenging task and may take some time.
15 Once the object is detected, the second function tracking the
16 object, is performed by applying to the images a less accurate but faster
17 neural network highlighted in blue. Using only one neural network for both
18 detection and tracking tends to be either too slow or not accurate enough.
19 Another variant of the multi-neural network solution, which is covered by
20 Claim 37, is confidence-based application.
21 Here, the neural network provides, for each image it processes, a
22 confidence in the detection of the object in the image. If the confidence is
23 low, a more robust but slower neural network is used. If the confidence is
24 high, a less robust but faster neural network is used. Again, together, the

1 two neural networks facilitate robust and fast target detection and location
2 determination on a limited compute budget.
3 We will skip Slide 7. Slide 8. The three features that are discussed
4 enabled the inventors to build the world's first fully autonomous drone.
5 Autonomous navigation is covered by unamended Claim 12, which we will
6 now discuss. The main dispute, as we just learned and, and heard, for Claim
7 12 is claim construction, the correct interpretation of autonomously
8 navigating that Claim 12 recites. Petitioners mentioned three different
9 constructions, but those were slight refinements. The main theme is the
10 same.
11 According to the Petitioners, autonomous navigation is achieved
12 simply when there is no human control. So, according to the Petitioner's
13 construction, remotely controlling a drone by a remote control computer
14 would suffice as autonomous navigation. The specification, however,
15 describes and distinguishes remote-controlled operation from autonomous
16 navigation. It says, as you can see here, in some embodiments, the CPU of
17 the drone receives flight instructions from a remote command center.
18 The flight instructions may be sent by a human or by a computer.
19 The patent does not distinguish. This is the remotely controlled operation.
20 As you can see, the specification says, in other embodiments, the CPU
21 autonomously flies the drone, which is different from remotely controlled or
22 outside control. Our construction addresses both problems the specification
23 described, avoiding human control and minimizing reliance on ground
24 communication. Contrary to what Petitioners say, autonomous according to

1 the specification is not just avoiding human control.
2 Slide 10. Per our construction, and as the papers show, is derived
3 entirely from the specification. The key excerpt from the '711 patent that
4 describes autonomous, which you will see at the bottom in green, ties that
5 term to the operations highlighted in blue that are carried out entirely by the
6 onboard CPU of the drone and not by a remote controller. Those are the
7 flight decisions. Thus, autonomously, as Claim 12 recites, refers to
8 decisions and control actions that are carried out by the drone on its own
9 using its onboard CPU without a remote computer.
10 Slide 11. We now turn to the substitute claims, starting with
11 written description support. A disputed limitation of Claim 37 is shown.
12 Petitioners allege that the specification does not teach decision-making
13 based on the current image. The question is, where does Claim 37 say any
14 such thing? Claim 37 does not recite or require decision-making based on a
15 current image.
16 The selection is for a detection in the current image. Petitioners
17 read out this requirement. The confidence level used is not based on or
18 derived from the processing of the current image. So, making a selection is
19 not based on a yet-to-be-performed processing of the current image. It is
20 based on the processing of the immediately preceding image.
21 Slide 13. Petitioners also make a second argument that the
22 specification does not support using a confidence from the immediately
23 preceding image in an image-by-image processing, but this is also not true.
24 The specification discloses image analysis on a per spatiotemporal frame

1 basis, using different algorithms in alternate manner.
2 In this context, frame and image are used interchangeably. The
3 spatiotemporal analysis is performed continuously. For each frame, an
4 object prediction is obtained and also a confidence number is obtained,
5 which corresponds to performance score. For each frame, an active
6 processing scheme is then selected based on the performance score, that is,
7 confidence from the processing of the previous frame. The continuous
8 processing of frames on a per-frame basis that the specification describes is
9 the image-by-image decision-making using confidence from the
10 immediately preceding image as claimed.
11 Slide 14. Another limitation of Claim 37 is shown here.
12 Petitioners argue that a single threshold is different from and insufficient to
13 support two separate thresholds that can be equal. The claim language
14 covers two embodiments from the specification. For the first embodiment,
15 the specification describes a range and also two thresholds, a low threshold
16 and an activation number. Switching of a neural network happens when the
17 confidence falls outside of range. On the next slide, we will see the other
18 embodiment where the range can be defined by a single threshold.
19 Slide 15. In the second embodiment, failing to satisfy a threshold
20 means that the confidence is low, that is below the threshold, or high, that is
21 above the same threshold. So, here the range is defined by one threshold.
22 Claim 37 simply covers both embodiments by reciting a range defined by
23 the first threshold and a second threshold, where the second threshold can be
24 greater than or equal to the first threshold. This, as we saw, is fully

