

NOTE: This disposition is nonprecedential.

**United States Court of Appeals
for the Federal Circuit**

METROM RAIL, LLC,
Appellant

v.

**SIEMENS MOBILITY, INC., HITACHI RAIL GTS
USA INC., FKA GROUND TRANSPORTATION
SYSTEMS USA INC., HUMATICS CORP., PIPER
NETWORKS, INC.,**
Cross-Appellants

2024-2223, 2024-2236, 2024-2264

Appeals from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in Nos. IPR2023-
00468, IPR2023-00470.

Decided: May 11, 2026

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NICOLE CUNNINGHAM, Vanguard Crest P.C., Washington, DC, for cross-appellant Piper Networks, Inc. Also represented by STEVEN A. MOORE.

Before DYK, MAYER, and TARANTO, *Circuit Judges*.

Opinion for the Court filed by *Circuit Judge* DYK.

Opinion concurring-in-part and dissenting-in-part filed by *Circuit Judge* TARANTO.

DYK, *Circuit Judge*.

Siemens Mobility, Inc., Hitachi Rail GTS USA Inc., Humatics Corp., and Piper Networks, Inc. (collectively, “petitioners”) jointly petitioned for inter partes review of U.S. Patent Nos. 9,043,131 (’131 patent) and 8,812,227 (’227 patent), both of which are owned by appellant Metrom Rail, LLC (“Metrom”). The Patent Trial and Appeal Board (“Board”) instituted review on both patents.

In the final written decisions, the Board determined that all claims of the ’227 patent and claims 1–16 of the ’131 patent are unpatentable as obvious and that claims 17–20 of the ’131 patent are not unpatentable as

METROM RAIL, LLC v. SIEMENS MOBILITY, INC.

3

obvious over the prior art references cited in the petitions. Metrom appeals the Board's unpatentability determinations as to all claims of the '227 patent and claims 1–16 of the '131 patent; the petitioners cross-appeal the Board's determinations that claims 17–20 of the '131 patent are not unpatentable.

With respect to the main appeal, we *affirm* the Board's determination that all of the claims of the '227 patent and claims 1–16 of the '131 patent are unpatentable. As to the cross-appeal, we *reverse* the Board's determination that claims 17–20 of the '131 patent are not unpatentable.

BACKGROUND

The '131 patent and '227 patent, which are derived from the same parent application and share a common specification in all relevant respects, relate to collision-avoidance systems in the railroad industry. The claimed collision-avoidance systems in the '131 and '227 patents use sensor technologies such as ultra wideband (“UWB”) sensing technology and global positioning systems (“GPS”) to “reliably track the location and speed of vehicles and the distance between vehicles over a wide variety of track and terrain.” '131 patent, abstract.¹ Both patents claim a priority date of May 19, 2011.

Petitioners filed petitions for inter partes review of the '131 patent and the '227 patent, arguing all claims were unpatentable as obvious over multiple proposed prior art combinations. The primary prior art reference relied on in both petitions was U.S. Patent No. 6,759,948 (“Grisham”) (issued July 6, 2004), which petitioners relied on for each ground of obviousness asserted in both petitions. Grisham discloses a collision-avoidance system in the railroad industry using UWB sensing technology. Petitioners relied

¹ Unless otherwise noted, we cite to documents in the '131 patent inter partes review proceeding.

on Nixon, Int'l Pub. No. WO 03/009254 A1 ("Nixon") (filed July 16, 2002) (published Jan. 30, 2003), which also discloses a collision-avoidance system, for the GPS functionality. The Board instituted review on all claims of both patents.

In the final written decisions, the Board concluded that each claim of the '227 patent and claims 1–16 of the '131 patent are unpatentable as obvious and rejected Metrom's contentions that secondary considerations of nonobviousness established the patentability of the claims, that certain limitations related to location tracking were not disclosed in the prior art, and that there was no motivation to combine the prior art references relied on by petitioners. However, the Board determined that independent claim 17 of the '131 patent and dependent claims 18–20 were not unpatentable as obvious because Grisham did not disclose limitation 17C of claim 17, which requires "a first wireless communications antenna operable to send and receive data representing the separation distance over the air."

Metrom appeals the Board's unpatentability determinations as to all the claims of the '227 patent and claims 1–16 of the '131 patent. Petitioners cross-appeal the Board's determination that claims 17–20 are not unpatentable as obvious. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

I

The obviousness inquiry is a mixed question of law and fact. *Apple Inc. v. Gesture Tech. Partners, LLC*, 127 F.4th 364, 368 (Fed. Cir. 2025). We review the Board's legal conclusion of obviousness de novo and its factual findings related to obviousness for substantial evidence. *Id.*

A

We first address the issues raised by the main appeal. Metrom argues that the Board erred by failing to give weight to evidence of secondary considerations of nonobviousness, which it presented in both inter partes review proceedings. “In order to accord substantial weight to secondary considerations in an obviousness analysis, the evidence of secondary considerations must have a nexus to the claims, *i.e.*, there must be a legally and factually sufficient connection between the evidence and the patented invention.” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (internal quotations omitted).

