

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Digital Global Systems, Inc.,
Petitioner,

v.

DeepSig, Inc.,
Patent Owner.

IPR2025-00194

U.S. Patent No. 11,777,540

PETITIONER'S REQUEST FOR DIRECTOR REVIEW

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Petitioner Digital Global Systems, Inc. (“DGS” or “Petitioner”) requests Director review of the Board’s May 28, 2025 Decision denying Institution of *Inter Partes* Review. Paper 10 (the “Decision”). 37 C.F.R. § 42.75(a) (permitting requests for Director review of decisions on institution under 35 U.S.C. § 314). The Decision rests on a misinterpretation of what the claims require and of Petitioner’s arguments on the disclosures of Jüschke and Holt that merit reversing that Decision.

I. INTRODUCTION

Petitioner challenged claims 1-10, 12-14, and 16-22 and Patent Owner disclaimed claims 1-3 and 7-10. This left claims 4-6, 12-14, and 16-22, of which only claim 12 is an independent claim. Claims 4-6 depend from disclaimed independent claim 1. Claims 13-14 and 16-22 depend from independent claim 12.

Focusing on claims 4 and 12 for purposes of this argument, the Decision appears to interpret claim 4 as requiring use of “a signal *received* at a receiver.” (Decision at 7 (*italics in original*), 12 (*same*), 13 (*same*); *see also id.* at 14 ([c]laim 12 recites limitations similar to those discussed above for claim 4”).) That is, the Decisions appears to interpret claims 4 and 12 as requiring use of **actual** transmissions as opposed to **modeled** transmissions. But neither claim 4 nor claim 12 requires using an **actual** signal “received at a receiver.” (*Cf.* Decision at 6-7 (interpreting claim 4).) Instead, each claim uses a **modeled** received radio signal to determine the “distance metric,” which is then used to update the claimed nonlinear

pre-distortion machine learning model.¹ When properly interpreted, the Board admits that Holt teaches the relevant limitation by stating that Holt “teach[es] training an encoder model based on a loss of function computed using a modeled signal.” (Decision at 13.) This is indeed what Holt teaches, and it is what claims 4 and 12 require.

The Board correctly determined that Petitioner met the standard for institution for claim 13. Namely, the Board determined that Petitioner “may satisfy its burden for claim 13,” Decision at 5 and 16, because “for claim 13, Petitioner relies on Holt’s embodiments that include a channel *model*, rather than the embodiments that include an *actual* communication channel,” *id.* at 15 (emphasis added). Despite this, the Board denied institution because it found that instituting trial on one of 13 total claims would be an inefficient use of the Board’s time and resources. (Decision at 17.) Respectfully, this was an abuse of the Board’s discretion.

Because the Board already determined that trial could be instituted on claim 13 and acknowledged Petitioner’s arguments that Holt teaches training an encoder

¹ The Board appears to acknowledge this interpretation for independent claim 12, *see* Decision at 14, n.3, but determines that claim 4 requires use of actual received signals, *e.g.*, *id.* at 7.

model based on a loss of function computed using a **modeled** signal as the claims require, the Decision should be reversed and trial should be instituted.

II. LEGAL STANDARD

“Requests for Director Review of a Board’s decision on institution under 35 U.S.C. §§ 135, 314, or 324, or decisions granting rehearing of such a decision, shall be limited to decisions presenting (a) an abuse of discretion, (b) important issues of law or policy, (c) erroneous findings of material fact, or (d) erroneous conclusions of law.” See USPTO, Director Review Process at 2.B, Availability of Director Review: Proceedings under part 42 of 37 C.F.R. (last modified March 18, 2025), <https://www.uspto.gov/patents/ptab/decisions/director-review-process#RIDRP>.

“An abuse of discretion is found if [a] decision: (1) is clearly unreasonable, arbitrary, or fanciful; (2) is based on an erroneous conclusion of law; (3) rests on clearly erroneous fact finding; or (4) involves a record that contains no evidence on which the Board could rationally base its discretion.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016) (quoting *Bilstad v. Wakalopulos*, 386 F.3d 1116, 1121 (Fed. Cir. 2004) (citations omitted)).

Here, the Board interpreted claims 4 and 12 incorrectly, which led it to abuse its discretion in denying institution.

III. ARGUMENT

Respectfully, the Board denied institution because it incorrectly determined

that claim 4 requires using ***actually received*** transmissions to determine the claimed “distance metric” for updating the machine learning model, Decision at 7, and criticized Petitioner for relying on portions of Holt that teach using a ***modeled*** signal, *id.* at 13. While the Board refers to the same reasoning with respect to claim 12, it also appears to reverse course in footnote 3 by stating that “Petitioner only proposes modifying Jüscke to include ‘Holt’s loss functions based on ***actually*** received transmissions’” instead of using a ***modeled*** signal as claim 12 “may be interpreted to cover.” (Decision at 14 (emphasis added).) The Board’s reasoning is not only internally inconsistent, it is contrary to the plain reading of the claims and to Petitioner’s arguments.

