



STARK, U.S. District Judge:

Plaintiff Siemens Industry, Inc. (“Siemens”) alleges that Defendants Westinghouse Air Brake Technologies Corporation (d/b/a Wabtec Corporation) and Wabtec Railway Electronics, Inc. (collectively, “Wabtec”) infringe 13 patents directed to different aspects of train safety and control. The 13 patents can be broken into three technological buckets: patents relating to the on-board unit (“OBU”); patents directed to the back office server (“BOS”); and patents relating to end-of-train (“EOT”) systems.¹

Presently before the Court is the issue of claim construction. The parties submitted briefs (*see* D.I. 107, 109, 119, 121) and technology tutorials (D.I. 106, 110). The Court held a claim construction hearing on September 5, 2017. (*See* D.I. 49)

I. LEGAL STANDARDS

The ultimate question of the proper construction of a patent is a question of law. *See Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 837 (2015) (citing *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 388-91 (1996)). “It is a bedrock principle of patent law that the claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (internal quotation marks omitted). “[T]here is no magic formula or catechism for conducting claim construction.” *Id.* at 1324.

¹The OBU patents include U.S. Patent Nos. 6,845,953 (“the ’953 Patent”); 7,036,774 (“the ’774 Patent”); 6,996,461 (“the ’461 Patent”); 7,236,860 (“the ’860 Patent”); 6,978,195 (“the ’195 Patent”); 7,079,926 (“the ’926 Patent”); 7,092,801 (“the ’801 Patent”); 7,200,471 (“the ’471 Patent”); and 6,824,110 (“the ’110 Patent”). The BOS patents include U.S. Patent Nos. 8,714,494 (“the ’494 Patent”) and 9,233,698 (“the ’698 Patent”). The EOT patents include U.S. Patent Nos. 7,467,032 (“the ’032 Patent”) and 7,742,850 (“the ’850 Patent”). While Wabtec contends that the title “BOS Patents” is “a little bit inaccurate” – and prefers to refer to them instead as the “safety patents” (D.I. 138 (“Tr.”) at 92-94) – for ease of reference the Court will use the term “BOS patents.”

Instead, the court is free to attach the appropriate weight to appropriate sources “in light of the statutes and policies that inform patent law.” *Id.*

“[T]he words of a claim are generally given their ordinary and customary meaning . . . [which is] the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Id.* at 1312-13 (internal citations and quotation marks omitted). “[T]he ordinary meaning of a claim term is its meaning to the ordinary artisan after reading the entire patent.” *Id.* at 1321 (internal quotation marks omitted). The patent specification “is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996).

While “the claims themselves provide substantial guidance as to the meaning of particular claim terms,” the context of the surrounding words of the claim also must be considered. *Phillips*, 415 F.3d at 1314. Furthermore, “[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment . . . [b]ecause claim terms are normally used consistently throughout the patent” *Id.* (internal citation omitted).

It is likewise true that “[d]ifferences among claims can also be a useful guide For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.” *Id.* at 1314-15 (internal citation omitted). This “presumption is especially strong when the limitation in dispute is the only meaningful difference between an independent and dependent claim, and one party is urging that the limitation in the dependent claim should be read into the independent claim.” *SunRace Roots Enter. Co., Ltd. v. SRAM Corp.*, 336 F.3d 1298, 1303 (Fed. Cir. 2003).

It is also possible that “the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor’s lexicography governs.” *Phillips*, 415 F.3d at 1316. It bears emphasis that “[e]ven when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction.” *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1372 (Fed. Cir. 2014) (quoting *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004)) (internal quotation marks omitted).

In addition to the specification, a court “should also consider the patent’s prosecution history, if it is in evidence.” *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995), *aff’d*, 517 U.S. 370 (1996). The prosecution history, which is “intrinsic evidence,” “consists of the complete record of the proceedings before the PTO [Patent and Trademark Office] and includes the prior art cited during the examination of the patent.” *Phillips*, 415 F.3d at 1317. “[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be.” *Id.*