“[A] patentee is entitled to a rebuttable presumption of nexus between the asserted evidence of secondary considerations and a patent claim if the patentee shows that the asserted evidence is tied to a specific product and that the product is the invention disclosed and claimed.” *Id.* (emphasis in original) (internal quotations omitted). Metrom argues that its AURA CAS product, a collision-avoidance system that uses a combination of UWB sensor technology and GPS to detect distances between trains and warn operators, is coextensive with the patented inventions and, therefore, that Metrom was entitled to a presumption of nexus.

Relying on testimony from Metrom’s CEO, the Board found that the AURA CAS product had unclaimed “important features or components,” including “key machine function monitoring and remote data reporting,” that were “not insignificant.” J.A. 27–28 (emphasis in original).² When the product alleged to embody the claims has important unclaimed features that are not “insignificant” to

² Citations to the “J.A.” refer to the Joint Appendix filed by the parties in this case. Dkt. No. 52.

the product, a patentee is not entitled to a presumption of nexus. *Fox Factory*, 944 F.3d at 1374–75. We see no error in the Board’s conclusion that Metrom was not entitled to a presumption of nexus.

Nexus may also be established by showing that the proposed secondary considerations evidence was the “direct result of the unique characteristics of the invention.” *Id.* at 1373–74 (quoting *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)). Metrom failed to make such a showing. The Board noted that Metrom’s expert, while conclusorily stating that “the claimed features of the AURA CAS are the features that drive demand for the AURA CAS,” J.A. 4195–96, did not “separately identify any unique characteristics” of the patented invention—as embodied in the AURA CAS product—that drove demand for the AURA CAS product that were not already known in the prior art, nor did Metrom “argue that any inventive combination of known elements supports a finding of nexus,” J.A. 31–32 (emphasis in original). These findings are supported by substantial evidence. Metrom’s secondary considerations evidence “does not weigh in favor of nonobviousness.” J.A. 33.

B

Metrom next contends that substantial evidence did not support the Board’s determinations that claim 1 of each patent was obvious over Grisham alone. The petitions asserted that Grisham alone rendered obvious each limitation of claim 1 of each patent based on a single-reference obviousness theory. Aside from its secondary-considerations evidence, Metrom did not challenge petitioners’ contentions regarding the obviousness of these claims over Grisham in its patent owner responses. Although Metrom made additional arguments in its sur-replies that these claims were not obvious over Grisham, we see no error in the Board’s conclusions that these arguments were

METROM RAIL, LLC v. SIEMENS MOBILITY, INC.

7

untimely and forfeited. J.A. 22 n.13; *Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1383 (Fed. Cir. 2023) (“We have held that in some circumstances the Board acts within its discretion when declining to consider . . . a new theory of patentability raised by patent owner in sur-reply.”). Like the Board, we decline to consider these untimely arguments. We see no error in the Board’s conclusions that claim 1 of each challenged patent are obvious over Grisham.

C

Metrom argues that the Board erred in determining that claims 2 through 4 of both the ’131 patent and the ’227 patent were unpatentable as obvious over the prior art. Claim 2 of the ’131 patent, which is substantively identical in relevant respect to claim 2 of the ’227 patent, recites:

The collision avoidance system of claim 1, further comprising:

a central tracking unit in communication with the first vehicle mounted module and the second vehicle mounted module, wherein the central tracking unit is operable to track a location of the first vehicle mounted module and a location of the second vehicle mounted module.

’131 patent, claim 2 (emphasis added).³ Claims 3 and 4 of both challenged patents depend from each patent’s

³ Claim 2 of the ’227 patent recites a central tracking unit operable to “track the location” instead of tracking “a location.” ’227 patent, claim 2 (emphasis added). Metrom does not argue that the use of “a” in place of “the” meaningfully changes the scope of the claims.

respective claim 2. Metrom makes no separate arguments with respect to dependent claims 3 and 4.

The Board concluded that claim 2 of each patent and their respective dependent claims were obvious over a combination of Grisham and a second prior art reference, Douglas, U.S. Patent No. 8,874,359 (“Douglas”) (filed February 19, 2010) (issued Oct. 28, 2014). The Board found that Douglas discloses “track[ing] the locations of trains along specific tracks . . . relative to links . . . that connect specific tracks to allow a specific train to switch tracks at a particular location and within the limited zone of station” and that this disclosure in Douglas “tracks location as recited in claim 2.” J.A. 39 (citing J.A. 1608, col. 3 ll. 1–23).