A. The Board incorrectly determined that claim 4 requires using a signal actually transmitted and received.

Respectfully, the Board’s interpretation of claim 4 is incorrect. Referring to limitations [4A], [4B], and [4C], the Board summarily states that “[t]his portion of claim 4 requires updating the model’s parameter values based on a distance metric computed using a signal ***received at a receiver***” (Decision at 7 (emphasis added)), and, “together [with limitation [1C]], these portions of claim 4 require updating parameter values for a model that processes a *transmit* signal (i.e., a transmit model) based on a distance metric computed using a signal *received* at a receiver” (*id.* (italics in original).) The Board then concluded that Petitioner did not meet the standard for institution because it did not show that the Jüscke and Holt combination “teaches

or suggests updating parameter values for a transmit model based on a distance metric computed using a signal ***received at a receiver***.” (Decision at 7-8 (emphasis added).)

The Board’s reasoning for that conclusion is revealing. Specifically, the Board stated that “[t]he portions of Jüschke ***cited by Petitioner*** teach updating parameters for a model that processes a transmit signal based on a difference computed using a ***transmitted*** signal, not a ***received*** signal.” (Decision at 9 (emphasis added).) According to the Board, “Jüschke’s ***transmitted*** signal is [not] ‘the same’ as a ***received*** signal” because a signal ***received at a receiver*** “accounts for the ***actual effects*** of the transmission, channel, and reception.” (Decision at 9 (emphasis added) (citing Pet. at 60, Ex. 1003, ¶233).) Taken together, the Board seems to be indicating that its interpretation of claim 4, which the Board states requires a “signal ***received*** at a receiver,” must account for “***actual effects*** of the transmission.”

Similarly, with respect to Holt, the Board states that “[t]he portions of Holt ***cited by Petitioner*** teach training an encoder model (i.e., a model that processes a transmit signal) based on a loss function computed using a ***modeled signal***, not a signal ***received at a receiver***.” (Decision at 12-13 (emphasis added).) Based on this, the Board concluded that Petitioner did not meet the standard for institution because it did not show that Holt uses a signal “***received*** at a receiver.” (Decision at 13

(emphasis added).) Thus, the Board again distinguished “a modeled signal” from its interpretation of claim 4 as requiring “a signal received at a receiver.” (*Id.*) Accordingly, the Board reasoned that Petitioner did not meet the standard for institution because claim 4 requires a signal actually received, but Petitioner relied on portions of Jüscke and Holt that teach using a modeled signal.

For claim 12, the Board referred to its conclusions and reasoning for claim 4. (Decision at 14-15.) Curiously, however, the Board then seems to offer contradictory reasoning in footnote 3. That is, though the Board criticized Petitioner for citing portions of Jüscke and Holt that refer to **modeled** received signals when claims 4 and 12 supposedly require signals **actually received** at a receiver, *see* Decision at 7-9 (Jüscke), 12-13 (Holt), it then states in footnote 3 that “[t]o the extent claim 12 may be interpreted to cover updating model parameter values based on a distance metric computed using a **modeled** signal,” “Petitioner only proposes modifying Jüscke to include ‘Holt’s loss functions based on **actually received** transmissions,’” Decision at 14, n.3 (emphasis added). Thus, on the one hand, the Board criticizes Petitioner for using evidence directed to **modeled** signals when it interprets the claims to require **actual** signals, and on the other hand, criticizes Petitioner for using evidence directed to **actual** signals when it interprets the claim to cover **modeled** signals. Respectfully, this heads we win, tails you lose approach is inappropriate.

B. Claims 4 and 12 require use of a modeled received signal.

The Board used claim 12 as an illustrative claim in the Decision:

12. A method comprising:
obtaining a transmit radio signal;
accessing a nonlinear pre-distortion machine learning model, wherein the nonlinear pre-distortion machine learning model includes model parameters and at least one nonlinear function to correct radio signal distortion;
generating a pre-distorted radio signal by processing the transmit radio signal using the nonlinear pre-distortion machine learning model;
processing the pre-distorted radio signal, including adding at least one of distortion or interference to the pre-distorted radio signal, to obtain a received radio signal; and
updating the model parameters based on a distance metric computed between the transmit radio signal and the received radio signal.