1 supported.
2 Slide 16. We will now discuss the alleged enablement issues.
3 Slide 17. Each of the independent substitute claims 21, 36, and 37, and
4 dependent Claim 25, recites a speed adjustment factor, or SAF. Claim 37
5 also recites the first and second thresholds for the confidence level.
6 Petitioners argue that these limitations are not enabled, but in arguing so,
7 they conflate selecting the best or the optimum values for the SAF, for the
8 thresholds which merely select useful functional values.
9 Throughout his declaration and deposition, Dr. Papanikolopoulos
10 also explained how the knowledge of the drone characteristic affect the
11 selecting of the best SAF. And this, he also explained, is a production-level
12 detail. Only the latter is required by the claims and by the enablement
13 requirement, not the former.
14 Slide 18. For the speed adjustment factors, the specification
15 provides more than adequate guidance. For example, curve shapes and
16 representative equations. Only to find the optimized or the best SAF, a
17 specific curve or specific values of equation constants may be necessary, and
18 then they may then depend on drone characteristics. They are not needed to
19 obtain one or more values that can be used simply to configure and operate
20 the drone as claimed.
21 For the thresholds, Petitioners argue that in the specification
22 -- Slide 19, I'm sorry. For the thresholds, Petitioners argue that in the
23 specification, there is, and I quote, "no guidance or examples of a first
24 threshold and second threshold defining a range set equal." This really is the

1 same written description argument they presented about the same limitation
2 we already discussed in discussing Slide 14 and 15. So, if the enable
3 argument is that there is no guidance for selecting specific threshold values,
4 that is a misleading argument.
5 As we see here in the excerpt, it identifies a particular range of
6 confidence level, which readily informs the feasible thresholds. By saying
7 that the confidence levels are normalized to values between zero and one, a
8 POSITA would surely understand that one or more thresholds too can be the
9 values in that range. Some such values may yield the best trade-off between
10 robustness and speed, but Claim 37 does not recite such an optimization.
11 Furthermore, Dr. Papanikolopoulos also explained that neural
12 networks report their confidence level, which has percentages. Any reported
13 value can be used as a threshold without extensive experimentation. Slide
14 20. I'm going to skip this slide for now in the interest of time. I may come
15 back to this later. So, we will now discuss the alleged indefiniteness issues.
16 Slide 23. Slide 24. Regarding the speed adjustment factors,
17 Petitioners make two arguments. In their opposition, they argue that the
18 meaning of a speed adjustment factor is unclear. In the surreply, they argue
19 that the specification does not explain how an SAF is determined. That
20 second argument is not really an indefiniteness argument; it is a lack of
21 enablement argument, as we already discussed on Slide 17 and 18.
22 Slide 25. Regarding the first argument, the meaning of an SAF,
23 the specification describes clearly what the speed adjustment factor means.
24 It describes a vector identifying a target's relative location, and that a factor

1 is used to control the speed based on direction or distance. So, it is clear that
2 an SAF is a vector element that specifies a speed modification.
3 I will skip this slide in the interest of time. I may come back to
4 this, if the time permits. Slide 27. Petitioners argue that Claim 37 is unclear
5 because it requires using a confidence from applying a neural network to a
6 current image before selecting the neural network to be applied to the
7 current image. This is a repetition of the argument they made in arguing
8 lack of written description support, as we discussed on Slide 12. Per Claim
9 37, the confidence level is for a detection in the current image, not from a
10 detection in the current image. This is clear from the claim language and is
11 fully supported, as discussed before.
12 We will now turn to the obviousness issues. For Claim 12, several
13 grounds are presented, but in all of them, Petitioners rely on Laufer, as
14 allegedly teaching the autonomously navigating limitation of Claim 12. We
15 will see next that Laufer does not teach this limitation according to its proper
16 construction. So, all of the Claim 12 grounds fail. We will also discuss the
17 other claims.
18 Slide 30. We discussed earlier the claim construction dispute. The
19 specification distinguishes between remote control operation, whether by a
20 human or by a computer, and autonomous, that is self-control operation
21 without a remote computer, which is what Claim 12 requires. Laufer central
22 controller is a ground-based remote controller that sends autopilot
23 commands via wireless communication. Laufer does not teach or suggest a
24 drone making its own navigation decisions, that is autonomous navigation.