Metrom contends that these claims require some level of precise location tracking beyond that disclosed by Douglas. However, as the Board correctly noted, “the challenged claims do not require any particular precision for train location.” J.A. 38. Douglas’s disclosure thus is sufficient to satisfy the “track a location” limitation, and we see no error in the Board’s determination that the combination of Grisham and Douglas renders claims 2 through 4 of both challenged patents unpatentable as obvious.

D

Finally, with respect to the Board’s unpatentability determinations related to claim 7 of each patent, Metrom argues that the Board erred in determining that an ordinarily skilled artisan would be motivated to combine Grisham with Nixon to render these claims unpatentable as obvious. Nixon discloses a collision-avoidance system using GPS that “can be applied to any kind of vehicle, such as an airplane, a boat, a ship, a train, a snowmobile and an ATV.” J.A. 1749–50 (emphasis added). Petitioners proposed combining Nixon’s GPS units with the UWB-based system in Grisham and argued that “an ordinarily skilled

METROM RAIL, LLC v. SIEMENS MOBILITY, INC.

9

artisan would have been motivated to supplement Grisham's UWB-based collision avoidance system with Nixon's GPS units because UWB accuracy is range-limited due to low transmission power that reduces its usefulness in stopping long trains." J.A. 55–56.

Metrom contends that the Board "ignored Metrom's proffered evidence that a[n ordinarily skilled artisan] would have been concerned about interference from UWB radios" and "relied on the conclusory opinions of [Petitioner's expert Scott] Andrews" to determine that there was a motivation to combine Grisham and Nixon. Appellant's Br. 48.

The Board considered each of these arguments and found, in light of competing evidence from petitioners, that an ordinarily skilled artisan would be motivated to combine Grisham and Nixon. This evidence included testimony from Mr. Andrews that "an ordinarily skill[ed] artisan would have augmented Grisham's UWB-based system with Nixon's GPS because UWB has low transmission power and would benefit from using GPS to measure the absolute position and heading of vehicles," J.A. 57 (citing J.A. 1029–31), and Nixon's express use of "GPS and UWB in a collision avoidance system, which Nixon states can be applied to a train." J.A. 58 (emphasis in original) (citing J.A. 1745–46, 1748–57). The Board's motivation-to-combine findings are supported by substantial evidence. The Board properly determined that claim 7 of each challenged patent was unpatentable as obvious over the combination of Grisham and Nixon.

Accordingly, we affirm as to all issues raised in Metrom's appeal.

II

The sole issue presented by petitioners' cross-appeal is whether the Board erred in its determination that

claims 17–20 of the '131 patent are not unpatentable as obvious in light of Grisham's express disclosures.⁴

Claim 17 recites:

[17Pre] A rail vehicle module mountable on a first rail vehicle, the module comprising:

[17A] a transponder sensor module comprising:

[17B] a radio communication unit operable to employ time of flight techniques to detect a separation distance between the first rail vehicle and a second vehicle;

[17C] a first wireless communications antenna operable to send and receive data representing the separation distance over the air;

[17D] a global positioning system unit operable to receive information from one or more satellites to determine an absolute position of the first rail vehicle;

[17E] a control electronics module comprising a processor in communication with the transponder sensor module; and

[17F] a user interface module including a user interface operable to

⁴ Petitioners argued that claim 17, from which claims 18 through 20 depend, was unpatentable over a combination of Grisham and Nixon. However, petitioners only cite Grisham's disclosures with respect to the challenged limitation.

provide rail vehicle information to a vehicle operator and to receive input from the vehicle operator,

[17G] wherein the rail vehicle module communicates with a second rail vehicle module mountable on the second vehicle to detect a separation distance between the first rail vehicle and the second vehicle.

'131 patent, claim 17 (emphases added).

The Board rejected petitioners' obviousness arguments with respect to claims 17–20 because the Board concluded that limitation 17C was not disclosed in Grisham.

Understanding the Board's determination that Grisham does not disclose limitation 17C requires review of the overall structure of claim 17 and its relationship to the other claims. Earlier in the petition, with respect to claim 1, Petitioners discussed how impulse radio signals consisting of sequences of pulses are transmitted between locomotives that are used to measure a total "time-of-flight" difference between locomotives. As the Board articulated with respect to claim 1 in its final written decision, describing Mr. Andrews's testimony, the time-of-flight technique refers to "using two sequences of pulses between two transceivers, measuring a time difference between the delayed first reference signal and the first [reference] signal, as the total time of flight of the sequences and the distance between the transceivers is determined from the time difference." J.A. 22 n.12 (internal quotations omitted) (citing J.A. 1000–01 ¶¶ 125–26). Similarly, the specification of the '131 patent describes transmitted radio signals as "data [that] travel[s] from one UWB unit to the other" and contemplates that "distance information may be computed by determin[ing] how long it took" for this data to travel between the locomotives. '131 patent, col. 14 ll. 12–31.