In some cases, “the district court will need to look beyond the patent’s intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period.” *Teva*, 135 S. Ct. at 841. Extrinsic evidence “consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises.” *Markman*, 52 F.3d

at 980. For instance, technical dictionaries can assist the court in determining the meaning of a term to those of skill in the relevant art because such dictionaries “endeavor to collect the accepted meanings of terms used in various fields of science and technology.” *Phillips*, 415 F.3d at 1318. In addition, expert testimony can be useful “to ensure that the court’s understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field.” *Id.* Nonetheless, courts must not lose sight of the fact that “expert reports and testimony [are] generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence.” *Id.* Overall, while extrinsic evidence “may be useful” to the court, it is “less reliable” than intrinsic evidence, and its consideration “is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence.” *Id.* at 1318-19. Where the intrinsic record unambiguously describes the scope of the patented invention, reliance on any extrinsic evidence is improper. *See Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1308 (Fed. Cir. 1999) (citing *Vitronics*, 90 F.3d at 1583).

Finally, “[t]he construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). It follows that “a claim interpretation that would exclude the inventor’s device is rarely the correct interpretation.” *Osram GmbH v. Int’l Trade Comm’n*, 505 F.3d 1351, 1358 (Fed. Cir. 2007) (quoting *Modine Mfg. Co. v. U.S. Int’l Trade Comm’n*, 75 F.3d 1545, 1550 (Fed. Cir. 1996)).

II. CONSTRUCTION OF DISPUTED TERMS²

A. OBU Patents

1. “weight of the train”³

Siemens No construction necessary. ⁴ Alternative: The combined weight of the cars making up the train.
Wabtec The actual weight of the train.
Court The combined weight of the cars making up the train.

The parties dispute whether the “weight of the train” must be the actual weight (Wabtec’s proposal) or an estimated weight (Siemens’ proposal). Wabtec contends that the patent was meant to overcome the “worst-case” assumption used in the fixed braking curve system of the prior art – a system that stops the train by calculating the time and distance before the train

²The parties agreed to certain constructions prior to the claim construction hearing, all of which the Court will adopt. (*See generally* D.I. 131) During the hearing, the parties notified the Court of two additional terms on which they had since reached agreement. (Tr. at 6) The parties agreed that no construction was necessary for the term “preventing the train from entering,” which appears in claims 1 and 6 of the ’471 patent, and agreed to construe the term “incapable of sending,” which appears in claims 1, 2, 5, 10, 11, and 14 of the ’494 patent and claims 1, 2, 5, 10, 11, and 14 of the ’698 patent, as “not able to send.” (*Id.*) The Court will adopt these constructions.

³This term appears in claims 1 and 10 of the ’801 patent.

⁴While Siemens contends that no construction is necessary for seven of the disputed terms, counsel conceded at oral argument that “the most efficient course of action [for the Court] is to adopt a construction for each of these disputed terms.” (Tr. at 15-16) The Court agrees. As the parties present genuine disputes as to the meaning of each of these terms, the Court will construe them. *See O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008).

reaches a stop signal based on the assumption that the train is “traveling downhill on the most steeply graded section of track, and that the train is at the maximum weight.” ’801 patent at 3:22-25. One problem with the prior art fixed braking curve system is that it resulted in the train stopping too early, and thus, the system operating inefficiently. According to Wabtec, because the prior art was based on an *estimated* weight of the train, and because the patent was meant to overcome this problem of stopping too early, the “weight of the train” here must be construed as the actual, rather than the estimated, weight of the train. (D.I. 109 at 11-12)

While the patent was meant to overcome the fixed braking curve system of the prior art, Siemens contends that the solution was based on an innovation other than a transition from using an estimated weight to the actual weight of the train. (D.I. 119 at 2-3) Instead, the patent “identifies numerous factors that may be taken into account to more accurately determine when and how to automatically apply a train’s brakes.” (*Id.* at 3) For example, the patent calculates the time and/or distance required to stop the train depending on factors such as “the speed of the train, the weight and length of the train, the grade and amount of curvature of the upcoming track . . . , braking power, braking ratios, type of brake equipment, aerodynamic drag of the train, etc.” ’801 patent at 11:26-33. Siemens contends that “nowhere in the claims or the specification are words such as ‘actual,’ ‘exact,’ or ‘precise’ used with respect to weight, nor is there even any discussion of how the weight of the train is to be determined as a practical matter.” (D.I. 119 at 3)

The Court agrees with Siemens. The patent uses the term “weight of the train” only generally; nowhere does it indicate whether that weight must be exact or whether a specific method must be used to calculate it. The specification makes clear that the patented invention

uses many factors to calculate the speed/distance required to stop the train, rather than simply assuming the worst-case scenario, *see* '801 patent at 11:26-33, and none of the listed factors involve using an exact or precise weight. Instead, the patented method considers multiple factors not considered by the prior art (e.g., length of the train, track curvature, braking power, etc.) in order to create a more efficient system. Nothing in the claims or specification preclude using an estimated weight of the train.⁵

Accordingly, the Court will adopt Siemens' proposed construction of "the combined weight of the cars making up the train."