1 Petitioners conflate making a navigation decision and executing
2 the navigation decision. If I understand correctly, as Judge Moore noted,
3 reacting to a received decision or a command is not making a decision.
4 Importantly, this does not eliminate reliance on continuous ground
5 communication because significant navigation decisions are still made by
6 the remote computer.
7 Petitioners also mentioned Dr. Singhose's article, but our
8 construction is not based on any extrinsic evidence. It is based on the
9 specification, which distinguishes between remote control and autonomous
10 navigation. Slide 31. Now moving to Claims 21 and 36. Claim 21 requires
11 an onboard multifunction ML model, and Claim 36 requires two onboard
12 neural networks having different parameters. Petitioners recognize that no
13 cited reference teaches or suggests onboard application of a multifunction
14 ML model or of two neural networks.
15 So, to allege obviousness, Petitioners rely on the teachings from at
16 least three and up to five references, but the multifunction ML model or the
17 selective use of two neural networks were entirely foreign concepts before
18 the '711 patent. No one at this time was even thinking of onboard use of
19 multifunction or multiple ML models. And as such, the proposed
20 combinations are more like amalgams and not combinations.
21 The teachings of their references just don't fit together, and the
22 combinations still miss certain claim elements. Contrary to Petitioner's
23 allegations, proposed combinations are far from simple programming and
24 combining well-known algorithms, as we will see. As a starting point, it

1 was well known before the '711 patent that due to their very large size and
2 computation burden, running an ML model or a neural network on a
3 conventional image processor, for example, a digital signal processor or a
4 CPU, is a significant challenge.
5 Petitioners note that the '711 patent mentions an image processor,
6 but '711 patent describes several different image processing algorithms too,
7 that are not ML models. Furthermore, the specification does describe the
8 GPU. Slide 32. Exhibit 2042 shows the computation burden of a neural
9 network as compared to the sort of algorithms Petitioner's references run on
10 their image processors or CPUs. It is roughly seven to several hundred
11 times greater. As such, running the claim ML model and neural networks on
12 these processors was well beyond a POSITA's capabilities, as we will see.
13 Slide 33. Researchers had already attempted running a neural
14 network on a conventional CPU, and they ran into several problems. For
15 example, the selection of a framework suitable for a CPU implementation is
16 necessary. And that selection itself can be a significant challenge. The
17 results of some choices can be terrible, and the processing speed can be too
18 slow.
19 Even if a POSITA were able to select a suitable framework, the
20 weights of the neural network then need to be ported to the selected
21 framework. That requires writing custom scripts and even further manual
22 adjustments. None of this was within the scope of a POSITA, as Dr.
23 Papanikolopoulos explains. Notably, Petitioner's expert says nothing about
24 how a POSITA would complete these complex tasks and expect to succeed.

1 Slide 34. Petitioners argue that Pierce teaches an onboard
2 implementation of a neural network. They refer to paragraph 42 and Figure
3 6 and allege that the embodiments depicted in Figure 6 is a drone system
4 600, that is a drone. The embodiment of Figure 6 includes an object
5 tracking module 615 that includes a neural network, but that embodiment
6 also includes an interface 611, which Petitioners did not acknowledge in
7 their analysis, as we can see here. Slide 35.
8 JUDGE ZECHER: Counsel, can we go back to that slide? Slide
9 34. But doesn't it say that the system 600 may be a drone? So, we know
10 that that's one embodiment of a drone, and it does include object tracking
11 module 615 that can run a neural network? Isn't that all that's required?
12 MR. WADEKAR: Yes, Your Honor. But if you notice, there is
13 additional language in that same paragraph, and we will get to that in just a
14 moment. That, I believe, will answer your question.
15 JUDGE ZECHER: Well, and feel free to proceed, and hopefully
16 you get to this, but I'm questioning why that additional language is relevant
17 to making that determination that this can run a neural network.
18 MR. WADEKAR: So, to give you a quick preview, the way
19 Pierce describes its neural network system is, first of all, in this embodiment,
20 it -- so there are two arguments here. First of all, as you can see in this
21 embodiment, even if this -- even if we assume that this system could be
22 onboard, we'll see on the next slide that the interface 611 is a terrestrial
23 interface, so it really cannot be on the drone. So, that tells us that when
24 Pierce talks about system 600 may be a drone, it is not talking about this