Claim 17 explicitly requires the use of the time-of-flight technique to determine separation distance. Limitation 17B requires “employ[ing] time of flight techniques to detect a separation distance between the first rail vehicle and a second vehicle.” Metrom did not argue that Grisham failed to disclose limitation 17B. Limitation 17G specifies that “the rail vehicle module communicates with a second rail vehicle module mountable on the second vehicle to detect a separation distance between the first rail vehicle and the second vehicle.” Metrom also did not argue that Grisham failed to disclose limitation 17G.

With respect to claim limitation 17C, “a first wireless communications antenna operable to send and receive data representing the separation distance over the air,” petitioners argued in the petition that Grisham’s radio units include antennas that “continuously transmit and receive impulse radio signals wirelessly.” J.A. 4966. The petition cites to Grisham’s specification, which describes how these signals have “a known pseudorandom sequence of pulses.” J.A. 1387 col. 23 ll. 42–47. Petitioners argued that the impulse radio signals sent and received by Grisham’s antennas “provide data such as direction, speed, and distance of each rail vehicle (showing the separation distance between trains).” J.A. 4966. Thus, petitioners clearly argued that the “data representing the separation distance” was the time-of-flight data, and that the transmission and receipt of such data over the air was disclosed by Grisham.

In its patent owner response, Metrom’s argument as to why claim 17 was not unpatentable as obvious consisted of only three sentences, arguing that limitation 17C was not obvious. In a figure of Grisham, “the only details displayed are direction, speed and distance. There is no suggestion that data representing the separation distance is communicated over the air.” J.A. 5252. Therefore, as Metrom argued, “[t]he combination of Grisham and Nixon does not disclose ‘a first wireless communications antenna operable

METROM RAIL, LLC v. SIEMENS MOBILITY, INC.

13

to send and receive data ***representing the separation distance over the air***,” as required by limitation 17C. *Id.* (emphasis in original).

In reply, petitioners argued that “[t]he only way distance information is displayed [in Grisham] is if data representing the separation distance is communicated over the air.” J.A. 5412–13. Petitioners pointed out that “[t]he exact details about how this separation distance is determined from the impulse radio signal (via the time of flight technique) was described with respect to [17G] (where Mr. Andrews refers back to [1J]).” J.A. 5413–14 (citing J.A. 1039 ¶ 197; J.A. 1000–02 ¶¶ 125–27. Thus, both in the petition and reply, petitioners argued that the data used in the time-of-flight calculation is the claimed “data representing the separation distance,” which is later used to calculate a separation distance by the vehicle module.

In its sur-reply, Metrom argued that because Grisham’s locomotives could independently calculate the separation distance using the time-of-flight technique, “there is no need to transmit the separation distance,” *i.e.*, the computed distance. J.A. 5463. Metrom’s theory for the first time suggested that “data representing the separation distance” should be construed to mean the computed separation distance, rather than the data that is used to compute a separation distance using the time-of-flight technique.

At the hearing, petitioners responded to Metrom’s theory that “the second train makes that determination [computing the separation distance] but it never sends that information back to the first train” by arguing that Grisham also disclosed transmitting the computed separation distance between locomotives. J.A. 5639. Petitioners quoted a sentence of Grisham’s specification, which was cited in petitioners’ reply, that disclosed that the first locomotive “can contain the same equipment as the second

locomotive” and “could be notified of the presence and speed of an oncoming second locomotive,” J.A. 5638–39 (quoting J.A. 1387 col. 24 ll. 25–29), and that separation distance is “what’s meant by presence and speed here.” J.A. 5640.

The Board concluded that petitioners failed to establish that claim limitation 17C was disclosed by Grisham. J.A. 63–64. It agreed with Metrom that limitation 17C required transmitting the computed separation distance rather than the time-of-flight data that is used to compute the separation distance, and that it was not obvious to transmit the computed separation distance in Grisham. This was so, the Board reasoned, because the locomotives in Grisham could compute a separation distance from the data used in the time-of-flight calculation, and thus it was “not persuaded that Grisham requires ‘separation distance’ data to be communicated in order to determine or display distance information.” J.A. 63–64 (emphasis in original). It also found that Mr. Andrews’s testimony regarding the data transmitted between the antennas in Grisham merely “detail[ed] how distance may be calculated at the receiving unit,” rather than describing how Grisham disclosed transmitting an already-computed separation distance between locomotives. J.A. 64. As such, it agreed with Metrom’s contention that “there is no need to transmit the separation distance” in Grisham. J.A. 64 (quoting J.A. 5463).