2. "determining when a train is in danger of violating the speed restriction"⁶

<p>Siemens No construction necessary.</p> <p>Alternative: Ascertaining that a train is likely to exceed a maximum allowable speed.</p>
<p>Wabtec Indefinite.</p>
<p>Court Ascertaining that a train is likely to exceed a maximum allowable speed.</p>

Wabtec contends that the term "determining when a train is in danger of violating the speed restriction" is indefinite because the patent "provides zero guidance on how the claimed

⁵The Court is also not persuaded by Wabtec's argument that the patent's description of a "more sophisticated" embodiment supports requiring use of the actual weight of the train. (D.I. 109 at 12) The "more sophisticated" embodiment describes using "the location and weight of each car . . . rather than simply a total weight of the train." '801 patent at 11:33-37. This embodiment does not require that an actual weight of each car be used, as opposed to an estimated weight of each car. It merely differentiates between calculations based on the weight of the train as a whole and calculations based on the weight of individual cars.

⁶This term appears in claims 1 and 10 of the '801 patent.

train control system actually determines what constitutes ‘danger’ versus what does not.” (D.I. 109 at 29) Siemens counters that the term is not indefinite, and further that it is a non-technical phrase that requires no construction. (D.I. 107 at 4-5) According to Siemens, the ordinary meaning of the term is explained in the specification, which teaches that the invention may be implemented with a computer that monitors the speed of the train in order “to warn the conductor or engineer if an authority (speed, position, etc.) is about to be exceeded and, if required, to automatically stop or slow down the train before the authority is exceeded.” ’801 patent at 12:60-13:4; *id.* at 5:65-6:3. Furthermore, Siemens explains that, “[w]hether and when such a warning is given can be based on a variety of factors, including the grade of the track (e.g., uphill, downhill) and the weight of the train.” (D.I. 107 at 5)

The Court agrees with Siemens.⁷ Wabtec has failed to show that the patents do not provide a person of ordinary skill in the art at least reasonable certainty as to the scope of its claims. *See Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014).

While the specification does not explicitly define when a train is in “danger” of violating a certain restriction, the ordinary meaning of the term and the specification provide enough detail that one of ordinary skill in the art is able to determine the scope of the claims. As explained in relation to the term “weight of the train,” the patented invention calculates the time and/or distance required to stop the train – e.g., when it is in danger of violating a restriction – based on multiple factors. Given the multiple variables that go into such a determination, it is sensible that

⁷Wabtec proposed definitions of the level of ordinary skill in the art for each asserted patent, the majority of which Siemens did not object to. (*See* D.I. 109 Ex. 1; *see also* D.I. 119 at 1-2) For those definitions that Siemens did object to, the parties’ dispute does not affect the Court’s constructions of disputed claim terms.

the patent does not delineate each potential circumstance in which the train may be in danger of such a violation. The record reveals no basis to doubt that a person of ordinary skill in the art would understand that a train is in danger of violating the speed restriction when the train is likely to exceed a maximum allowable speed, based on various factors (including those expressly identified in the specification).

3. “in compliance with a regulation”⁸

<p>Siemens No construction necessary.</p> <p>Alternative: In accordance with a rule or directive mandated by an authority.</p>
<p>Wabtec Indefinite.</p>
<p>Court In accordance with a rule or directive mandated by an authority.</p>

Wabtec contends the term “in compliance with a regulation” is indefinite because “the first time the term appears in the ’110 Patent is in the claims themselves,” and “the term lacks any clarity regarding the regulations to which it refers.” (D.I. 109 at 30) Siemens counters that the fact that the term does not appear in the patent prior to the claims does not mandate finding the term indefinite. (D.I. 119 at 6) (citing *All Dental Prox, LLC v. Advantage Dental Prods., Inc.*, 309 F.3d 774, 779 (Fed. Cir. 2002)) Instead, in Siemens’ view, because a person of ordinary skill in the art reading the patent would understand the regulations to which the term refers, the term is not indefinite. Siemens also points out that the specification, in describing the interplay between state and federal regulations, provides examples of relevant regulations, such