1 particular version of 600. That --
2 JUDGE ZECHER: But I guess, why is the interface relevant?
3 Isn't it the object tracking module that is on the system onboard the drone
4 that runs the neural network?
5 MR. WADEKAR: So, the argument there would be that we then
6 somehow exclude interface 611 from this embodiment and place the
7 remainder on the drone. So, if that is the argument, we have to see that in
8 the context of how Pierce actually describes this neural network system. So
9 then I will skip the next slide, which is about the interface being a wired
10 interface, but I will go to this slide.
11 So, here, Slide 36. Pierce tells us that its neural network system
12 operates as a streaming server. That system also has an interface 511, and I
13 don't have a slide for this, but the language of interface 511 is exactly the
14 same as that of 611. It's the same type of interface. And the key issue is
15 this, that the -- it operates as a streaming server, that is a server that
16 exchanges data with several clients, which requires high-bandwidth
17 terrestrial networks, the antithesis of an onboard drone device cut off from a
18 remote computer.
19 So, we believe that Pierce is clearly talking about a server platform
20 with terrestrial wired interfaces that cannot be integrated into the drone.
21 And then, as I just mentioned, now the last sentence of that same paragraph,
22 it says here that elements of the system 600 -- so it's the same system 600
23 -- can be separate components that include a server.
24 So, although Pierce showed one system and stayed in -- in the

1 same paragraph, it says that the system 600 can be a drone, but it does not
2 seem to tell us that exact system is a drone. Because then what is the
3 separate servers -- separate component system? That is also system 600,
4 which is a separate component system that has a server like the streaming
5 server of Pierce.
6 JUDGE ZECHER: I guess I'm failing to see the connection
7 because I was under the impression that Petitioner mapped it to the object
8 tracking module 615. And if we look at paragraph 45, it specifically says
9 that this object tracking module may be configured to process a neural
10 network detection system.
11 MR. WADEKAR: So, but that is the neural network. So, the
12 object tracking module has a neural network system, which is the neural
13 network system 500. So, what is contained in the object tracking module is
14 the neural network system 500, which is a streaming server. So, it is a
15 separate component. Object tracking module is not a small system, not a
16 small device. It is a neutral network system 500 that is actually a streaming
17 server.
18 JUDGE ZECHER: And you're saying it's separate and apart from
19 the system 600, so it's not onboard?
20 MR. WADEKAR: No, it is not separate and apart from 600. It is
21 an implementation and some embodiments, as it says, where various
22 elements of system 600 -- so, it is a part of system 600, but it corresponds to
23 a separate component. So, the drone is one component of that system and a
24 server is a different component of that system. So, the server is not on the

1 drone. That is what Pierce is telling us here.
2 JUDGE ZECHER: Okay.
3 MR. WADEKAR: And then ultimately, even if we get to this
4 aspect that even if you are -- so moving on to the next slide, it's interestingly
5 enough, Slide 37. Even if we assume for the sake of the argument that
6 Pierce's neural network is on board, it is not a multifunction neural network
7 or ML model that we discussed on Slide 5. Petitioners rely on several other
8 references that describe ML models for classification, but all of the proposed
9 combinations require combining different functionalities of different neural
10 networks, namely bounding box generation and classification, and even
11 different ML models, like support vector machines, or SVMs.
12 This was well outside the scope of a POSITA, as Dr.
13 Papanikolopoulos explained, not because bodily incorporation is required,
14 but because in each reference, the respective ML model is trained only for
15 one specified function. Therefore, a full retraining for all functionalities to
16 be provided is required. Such retraining is not a matter of pressing a button.
17 Starting from the scratch, that is from an untrained ML model, redefining all
18 the layers and connections and recomputing all of the weights based on the
19 collective set of all the functions that are to be implemented is what is
20 needed. This, in essence, is rebuilding the entire multifunction neural
21 networks. That Dr. Papanikolopoulos explained was outside the scope of a
22 POSITA.
23 JUDGE ZECHER: So, is your argument that training a neural
24 network to have these different functionalities like Laufer's classifier, Khan's