In reaching this conclusion, the Board’s critical error was agreeing with the theory, advanced in Metrom’s sur-reply, that the claim term “data representing the separation distance” means only the computed separation distance rather than data that is then used in the time-of-flight calculation to compute a separation distance. This construction is incorrect. Claim limitation 17C references “the separation distance” calculated in limitation 17G, and limitation 17B describes how separation distance is calculated using the time-of-flight technique. Claim 17B

explicitly requires “employ[ing] time of flight techniques to detect a separation distance between the first rail vehicle and a second vehicle,” and limitation 17G specifies that “the rail vehicle module communicates with a second rail vehicle module mountable on the second vehicle to detect a separation distance between the first rail vehicle and the second vehicle.” ’131 patent, claim 17 (emphases added). This on its face requires that “data representing the separation distance” is the data being used in the time-of-flight technique “to detect a separation distance.”

Significantly, in Metrom’s complaint against petitioners in the related district court proceedings, Metrom itself contended that “data representing the separation distance” is “data used to determine the time of flight.” J.A. 1561. Requiring “data representing the separation distance” to be the computed separation distance, rather than the data used to detect the separation distance, is incompatible with the language and structure of the claim as a whole and Metrom’s argument in the parallel district court proceeding. The Board erred in construing “data representing the separation distance” to be the computed separation distance rather than the data representing the separation distance that is used in the time-of-flight calculation.

As Metrom conceded at oral argument, Grisham discloses transmitting data used in the time-of-flight technique over the air. Oral Arg. at 37:45–38:08. We conclude that there is no dispute that Grisham discloses sending and receiving data used to determine a separation distance using the time-of-flight technique over the air, which satisfies claim limitation 17C.

In light of our determination, we need not reach petitioners’ argument that Grisham expressly discloses transmitting a computed separation distance between locomotives. As Metrom does not challenge petitioners’ other obviousness contentions for claims 17–20 beyond

challenges that were already considered and rejected by the Board with respect to other claims that the Board determined to be unpatentable in both proceedings, we conclude that petitioners have shown that claims 17–20 of the '131 patent are unpatentable as obvious. We reverse with respect to petitioners' cross-appeal.

The dissent argues that the petitioners did not argue before the Board that “any pulses whose timing is used for calculating separation distance (even when the signals encode nothing, much less separation distance) *constitute* ‘data representing the separation distance’ as a matter of claim construction.” Dissent at 7 (emphasis in original). But the issue was raised, even though it was not designated as a matter of claim construction. The petitioners elaborated in their reply on the impulse radio signal theory articulated in the petition, which clearly argued that the “data representing the separation distance” is the data used in the time-of-flight technique. The reply stated “[t]he only way distance information is displayed [in Grisham] is if data representing the separation distance is communicated over the air. . . . The exact details about how this separation distance is determined from the impulse radio signal (via the time of flight technique) was described with respect to [17G] (where Mr. Andrews refers back to [1J]).” J.A. 5413. The patentee had the opportunity to respond in its sur-reply. The Board considered the reply and did not suggest that the reply unfairly exceeded the theory in the petition. J.A. 64. Faulting petitioners for not raising claim construction seems unfair because it was Metrom in its sur-reply and the Board in its final written decision that adopted the implied and incorrect claim construction.

On appeal, the petitioners expressly argued that Grisham discloses limitation 17C. To be sure, petitioners' appellate briefing does not do a good job of explaining this issue, but we may exercise our discretion to “overlook such failures and address the merits.” 16AA Wright & Miller, Federal Practice & Procedure § 3974.1 (5th ed. 2026). This

METROM RAIL, LLC v. SIEMENS MOBILITY, INC.

17

is particularly so where, as here, the issue was presented to the Board in the first instance.

We have considered Metrom's remaining arguments and find them unpersuasive.

AFFIRMED-IN-PART AND REVERSED-IN-PART

COSTS

Costs to appellees/cross-appellants.

NOTE: This disposition is nonprecedential.

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2024-2223, 2024-2236, 2024-2264

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2023-00468, IPR2023-00470.

TARANTO, *Circuit Judge*, concurring-in-part and dissenting-in-part.

I join the court's opinion except with respect to claims 17–20 of the '131 patent, as to which I respectfully dissent. The court's decision reversing the Board's upholding of those claims rests on the court's own claim construction of Claim 17's disputed element (17C), a construction the court adopts based on its relationship to elements 17B and 17G. *See* Op. 14 (“critical error” is one of “construction”). But

Siemens did not present or develop this construction in challenging the Board’s ruling on claims 17–20 in this court; indeed, it did not present a claim-construction argument at all, but only an argument that the Board misread the prior-art reference, Grisham. Siemens Cross-Appeal Br. at 3 (statement of issue), 64–70 (argument). Nor did Siemens urge the court’s claim construction before the Board. We should not be *sua sponte* deciding the cross-appeal on this basis, given the important principles of party presentation and adequate preservation. *See Clark v. Sweeney*, 607 U.S. 7, 9 (2025) (the court “transgressed the party-presentation principle by granting relief on a claim that [the appellant] never asserted and that [the appellee] never had the chance to address”); *In re Google Technology Holdings LLC*, 980 F.3d 858, 863 (Fed. Cir. 2020) (party forfeited claim-construction arguments by failing to present them to the Board).