⁸This term appears in claims 1 and 11 of the ’110 patent.

as 49 C.F.R. § 222.21. (*Id.*)

The Court agrees with Siemens. The specification makes clear that the patented system operates in accordance with federal and state regulations. *See* '110 patent at 1:32-35, 44-50. The patent provides an example of one such federal regulation, 49 C.F.R. § 222.21, which was promulgated to regulate how and when horns are to be sounded. *See id.* at 1:32-35. However, the patent clarifies that a “warning device” is not limited to a horn. *See id.* at 2:64-67 (“... the warning device (*e.g.*, horn) is activated in accordance with state regulations. . .”) (emphasis added). The patent also claims a database “containing locations of grade crossings and other locations at which a train is required to activate a warning device, *as well as what regulations govern activation of the warning device at such locations.*” *Id.* at 2:2-6 (emphasis added). Therefore, the patented system requires compliance with regulations related to any type of warning signal, and the claimed database provides further information on which specific regulations (state or federal) are triggered and when. Wabtec has failed to show that a person of ordinary skill in the art would lack reasonable certainty as to the scope of the claims. *See Nautilus*, 134 S. Ct. at 2124.

4. “interrogation message”⁹

Siemens
A targeted request for status information.
Wabtec
A message that requires a response.

⁹This term appears in claims 1, 8, 10, 20, 27, and 29 of the '953 patent, claims 1, 4-6, 14, 28, and 44 of the '461 patent, claims 1, 7-9, 19, 26, and 28 of the '774 patent, and claims 1, 15, and 16 of the '860 patent.

Court

A targeted request that requires a response containing status information.

Wabtec contends that an “interrogation message” is a message that requires a response. (D.I. 109 at 9) Wabtec points to the specification, which, after describing the need for “a method and apparatus that ensures that a train will not pass a switch, grade crossing gate, or other device that is not properly configured,” discloses a system that “continuously interrogates the [configurable] device *to determine its status* as the train approaches the device.” (*Id.* at 9-10) (quoting ’461 patent at 1:48-55) (emphasis added) Further, Wabtec contends, the specification shows that a response is required by the interrogation message because, without it, a malfunction – due to the failure to respond – can be reported by the device or declared by the system itself. (*Id.*)

Siemens does not contest that the interrogation message must receive a response, but argues that the claims “expressly require a response to the ‘interrogation message’” such that reading such a requirement into the term “interrogation message” is unnecessary. (D.I. 119 at 7) (citing ’953 patent at claim 1) Siemens contends that its proposal requiring a “targeted request” arises “from the claimed requirement that the train send a request to a particular device off the train.” (D.I. 107 at 7) Similarly, Siemens’ proposal that the interrogation message request “status information” arises from “the claimed requirement that the response to the interrogation message contains information about the status of the device being interrogated.” (*Id.*) Siemens asserts that requiring a response alone – that acknowledges the interrogation message was received but does not provide any status information – is insufficient, as the purpose of the interrogation message is to “get information about the status of the configurable device or the track circuit.”

(Tr. at 54)

The Court will adopt the modified construction offered by Siemens at the claim construction hearing: “a targeted request that requires a response containing status information.” (Tr. at 54) Although the claims expressly require the interrogation message to receive a response, *see, e.g.*, ’860 patent at cl. 1, 15 (“transmitting an interrogation message . . . ; [and] receiving a response to the interrogation message”), Siemens’ new proposal nonetheless reiterates the requirement of a response, an emphasis that (while unnecessary) is neither wrong nor likely to confuse the factfinder. Further, the patent explains that the interrogation message is sent to a specific, targeted device, *see, e.g.*, ’953 patent at cl. 1 (“transmitting . . . to a track circuit transceiver associated with a track circuit”); ’461 patent at cl. 1 (“transmitting . . . to a configurable device near the train”), and that the purpose of the interrogation message is to get status information from the device being interrogated, *see, e.g.*, ’953 patent at cl. 1 (“the response including an indication as to a condition of a section of track monitored by the track circuit”); *see also* ’461 patent at 1:48-53 (“The present invention . . . provid[es] a computerized train control system in which a control module . . . continuously interrogates the device to determine its status as the train approaches the device, and forces an engineer/conductor to acknowledge any detected malfunction.”). Therefore, simply requiring a response, without specifying that the response must provide status information, does not satisfy the purpose of the interrogation message.