1 SMV classifier, Ning's ROLO, in addition to Pierce's, all put on -- say for
2 example, Pierce's neural network, is not something that a POSITA would
3 know how to do?
4 MR. WADEKAR: Yes, Your Honor, because for example, think
5 about a skilled surgeon who is a brain surgeon and who obviously
6 understands about nerves, and also an equally skilled surgeon who is a
7 dermatologist and performs dermatology also understands nerves. But to
8 say that one -- the knowledge of one surgeon can simply be incorporated
9 into that of another surgeon is not straightforward.
10 Now, neural networks are even today, perhaps not as sophisticated
11 as brain surgeons. I will admit to that, but the way the training of a neural
12 network works -- and I asked this question to Dr. Papanikolopoulos, and he
13 explains that you have to start with a training set, a comparison set, or a
14 verification set, and the developer of the neural network has to come up with
15 examples, counterexamples, and then train those. And he mentions in his
16 expert report that when you do this for multiple functionalities, now the
17 weights that will work for one kind of training may affect the other one. So,
18 it begins to affect their performance accuracy. So, this becomes a pretty
19 challenging task to train a neural network for these different functionalities.
20 JUDGE ZECHER: It sounds like you're saying there are certain
21 trade-offs with training the neural network, but does that preclude an
22 obviousness finding of basically saying that you could train it to have these
23 different functionalities?
24 MR. WADEKAR: This requires particular domain knowledge of

1 how to train. So, because the prerequisite is to come up with the required
2 test set, come up with the required verification set, and these references
3 certainly don't say anything about that. And it is not readily accessible to a
4 POSITA. So, for somebody reading Pierce, for example, what Pierce tells
5 you, gives you a neural network that will give you a bounding box.
6 But now, how would you perform classification? If you look at
7 Laufer, Laufer will give you a neural network that tells you how to perform
8 classification. But what will you extract from that teaching? The
9 knowledge of the neural network itself is hidden within the neural network.
10 It is not going to print it out or provide it in any transportable form. So,
11 where you have to start now is you have to start with the classification
12 problem that you were trying to solve.
13 So, what are we trying to classify? Are we trying to classify
14 between dogs and cats, or are we trying to classify between commercial jets
15 and drones, or are we trying to classify between small fixed-wing drones and
16 rotor drones? So, all that, based on the classification that you need to train,
17 you need to then build your training set, build your verification set, and do
18 this training repeatedly while also training for the bounding box that is also
19 needed. So, all this doing together, Dr. Papanikolopoulos believes, is still
20 within the -- outside the scope of a POSITA.
21 JUDGE ZECHER: Does the '711 patent describe how you go
22 about training your neural network to generate all these different
23 functionalities?
24 MR. WADEKAR: It mentions using training sets and -- collecting

1 training sets directly from the drone itself. So, it suggests that the whatever
2 a drone is seeing, is used to train its operation. So, in that sense, it provides
3 that --
4 JUDGE ZECHER: Well, I mean, aren't most neural networks -- I
5 mean, I can't say this as an absolute statement, but you have to have a
6 training set to train a neural network, right? I mean --
7 MR. WADEKAR: Yes, yes, but how to train a neural network is a
8 job for computer scientist experts.
9 JUDGE ZECHER: I get what you're saying, but I guess I don't see
10 the detail in the '711 patent of how you're training your neural network. And
11 to hold this proposed obvious combination to some higher level seems odd
12 to me. It seems like that's what a POSITA would know how to do, because
13 your own patent doesn't even describe how to do it that way.
14 MR. WADEKAR: I would only say that what the '711 patent
15 describes is that it mentions using data from the drones. So, that required
16 data would be a part of the data that is actually used to collect the -- to
17 generate the training sets and verification sets.
18 JUDGE ZECHER: Okay.
19 MR. WADEKAR: Thank you, Your Honor. So, I will skip this
20 slide in the interest of time. So, now moving to Claim 36. Claim 30, Slide
21 39. So, Claim 36 recites two neural networks. The first one having a greater
22 compute cost than the second one, as we discussed on Slide 6. Petitioners
23 rely on Beard's and Pierce's processors for running not one, but two neural
24 networks. But as discussed before for Claim 21, the POSITA would know