(Decision at 3 (citing Ex. 1001, 15:45-61).) In short, the plain reading of claim 12 requires the claimed “received radio signal” to be derived (*i.e.*, modeled) from the claimed “transmit radio signal.” Under this proper interpretation, the Board acknowledged that the Jüscke and Holt combination teaches use of modeled signals, which should have resulted in the Board instituting trial. (Decision at 9, 12-13.)

Moving limitation-by-limitation, claim 12 first obtains a “transmit radio signal” and “process[es]” that signal into a “pre-distorted radio signal” using the “nonlinear pre-distortion machine learning model.” (Ex. 1001, 15:46-54.)

That “pre-distorted radio signal” is then further “process[ed],” such as by

“adding at least one of distortion or interference.” (*Id.*, 15:55-58.) Through this processing—which, again, starts with the “transmit radio signal”—a “received radio signal” is obtained. (*Id.*)

Notably, claim 12 does not require obtaining a “received radio signal” that was **actually transmitted** and **received** at a receiver, as the Board contends. (*E.g.*, Decision at 7 (discussing claim 4), 14-15 (referring to the same reasoning for claim 12).) Instead, according to the plain language of claim 12, the “received radio signal” that is “obtain[ed]” in claim 12 is based on processing the claimed “transmit radio signal.” That is, the claimed “received radio signal” is a **modeled** signal derived from processing the “transmit radio signal” through the machine learning model and, *e.g.*, adding interference or distortion to it. There is no requirement in claim 12 that the “received radio signal” actually be transmitted and received and thus suffer from actual environmental distortions (*e.g.*, linear, nonlinear, or interference). The claim instead requires obtaining a “received radio signal” through processing the “transmit radio signal.”

Lastly, the “distance metric” is “computed” by using the “transmit radio signal” along with the **modeled** “received radio signal.” (Ex. 1001, 15:59-61.) Taken together, claim 12 uses a **modeled** received signal to compute the distance metric and update the machine learning model.

Claim 4’s use of a **modeled** received signal is more conspicuous than in claim

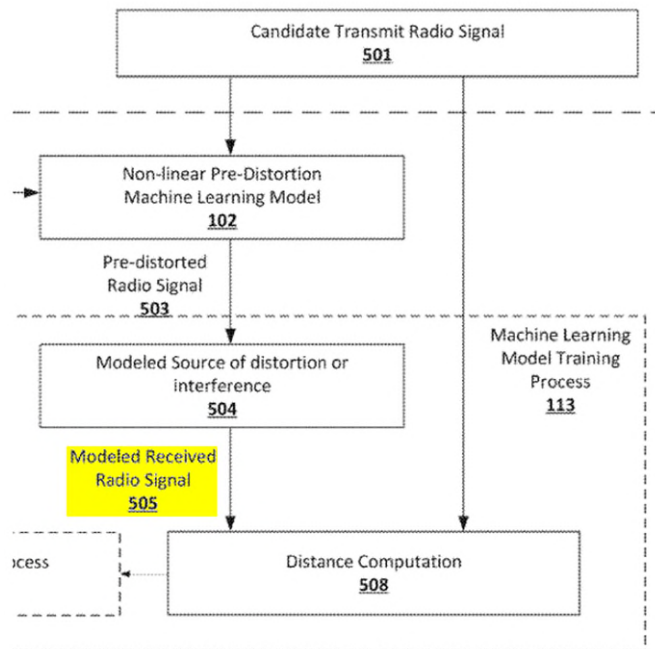
12 because claim 4 explicitly refers to a “**representation**” of a received signal that is, again, based on a transmit signal:

4. The method of claim 2, further comprising:
obtaining a received radio signal that **corresponds to a representation of** the transmit output radio signal received at the one or more radio receivers;
determining a distance metric between the transmit radio signal and the received radio signal; and
updating the values of the model parameters for the particular deployment scenario based at least on the distance metric.

(Ex. 1001, 15:3-11.) Thus, claim 4 also requires a **modeled** (*i.e.*, a “representative”) received signal that is derived from a transmit radio signal, similar to claim 12.

The Board does not address the fact that claim 4 requires the received signal to be “a representation of” the transmit signal received at a receiver. Instead, it skips over this explicit term and concludes that claim 4 requires a “received radio signal” to be a signal “received at the one or more radio receivers.” (Decision at 7.) Respectfully, the plain reading of claim 4 does not support the Board’s interpretation.

The specification supports Petitioner’s plain reading of claims 4 and 12. As one example, Fig. 5 outlines an embodiment corresponding to the processes claimed in claims 4 and 12 and refers to a “Modeled Received Radio Signal 505:”



(Ex. 1001, Fig. 5A; *see also id.* at 9:48-56.)