5. “transmitting . . . to [a / the next] configurable device” /
“transmitting . . . to a track circuit receiver”¹⁰

<p>Siemens No construction necessary.</p> <p>Alternative: Sending a message to [a selected / the next] configurable device [on the train’s route] / Sending a message to a transceiver associated with a selected track circuit.</p>
<p>Wabtec Sending a message from a controller on a train directly to a configurable device / Sending a message from a control unit on a train directly to a track circuit transceiver.</p>
<p>Court Sending a message to [a selected / the next] configurable device [on the train’s route] / Sending a message to a transceiver associated with a selected track circuit.</p>

The parties dispute whether the claimed transmission must be sent *directly* to a device or may also proceed *indirectly* by way of an intervening device. Wabtec contends that the transmission must be direct. As support, Wabtec points to figures in the specification depicting the transmission going directly from the transceiver on the train to the configurable device’s transceiver. (D.I. 109 at 7) (citing ’461 patent at Fig. 1) Wabtec further contends that during prosecution, the applicant disclaimed any method of indirect communication in order to overcome the prior art. (*Id.* at 8-9) The applicant stated that “the way in which [the prior art] system accommodates such switches is by having the switches communicate with the wayside controllers 20 rather than with any system on the train itself,” whereas the claims now at issue require communication “between the train and the switch.” (*Id.*)

Siemens responds that the patent is not so limited. Figure 1 of the ’461 patent, according

¹⁰The term “transmitting . . . to [a / the next] configurable device” appears in claims 1, 14, 28, and 44 of the ’461 patent and claims 1 and 15 of the ’860 patent. The term “transmitting . . . to a track circuit transceiver” appears in claims 1 and 20 of the ’953 patent and claims 1 and 19 of the ’774 patent.

to Siemens, depicts a “zig zag” line connecting the transceiver between the train and the switch, which “signifies only that the devices may communicate over a significant distance, without saying anything about the presence or absence of intermediate devices.” (D.I. 119 at 9)

Furthermore, in the view of Siemens, the applicant did not disclaim indirect communication, but instead specifically chose not to limit the scope of communication by writing in the specification that “[t]he transceiver 150 can be configured for any type of communication, including communicating through rails and wireless communication;” further, “[i]n addition to communication with track circuit transceivers 190, the transceiver 150 may communicate with transceivers connected to other devices such as switches and grade crossing gates, and may also communicate with a dispatcher.” (*Id.* at 10) (quoting ’953 patent at 4:24-35) Siemens further argues that, in differentiating the prior art, the applicant recognized the prior art’s disclosure of communication between a train control system and a wayside controller, and noted that the present invention was different because the prior art “lacked *any* communication of the switch’s configuration to the train, whether such communication was direct or through the wayside controller.” (*Id.* at 11) (emphasis added) Instead, the prior art switches communicated with the wayside controllers, and did not disclose that any information regarding the configuration of the switch was ever transmitted to the train. (*Id.*)

The Court agrees with Siemens. The claim language discloses “transmitting an interrogation message . . . to [a / the next] configurable device” or “transmitting an interrogation message . . . to a track circuit transceiver.” Nothing in the claims requires that the transmission be direct. To the contrary, the specification makes clear that the train’s transceiver “can be configured for *any* type of communication, including communicating through rails and wireless”

or “with a dispatcher.” ’461 patent at 2:66-3:6 (emphasis added). Nor, in context, do the applicant’s statements during prosecution amount to a clear and unmistakable disclaimer. *See Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1366-67 (Fed. Cir. 2012) (holding that disclaimer must be clear and unmistakable).