1 that this to be extremely challenging and likely to fail.
2 So, here we are not combining multiple functionalities but actually
3 running two different neural networks. So then correspondingly, the
4 problem of selecting a suitable platform, adjusting the weights, they
5 compound. Petitioners rely on Ning to show the two claimed neural
6 networks.
7 Slide 40. The first problem with Ning is that it has only one neural
8 network. Ning actually says so, as we can see, the disclosed network and a
9 single network evaluation. And Figure 3 demonstrates this. A single neural
10 network called ROLO, which is shown here, receives visual inputs and
11 provides predictions. And furthermore, Ning's structure explains this.
12 Ning's ROLO uses a YOLO structure and an LSTM structure as
13 components that are inextricably coupled. It is not just the final output of
14 the YOLO that is received, as Figure 3 may indicate here, but the LSTM
15 also depends on additional intermediate results, as the purple highlighting
16 shows.
17 We skip Slide 41. And on Slide 42, there is another problem with
18 Ning. If we somehow try to take the single neural network ROLO and break
19 it up into two neural networks, YOLO as the alleged first neural network
20 And the LSTM as the alleged second one, their relative compute costs are
21 the opposite of what is claimed.
22 Why? Because per Claim 36, each of the two neural networks can
23 process an image independently without needing as an input an output from
24 applying the other neural network to that same image. In Petitioner's two

1 alleged neural networks, however, only the YOLO can process an image
2 independently. The LSTM cannot process any image independently, that is
3 without the outputs from the YOLO for that image. As such, the LSTM
4 compute cost must be cumulative of the YOLO's compute cost, and thus is
5 greater than the YOLO's, which is the opposite of what is claimed.
6 Slide 43. Moreover, even if we compare the YOLO's compute cost
7 for the processing an image with the LSTM compute cost for its subsequent
8 computations, as the Petitioners would have us do, those costs are still the
9 opposite of what the claim requires. The literature tells us so, as we will see.
10 As an aside, Petitioners state that Patent Owner incorporated this
11 argument by reference to the expert declaration, but this is not true. Our
12 reply, as shown here, makes this very point and pin cites references. Cost
13 and refresh rate are inversely related, and Petitioner's expert agrees. The
14 YOLO refresh rate of 45 frames per second is higher than that of the LSTM
15 at 12 frames per second.
16 So, as the reply states, the YOLO cost is less, which is the opposite
17 of what Claim 36 recites. Dr. Papanikolopoulos explains why the results
18 from two cited references are comparable. Slide 44. No prior art grounds
19 are asserted against Claim 37. So, in conclusion, before the inventors of the
20 '711 patent, no one had thought of the key breakthroughs required to enable
21 truly autonomous end-to-end navigation.
22 Specifically, no one had previously thought of what is set out in
23 Claim 1, which is the multifunction ML module, or in Claims 36 and 37,
24 which is a multi-neural network system for different functions. So, all of