C. Petitioner argued that the Jüschke and Holt combination teaches using a modeled received signal.

Respectfully, the Board acknowledges in its Decision that Petitioner made the proper arguments to at least meet the standard for institution for claims 4 and 12. (Decision at 9, 12-13.) For example, with respect to Jüschke, the Board acknowledges in its Decision that Petitioner cited portions that “teach updating parameters for a model that processes a transmit signal based on a difference computed using a transmitted signal, not a received signal.” (Decision at 9 (citing Pet. 61-64; Ex. 1005 ¶¶ 17, 18, 48, 49, 72, Figs. 4, 6).) As discussed above, the plain reading of each of claims 4 and 12 requires the claimed “received radio signal” to be processed from (*i.e.*, modeled from) the claimed “transmit radio signal.”

Additionally, for Holt, the Board acknowledged that Petitioner cited portions that “teach training an encoder model (i.e., a model that processes a transmit signal) based on a loss function computed using a modeled signal, not a signal received at a receiver.” (Decision at 12-13 (citing Pet. 10-12, 48-58, 61-66; Ex. 1006, code (57), 4:4-7, 5:45-51, Fig. 3); *see also id.* at 13 (“But the portions of Holt cited by Petitioner teach training an encoder model based on a loss function computed using a modeled signal, not a signal received at a receiver.”).)

Thus, based on the Board’s own acknowledgement of what Petitioner argued, Petitioner established that the Jüschke and Holt combination teaches processing a transmit signal into a modeled received signal and using the transmit signal and the modeled received signal to compute a loss function, which is what claims 4 and 12 require. Contrary to the Board’s decision, then, Petitioner showed that there was a reasonable likelihood that that it would prevail with respect to at least 1 of the claims

challenged in the Petition and trial should have been instituted. 35 U.S.C. § 314(a).²

D. The Board correctly determined that Petitioner met the standard for institution for claim 13.

The Board concluded that Petitioner met the standard for institution, then denied the Petition anyway.

More specifically, claim 13 depends directly from independent claim 12 and states that “processing the pre-distorted radio signal comprises generating the received radio signal using a modeled source of distortion or interference.” (Ex. 1001, 15:62-65.) There are two things to note about claim 13. *First*, it refers to “**generating** the received radio signal,” which reinforces an interpretation that claim 12 relies on a modeled received signal instead of a signal actually transmitted and received. *Second*, the term “modeled” in claim 13 modifies only the “source of distortion or interference,” which does not foreclose interpreting claim 12 to require a modeled received radio signal. Instead, the claim language narrows the source

² Petitioner refers only to claims 4 and 12 here because those claims were the basis of the Board’s Decision. As set forth in the Petition, however, Petitioner believes it has met the standard for institution for claims 5-6, 13-14, and 16-22 as well. In fact, Patent Owner chose to disclaim claims 1-3 and 7-10 instead of dispute Petitioner’s arguments.

from which the distortion or interference may be chosen.

Additionally, the Board correctly notes that “Petitioner relies on Holt’s embodiments that include a channel model, rather than the embodiments that include an actual communication channel.” (Decision at 15 (citing Pet. 71-74).) For this reason, the Board determined that “Petitioner may satisfy its burden for claim 13.” (Decision at 16.)

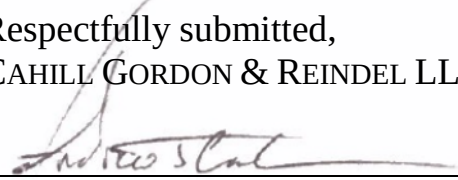
Yet, according to the Board, meeting the standard for institution for one out of 13 claims—despite meeting the literal statutory standard for institution under Section 314(a)—would not have been “an efficient use of the Board’s time and resources.” (Decision at 17.) This determination was based on the Board’s analysis of claims 4 and 12. As shown above, however, Petitioner met the standard for institution of claims 4 and 12, as properly interpreted. Accordingly, the Board’s decision to deny institution should be reversed.

IV. CONCLUSION

The Board denied institution based on errors of fact and law, including improperly limiting the claims to using a signal actually transmitted and received, and overlooking Petitioner’s arguments and evidence proffered with respect to Holt and its combination with Jüschke. It is respectfully requested that the Director reverse the Board’s decision and institute trial.

Dated: June 27, 2025

Respectfully submitted,
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CERTIFICATE OF SERVICE

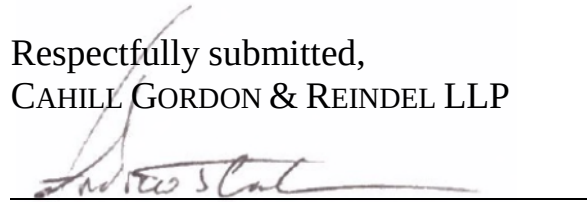
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