6. “dispatcher”¹¹

<p>Siemens No construction necessary.</p> <p>Alternative: A person or system responsible for organizing the movement of trains in a specified area of a track.</p>
<p>Wabtec Railroad personnel who direct the movement of trains within a division and coordinate the movement of trains from one division to another.</p>
<p>Court A person or system responsible for organizing the movement of trains in a specified area of a track.</p>

The parties dispute whether a “dispatcher” must be a person (as Wabtec contends) or can also be a system (as Siemens contends). The Court agrees with Siemens that the patent uses the term dispatcher as “a person *or system* responsible for organizing the movement of trains in a specified area of track.” (D.I. 107 at 12) (citing ’926 patent at 1:29-37, 5:9-19, 10:16-19, 12:29-32)

The patent acknowledges an “important disadvantage” to prior art systems is that they “rel[y] on human beings.” ’926 patent at 1:46-47. The patent solves this problem by disclosing “a computerized train control system,” *id.* at 4:2-3, that includes a control module, as “the center of the train control system . . . responsible for controlling the other components of the system,” as

¹¹This term appears in claims 1 and 20 of the ’926 patent.

well as a communications module, “responsible for conducting all communications between the system . . . and the central dispatcher computer system,” *id.* at 5:11-22. Thus, while a “human” dispatcher is not precluded, and a dispatcher system could indirectly be controlled by a human (Tr. at 57), a human dispatcher is not *required* by the patent. *See id.* at 12:29-32 (teaching that functions performed by the control module could be performed by a remotely located processing unit “located *at* a central dispatcher”) (emphasis added).

B. BOS Patents

1. “controller”¹²

<p>Siemens Computer hardware, firmware and/or software that controls the operations of an associated system, subsystem or function.</p>
<p>Wabtec Computer hardware and software that collectively control the operations of an associated system, subsystem or function.</p>
<p>Court Computer hardware and software that collectively control the operations of an associated system, subsystem or function.</p>

Wabtec contends that the specification limits the invention such that “the controller must be embodied in computer hardware *and* software.” (D.I. 109 at 26) (emphasis added) According to Wabtec, even though the specification explains that “the present invention may be implemented in various forms of hardware, software, firmware, special purpose processors, or a combination thereof,” the invention must be limited only to the “combination thereof” in order to achieve its stated goal of “replacing hardware *and* operating system software with more readily

¹²This term appears in claims 1, 2, 5, 10, 11, 14, 17, and 18 of the ’494 patent and claims 1, 2, 5, 10, 11, 14, 17, and 18 of the ’698 patent.

available non-proprietary commercial products.” (*Id.*)

Siemens contends that “controllers” may be implemented “in any combination of hardware, firmware and/or software.” (D.I. 119 at 16) Siemens points to the specification’s reference to the controller being part of “a combination thereof,” and also to the specification’s teaching that a controller can be either “physical” or “virtual.” (*Id.*) The virtual platform, according to Siemens, is “a clear reference to a controller that is implemented in software but which emulates the architecture and functionality of a physical device.” (*Id.*)

In the Court’s view, the specification supports a finding that “a physical or virtual controller platform 100 includes a processor 110 and a controller bus 120 in communication therewith” – two items which are hardware elements. ’494 patent at 5:64-66; *see also id.* at 2:30-34 (“[A]n object of the present invention is to simplify railway vital systems overall design by replacing . . . hardware *and* operating system software with more readily available non-proprietary commercial products.”) (emphasis added). Further, claim 1 of the ’494 patent requires three elements – “a first controller,” “a second controller,” and “an inter-controller communications pathway coupling the first and second controllers” – that each include hardware. Claim 7, a non-asserted dependent claim, requires the system of independent claim 1 in which “at least one of the controllers is virtually simulated.” ’494 patent at cl. 7. Therefore, while claim 7 requires software-only implementation, it is dependent upon claim 1, which requires additional hardware components. Finally, Siemens conceded in a prior IPR proceeding that a “controller” includes hardware *and* software. (*See* D.I. 121 Ex. 14 at 12) (Siemens: “In the ’494 patent . . . the term [controller] refers to a combination of hardware (*e.g.*, a processor) and the instructions (*e.g.*, hardware, firmware, or software) that are inherently required for the processor to provide

the recited redundant functionality.”); *see also generally Asylum Networks, Inc. v. Apple, Inc.*, 856 F.3d 1353, 1361 (Fed. Cir. 2017) (“[S]tatements made by a patent owner during an IPR proceeding can be considered during claim construction and relied upon to support a finding of prosecution disclaimer.”).