1 these features made end-to-end autonomous navigation without a remote
2 computer possible, as mentioned in Claim 12. So, if the Board has any
3 questions, I'm happy to answer them. And I'll reserve the remaining time.
4 Thank you.
5 JUDGE ZECHER: No questions from us.
6 JUDGE GROSSMAN: Yeah, I have a question. It wasn't an issue
7 you addressed, but it relates to claim construction in your patent. And every
8 time you use the phrase autonomous, and as you come up with a specific
9 construction in your papers, you refer to also it could be semi-autonomous.
10 MR. WADEKAR: Yes. Yes, Your Honor.
11 JUDGE GROSSMAN: And so, when you're telling us in your
12 argument autonomous, do you include that it can be autonomous or semi-
13 autonomous, or are you excluding semi-autonomous?
14 MR. WADEKAR: I'm excluding semi-autonomous. Those are
15 three different ways. So, in the interest of time, I did not discuss that in the
16 slides, but the patent describes autonomous when -- where everything, all
17 decisions are made by the drone. Semi-autonomous, where the drone CPU
18 provides some guidance to the remote controller, and then the remote
19 controller makes the rest of the decisions. And remote, which could be
20 either human or computer-based. The patent does not mention that, it just
21 simply calls it remote, where all of the decisions are coming from outside.
22 So, those are three different versions. So, autonomous is when all of the
23 decisions made by the drone's own CPU.
24 JUDGE GROSSMAN: Right. And I think your proposed

1 construction is the navigation decisions are made without outside control.
2 MR. WADEKAR: Outside control, yes.
3 JUDGE GROSSMAN: You're giving up on the semi-autonomous.
4 MR. WADEKAR: That is correct, Your Honor.
5 JUDGE GROSSMAN: Thank you.
6 MR. WALTERS: Thank you.
7 MR. WADEKAR: Thank you. Thank you, Your Honors.
8 MR. WALTERS: Thank you, Your Honor. I'd like to address a
9 few points, and I think my colleague, Mr. Barazesh, is going to address a
10 few points on the prior art. I'm showing here Patent Owner's Slide 7. Patent
11 Owner's Slide 7 here states that autonomous navigation in Claim 12 avoids
12 need for human control and reliance on continuous ground communication.
13 So, even this acknowledges that there could be some ground control for
14 autonomous navigation.
15 And Patent Owner also refers to a problem identified in the
16 background that communication between the aerial vehicle and the ground
17 could be lost or unreliable as supporting its construction of autonomous. But
18 that problem is actually solved elsewhere in the patent. So, at the bottom of
19 column 11 of the patent, it discusses the UAV communicating with other
20 UAVs to act as intermediaries. And at line 59, column 11, the patent states
21 that, as an example, that another UAV may act as an intermediary between
22 UAV-301 and a remote server.
23 UAV-301 may be out of range from the remote server to
24 communicate using its antennas, but another UAV may be in range to

1 communicate with UAV-301 and in range to communicate with a remote
2 server. So, the patent discusses UAV 301 communicating with the other
3 UAV, which may forward data to the remote server. That solves the issue of
4 the lost or unreliable communication, and it would still be communicating
5 with other UAVs in that regard.
6 Turning to the issue of the enablement of determining a speed
7 adjustment factor, and Patent Owner made an issue about there doesn't have
8 to be specific examples provided in the specification. And our argument is
9 not necessarily that there's no specific values. It's that there's nothing about
10 what those values could be, what A, B, and C could be, or how they can be
11 selected. And because of that, it would require an extreme amount of undue
12 experimentation for one of skill in the art to even understand how you would
13 determine a speed adjustment factor.
14 Again, it's not just adjusting a speed adjustment factor or using a
15 speed adjustment factor. The claim actually requires you to have to
16 determine a speed adjustment factor. I'll turn it over to my colleague, unless
17 you have additional questions.
18 MR. BARAZESH: All right. Thank you, Your Honors. Just a
19 few points. So, I think Petitioner's view on this is that the Patent Owner is
20 overcomplicating our combinations and holding us to a level higher than
21 required to find obviousness. The first point, Patent Owner is just ignoring
22 the explicit teachings of the prior art. In our view, the Pierce reference is
23 clear that the drone system 600, it clearly says it can be implemented as a
24 drone 102. And you'll notice that when I presented on this point, I added a