A

The Board found that Grisham does not teach Claim 17 for a simple reason. *See Siemens Mobility, Inc. v. Metrom Rail, LLC*, IPR2023-00468, 2024 WL 3048533, *27 (P.T.A.B June 18, 2024) (*Decision*). Grisham undisputedly discloses certain elements of claim 17, including the elements (17B and 17G) highlighted in the court’s analysis. Thus, in Grisham, a “first rail vehicle” sends over-the-air “impulse radio signals” to a “second vehicle,” which allows a “radio communication unit” within a “rail vehicle module mountable on” the first vehicle to calculate, from the time of “flight” (the amount of time it takes a signal to travel between the trains), a distance between the two trains (“to employ time of flight techniques to detect a separation distance between” the vehicles, as required by 17B). It is also undisputed that Grisham discloses a “rail vehicle module mountable on” the first vehicle that “communicates with” a “rail vehicle module mountable on” the second vehicle “to detect a separation distance between” the two trains (as required by 17G). *Decision*, at *2–3; *see* J.A. 4965–66

(petition); J.A. 5251–52 (patent owner response). And it is undisputed that the time of flight is calculated simply by using “time position measurement to measure a propagation delay,” *i.e.*, noting and comparing the timing of signals (such as pulse signals) and calculating distance based on that timing, not by using any encoding of information in the signals. *Decision*, at *9 & n.12; *see* Pet. 18–19; J.A. 957, 1001–02 (Siemens expert declaration, ¶¶ 50, 126–27). In short, “[t]he separation distance may be measured by determining how long it takes a pulse to travel between two transceivers, which is [] referred to as ‘Time of Flight’ (TOF).” Pet. 6.

What is missing in Grisham, the Board ruled, is what element 17C requires—that the first vehicle’s “communications antenna” is “operable to send and receive *data representing the separation distance over the air*” (17C (emphasis added)). The Board found that the only part of Grisham that Siemens’s petition relied on for the 17C-required over-the-air communications did not show over-the-air communication of data representing the separation distance. *Decision*, at *26–27. In particular, the Board rejected Siemens’s submission, in its petition (and accompanying expert declaration), that Grisham’s Figure 22 showed over-the-air communication of data representing the separation distance. *Id.*; *see* J.A. 4966 (petition); J.A. 1037 ¶ 192 (expert).

Grisham’s Figure 22 was the heart of Siemens’s case as relevant here:

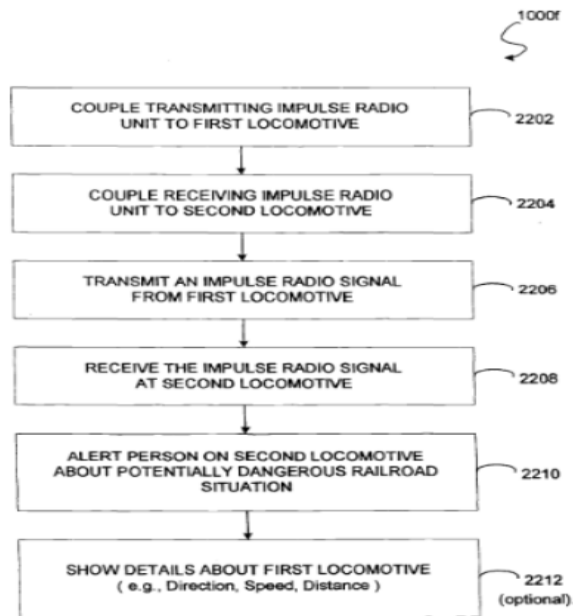


FIG. 22

Appx1375

Siemens EX1006
Page 27 of 41

J.A. 1375. Importantly, in Figure 22, the first four steps (2202, 2204, 2206, and 2208) are over-the-air transmitting and receiving of impulse radio signals (pulses), the *timing* of which is used for time-of-flight calculations to *determine* a distance. In contrast, the last step (2212) is about displaying certain distance (and other) information, stating: “show details about first locomotive (e.g., Direction, Speed, Distance).”¹

¹ The first four steps are versions of the first four (pulse) steps of Grisham’s flowchart, Figure 10, which details the steps for Grisham’s Figure 9—relied on by the Board for various claim elements other than 17C. *See* J.A. 1363, 1384–85 (Grisham, Figs. 9, 10 and col. 18, line 58, through col. 19, line 19); *Decision*, at *27.