2. “vital” / “vital application systems” “railway vital systems” “vital application control system” “railway vital application system”¹³

<p>Siemens Important for train safety / No separate construction necessary in view of construction of “vital.”</p> <p>Alternative: Important for train safety / [A / An] [railway system / application control system / railway application system] that is important for train safety.</p>
<p>Wabtec An application system that has a hazard rate of no more than 10^{-9} per operational hour.</p>
<p>Court An application system that has a hazard rate of no more than 10^{-9} per operational hour.</p>

Wabtec contends that a “vital” system must be construed as one limited to a hazard rate of no more than 10^{-9} per operational hour. (D.I. 109 at 21) Wabtec points to the specification’s explanation that “[r]ail way operators and governmental regulators often require a hazard rate of no more than 10^{-9} per operational hour for a vital function.” ’494 patent at 1:30-33.

Siemens contends that the use of “vital” in the ’494 patent is meant only to indicate that the systems referred to are important for train safety. Siemens cites to the patent’s “non-limiting” list of exemplary “vital systems,” including: “train management systems, onboard units for automatic intervention if a train exceeds safeguarded speed limits, data recorders that record operational information, train speed and position determination equipment,” etc. in explaining

¹³These terms appear in claims 1, 2, 5, 10, 11, 14, 17, and 18 of the ’494 patent.

that “[w]hat these various systems have in common is that they all relate to – and are important (i.e., ‘vital’) for – train safety.” (D.I. 107 at 15-16) To Siemens, its proposed construction – construing “vital” as “important for safety” – is consistent with how the term has been construed in the prior art. (*Id.* at 16)

The Court agrees with Wabtec. The patent describes using the invention to “control systems in railway critical or vital applications with low hazard rates.” *See* ’494 patent at 1:9-12. The specification explains that “vital function” requires “a hazard rate of no more than 10^{-9} per operational hour . . . (i.e., about one hazard per 114 thousand years of operation).” *Id.* at 1:30-33. Imperative to the claimed invention is that the “railway vital or critical application system” is “validated to conform with railway vital system failure-free standards.” *Id.* at Abstract; *see also id.* at 2:46-52. Therefore, construing “vital” as merely “important for train safety” is insufficient, as it does not capture the requirement that the system “conform with railway vital system failure-free standards,” including the standard (required by railway operators and government regulators) that the system have a hazard rate of no more than 10^{-9} per operational hour. *See id.* at 1:30-33.

3. **“safety critical” / “safety critical application system” “safety critical systems” “safety critical application control system”¹⁴**

Siemens

Important for train safety / No separate construction necessary in view of construction of “safety critical.”

Alternative: Important for train safety / An [application system / system / application control system] that is important for train safety.

¹⁴These terms appear in claims 1, 2, 5, 10, 11, 14, 17, and 18 of the ’698 patent.

Wabtec

An application system that contributes to safety and, in so doing, has a data failure rate less than 10^{-4} per operational hour.

Court

An application system that contributes to safety and, in so doing, has a data failure rate less than 10^{-4} per operational hour.

This term, used in the '698 patent, is similar to the term "vital" in the '494 patent. The parties' disputes are similar as well. Wabtec contends that the proper construction must be narrow and specifically contain a data failure rate of less than 10^{-4} per operational hour. (D.I. 109 at 22-23) Siemens counters that the term should be construed as "important for train safety," a construction similar to its proposed construction of "vital."

The Court agrees with Wabtec that the change from "vital" to "safety critical" in the '698 continuation-in-part patent application has meaning. "[V]ital' is far more safe and far more reliable than 'safety critical.'" (Tr. at 113-14) Consistent with the construction of "vital" above, the Court will adopt Wabtec's construction of "safety critical."

4. "task"¹⁵

Siemens

A set of instructions that are executed by a processor to perform an operation.

Wabtec

A stand-alone application or subprogram that is run as an independent entity.

Court

A stand-alone application or subprogram that is run as an independent entity.

Wabtec contends that the ability of tasks to fail independently of one another "ensures that the tasks are stand-alone (i.e., the viability of one is not tied to the viability of the other)."

¹⁵This term appears in claims 1, 2, 5, 10, 11, 14, 17, and 18 of the '698 patent.