1 little bit of -- I noted a bit of the disclosure in Pierce about some of those
2 other components in that drone system. Those components include a
3 velocity detector, global positioning system, the object tracking module, the
4 laser tracking module.
5 If you look at paragraph 45 -- actually, excuse me, paragraph 46, it
6 explains that the velocity detector 613 may be used to determine the velocity
7 of drone system 600. So, clearly, the examples provided and disclosure
8 appears contemplates that drone 600 is a drone, and the object tracking
9 module is one of the components of that drone that's implementing the
10 onboard neural networks.
11 My next point, just on the combinations, I think we heard some
12 arguments about how there'd be a lot of effort involved in combining these
13 references and implementing this on an onboard image processor. Pierce
14 talks about -- going back to the arguments in Pierce -- how various neural
15 networks, and that's a quote from Pierce, are implemented by the object
16 tracking module 615 that's onboard the drone.
17 So, just in view of that, our combination, how it's laid out, that
18 onboard neural network disclosure in Pierce. Beard also has a UAV that's
19 performing onboard processing of subjects in images. And then the Ning
20 reference talks about how it's also implementing onboard neural networks.
21 Now, Ning teaches that can be onboard an autonomous vehicle. That's the
22 Ning disclosure. So, in our view, the combination of teachings there meets
23 the claims.
24 Regarding Khan and Kumar, I think our view on that is that it's -- I

1 mentioned it earlier -- it's a bodily incorporation. Trying to pull all these
2 details that aren't necessarily part of our combination into the combination.
3 And as I mentioned, the different ways in which the bounding boxes and the
4 classification is implemented in those references would have been
5 understood and recognized by a POSITA applicable to these systems
6 onboard, which is provided by the Pierce reference.
7 The last point I'd like to make is on the YOLO and LSTM
8 distinction that Patent Owner mentioned. Our view, as we explained in the
9 opposition supported by Dr. Singhose, is that we align with the Patent
10 Owner's own disclosure of what the first neural network and the second
11 neural network would be. I think we've kind of talked about clarity here and
12 what some of these terms mean. And I think we looked at their specification
13 to see what we could -- how we could meet the claims, and we found that in
14 the prior art. So, with that, I'll conclude my presentation.
15 JUDGE ZECHER: Thank you very much. Appreciate it. Patent
16 Owner, you only have a few seconds left, but I'll give you a minute to wrap
17 up.
18 MR. WADEKAR: Thank you, Your Honor. So, quickly, the
19 Petitioners mentioned Slide 7, about the continuous communication, but
20 receiving simply a destination location is not receiving a navigation control
21 or navigation decision. Then with respect to the speed adjustment factors,
22 what the claims also say is that all the patent describes and the claims
23 require is to go slow when the direction is large -- direction deviation is
24 large, and go faster when the distance is -- go faster when the distance is

1 large. So, that's all that is required. So, that does not require any complex
2 computations. That's the last point.
3 And for Ning's system, it mentioned it's a road vehicle. It's not at
4 all a drone. And then the last point that Counsel made was they map it to
5 our neural networks in the terms of functions. So, the YOLO is used for
6 object detection and the LSTM is used for tracking. That's true, but the way
7 they operate and the way their structure is, and because of their computation
8 speeds are entirely different. So, it does not match to the Group 1 and Group
9 3 different neural networks that the specification explicitly discloses, it
10 doesn't match to that. Thank you, Your Honor.
11 JUDGE ZECHER: Thank you, Counselor. All right, that
12 concludes our hearing today for '525, '530, and the '629 cases. We did want
13 to thank the parties for being flexible with oral argument date, given that we
14 had an issue on our end. So, thank you guys for being accommodating to us.
15 We really do appreciate that. All three cases are submitted, and we'll issue a
16 final written decision before the statutory deadline. We'll also get back to
17 you on the *Dental Monitoring* issue and whether or not further briefing is
18 going to be required. Thank you.
19 JUDGE GROSSMAN: Protective order issue?
20 JUDGE ZECHER: No, no protective order issue in the motion.
21 (Whereupon the above-entitled matter went off the record at 4:21
22 p.m.)

PETITIONER:

Chad Walters
Harrison Rich
Joseph Grado
Ellyar Barazesh
BAKER BOTTS L.L.P.
chad.walters@bakerbotts.com
harrison.rich@bakerbotts.com
andrew.grado@bakerbotts.com
ellyar.barazesh@bakerbotts.com

PATENT OWNER:

Suhrid Wadekar
James Hall
PRINCE LOBEL TYE LLP
swadekar@princelobel.com
jhall@princelobel.com

Matthew Vella
mvella@vellapatentservices.com