Element 17G is similar to claim 1's element 1J, and Siemens pointed, for its assertion that Grisham taught 17G, to its analysis of why Grisham taught 1J. *See* J.A. 4966 (petition); J.A. 1039 (expert, ¶ 197). Element 1J reads, “the first vehicle mounted module and the second vehicle mounted module are operable to apply a time of flight technique to *determine* a separation distance between the first rail vehicle and the second rail vehicle.” (emphasis added). For that element, Siemens relied on the calculation made from the timing of the impulse radio signals (shown in the first four steps of Figure 22 and parallel Figure 10), not on any suggestion that separation distance was represented by the data encoded in those signals. *See* Pet. 17–19; J.A. 1000–02 (expert, ¶¶ 125–27).

In contrast, when Siemens and its expert asserted that Figure 22 teaches element 17C, they never stated that the first four steps (transmission and receipt of impulse radio signals) themselves constituted the over-the-air transmission and receipt of data representing the separation distance simply because the signals' timing is used to calculate a distance (by a time-of-flight method that does not rely on any encoding of information in the signals at all). That simple point is what Siemens would have made had it been advancing the claim construction adopted by the court today. It did not do so. Instead, for its contention that Grisham disclosed 17C, Siemens relied, at the petition stage and also at the reply stage, on certain arguments keyed to the reference in the *last* step to “distance” (2212, referring to display of “direction, speed, and distance”). That reliance was wholly unnecessary if bare use of the timing of pulse signals for a distance calculation is enough as a matter of claim construction.

In particular, Siemens made the following two submissions invoking step 2212. First, it made an unelaborated assertion that, in Figure 22, “[t]he signals provide data such as direction, speed, and distance of each rail vehicle (showing the separation of distance between trains).” J.A.

4966 (petition, citing Figure 22); *see also* J.A. 1037 (expert ¶ 192) (“The signals *can include* data such as direction, speed, and distance of each rail vehicle.”) (citing Figure 22) (emphasis added). In other words, Siemens declared that the pulse signals *can* encode the three kinds of information listed in step 2212. Siemens made its second assertion after Metrom responded to the first assertion by arguing that actually “[t]here is no suggestion [in Figure 22] that data representing the separation distance is communicated over the air,” J.A. 5252, *i.e.*, that the signals in Figure 22’s first four steps actually are encoded with such information. Siemens’s new point was that such communication *must* be occurring in Grisham: “The only way distance information is displayed is if data representing the separation distance is communicated over the air.” J.A. 5413. It added that the “exact details about how this separation distance is *determined from the impulse radio signal* (via the time of flight technique) was described with respect to [17G] where [Siemens’s expert] refers back to [1J].” *Id.* (emphasis added). The second sentence is only about how separation distance “is *determined from* the impulse radio signal”; it does not even purport to support the idea that the impulse signals are encoded with the separation distance information, let alone assert, as a matter of construction, that the signals always qualify as data representing the separation distance. *Contra* Op. 15–16.

The Board rejected Siemens’s argument. The Board found that nothing in Grisham timely identified by Siemens for its 17C mapping indicates that the impulse radio signals encode data representing the train-separation distance; after all, the time-of-flight calculation disclosed in Grisham relies only on the timing of the signals, not information they may encode. And the Board found that Grisham does not suggest that over-the-air communication of that distance is necessary; after all, a train that can calculate the distance (from impulse timing) need not have that result sent to it. *Decision*, at *26–27.

B

The court’s opinion does not rest on a showing that the Board was wrong in its analysis of Grisham and Siemens’s submissions about it. Rather, the court concludes that the Board’s conclusion was incorrect as a matter of claim construction. The court’s adopted construction is that any signals (even those not encoding anything, much less separation distance) sent over the air, as long as the *timing* of the signals is used to make a time-of-flight-based calculation of the separation distance between the trains, *themselves* constitute “data representing the separation distance” sent and received “over the air” under element 17C. Op. 14–15. The court draws this construction from its understanding of elements 17B and 17G. *Id.*

Siemens, however, did not make such a claim-construction argument, or any claim-construction argument at all, in its cross-appeal brief to us. Siemens argued only that the Board misunderstood Grisham, which presents a factual issue; and it relied for that argument overwhelmingly on a five-line passage in Grisham (J.A. 1387, col. 24, lines 25–29) on which it did not rely in its petition’s detailing of why Grisham taught element 17C (J.A. 4966). Siemens Cross-Appeal Br. at 3, 64–70. It would have been a simple matter for Siemens to assert—though a much less simple matter to try to defend the assertion—that signals sent to be used for time-of-flight calculations qualify on that basis alone as data representing the separation distance. Siemens did not do so.

Siemens’s choice in this court reflects its presentation to the Board. As summarized above, Siemens did not say that any pulses whose timing is used for calculating separation distance (even when the signals encode nothing, much less separation distance) *constitute* “data representing the separation distance” as a matter of claim construction. Had that been Siemens’s position, the task for Siemens and its expert regarding element 17C, relying on

Grisham’s Figure 22, would have been trivial: They would have simply pointed to steps 2202, 2204, 2206, and 2208, which, regardless of step 2212 and regardless of any data content of the signals, would have been enough. They never did so at any stage of the Board proceedings. Siemens never proposed the construction adopted by the court today—or, therefore, provided a supporting claim-construction analysis, much less one based (like the court’s) on inferences from elements 17B and 17G.

Compelling confirmation of the absence of such a position is apparent from the oral argument before the Board (after the reply and sur-reply). A Board judge asked Siemens specifically about Metrom’s contention that, after the train calculates the separation distance, “it never sends that information” to the other train (as Siemens summarized the contention). J.A. 5639. If Siemens had been advancing the court’s claim construction, its answer would have been simple: It would have said that no over-the-air sending of the distance *result* was needed because the sending of the pulses used *to make* the distance calculation already met the 17C requirement. It did not. Instead, Siemens’s response, referring to the Board judge’s question about sending the distance result over the air, was, “But Grisham does do that,” J.A. 5639, followed by a reference to the five-line passage from Grisham that it had not relied on for 17C in the petition, *id.* Counsel then elaborated that the calculating train really *should* inform the other train of the separation distance, J.A. 5639–40, and sought to translate the language used in the Grisham passage (“presence and speed”) into the different language of 17C (“the separation distance”), J.A. 5640. Again, that argument—presenting evident difficulties of substance and preservation—would have been wholly unnecessary had Siemens been advancing the claim construction on which the court today relies.

METROM RAIL, LLC v. SIEMENS MOBILITY, INC.

9

In these circumstances, there is a double forfeiture—in this court and before the Board—of the claim construction adopted by the court.

If there exist some claim-construction issues that are so easy to resolve that we could properly decide them despite such double forfeiture, this is not one of them. Even aside from the absence of exceptional circumstances excusing the forfeitures, we lack a complete claim-construction analysis. We have no analysis, from intrinsic or extrinsic evidence, of what “*data representing* the separation distance” means—and whether that phrase should cover a simple pulse (not encoding any meaning) whose departure and return timing can be used to calculate the distance. Moreover, the only basis the court recites for its conclusion about 17C is an inference based on 17B and 17G, but the inference has not been justified, let alone shown to be clearly compelled (so as to make full claim-construction arguments pointless). Neither says anything about the “data representing” phrase of 17C. 17B says that a unit “employ[s] time of flight techniques to detect a separation distance,” which does not imply that signals used as inputs into the time-of-flight calculation are data representing the calculation’s result or that the result is sent over the air. The same is true of 17G, which simply adds that the second vehicle, like the first, has a “rail vehicle module” mounted on it and the first vehicle’s module communicates with that module to detect a separation distance between them. Finally, the court cites in passing Metrom’s complaint in a related district court proceeding, which states that “data used to determine the time of flight” constitutes “data representing the separation distance,” J.A. 1561 (cited at Op. 15), but the parties in the present proceeding have not relied on that statement at all, much less explored its significance for a claim construction position never advanced here.

C

Because I conclude that we should not decide the cross-appeal on the basis set forth in the court's opinion, I address the argument Siemens has actually made to us regarding claims 17–20. That argument relies overwhelmingly on the five-line Grisham passage noted above, J.A. 1387 (Ex. 1006), col. 24, lines 25–29. We should readily reject that reliance.

We have recognized that the Board's determination that a particular theory was not adequately presented in a petition is subject to review only for abuse of discretion. *See Netflix, Inc. v. DivX, LLC*, 84 F.4th 1371, 1376 (Fed. Cir. 2023). Here, there was no such abuse. It is plain that Siemens did not rely on that passage in its petition's presentation of how Grisham disclosed element 17C. *See* J.A. 4965–66 (showing no reference to J.A. 1387, col. 24, lines 25–29). And as indicated by Siemens's new featuring of this passage, the Board could reasonably deem the passage to be materially different from—not just a small elaboration of—what Siemens did cite for its petition's 17C argument and, also, raising new interpretive issues of its own. In these circumstances, the Board did not commit reversible error in not allowing Siemens to rely on this passage late in the process. With no such error in that respect, there is no basis for disturbing the Board's decision to uphold claims 17–20.

For the foregoing reasons, I would affirm the Board with respect to claims 17–20.