(D.I. 109 at 28) According to Wabtec, the claims require that “each task must independently verify the message integrity and independently generate output data.” (*Id.*) Further, Wabtec finds support for its construction in the definition of “task” in Microsoft’s Computer Dictionary. (*Id.*)

Siemens contends that the patent “require[s] nothing more than that the ‘task’ is software-based, that it runs on some hardware, and that it does something.” (D.I. 107 at 20) Furthermore, Siemens asserts that Wabtec’s construction “unjustifiably excludes one of the two implementations contemplated by the claim language” because claim 1 specifically requires “at least one controller executing first and second tasks.” (*Id.* at 20-21) An embodiment having one controller that executes two tasks, according to Siemens, eliminates any construction that the tasks must be stand-alone. (*Id.* at 21)

The Court agrees with Wabtec. The patent describes “tasks” that communicate asymmetrically with one another, *see, e.g.*, ’698 patent at 2:63-66, and generate outputs to each other, *see id.* at 3:24-25. The patent explains that the two tasks are “paired,” meaning the output security code generated by the second task is sent to the first task, and then the first task sends one “output safety critical systems message” to the safety critical application system including both its own output safety data and the second task’s output security code. *See id.* at 3:8-29, 4:52-61. The patent clarifies, however, that “[b]oth tasks receive and verify safety critical systems input message data and security code integrity and *separately generate output data* responsive to the input message.” *Id.* at Abstract (emphasis added); *id.* at 2:59-62 (emphasis added). Further, the patent discloses a specific example of the patented control system in which “a commercial personal computer or a virtual computer environment . . . may be substituted for

proprietary railway-domain specific railway environment with *two independent tasks*, threads or nodes, and are configured for asymmetrical communication with other safety critical systems.” *Id.* at 2:53-59 (emphasis added). Therefore, while “a failure of either or both tasks . . . results in failure to transmit a safety critical system output message,” *id.* at 3:1-3, the tasks themselves operate independently of one another. The running of the first task has no bearing on the running of the second task.

C. EOT Patents

1. “end of train (EOT) unit monitoring station”¹⁶

<p>Siemens An off-train system for exchanging location-related messages with EOT units for tracking their location.</p>
<p>Wabtec Off-train equipment containing a wireless transceiver designed for exchanging messages with EOT units for tracking their location. The EOT unit monitoring station may not be integral with a central station.</p>
<p>Court An off-train system for exchanging location-related messages with EOT units for tracking their location.</p>

The parties agree that the EOT unit monitoring station is located off-train and functions to exchange messages with EOT units to track their location. (D.I. 107 at 21; D.I. 109 at 16)

Siemens contends that Wabtec’s added limitations – that the EOT unit monitoring station contain a wireless transceiver and that it may not be integral with a central station – are never described in the specification. (D.I. 107 at 22)

The Court agrees with Siemens that a transceiver is not required by the claims. That the

¹⁶This term appears in claims 1 and 2 of the ’032 patent and claims 1, 8, and 11 of the ’850 patent.

EOT unit monitoring station is “configured for wireless communication” with the EOT device is directly stated in the claims. Accordingly, construing the term “EOT unit monitoring station” to require a transceiver would render some of the remaining claim language superfluous.

Moreover, while the patent expressly describes a transceiver included in the EOT unit, no such requirement is described in relation to the EOT unit monitoring station. *See* ’032 Patent at 4:43-67. The Court further agrees with Siemens that the EOT unit monitoring station may be integral with the central authority, as nothing in the intrinsic record – most especially the specification – indicates otherwise.

2. “[configured for] wireless communication”¹⁷

Siemens No construction necessary. Alternative: Designed to communicate with another device not connected by a wire.
Wabtec Possessing either a short range transceiver or a long range transceiver but not both.
Court Designed to communicate with another device not connected by a wire.

Wabtec contends that because the EOT unit monitoring station must include a transceiver, and because that transceiver is capable of either short range or long range communication, but not both, the term “[configured for] wireless communication” must be construed as possessing either a short or long range transceiver and not both. (D.I. 109 at 19-20)

Siemens contends that the patent specifically discloses a head of train (HOT) unit – which communicates with the EOT unit – containing both a short and long range transceiver. (D.I. 119)

¹⁷This term appears in claim 1 of the ’032 patent.

at 29) (citing '032 patent at 7:1-5) Therefore, according to Siemens, being “[configured for] wireless transmission” does not mandate the use of only a short or long range transceiver, but allows for a combination of both transceivers. (*Id.*)

The Court agrees with Siemens that the short and long range communication systems are not mutually exclusive. The patent teaches EOT units as having both short and long range communications capability without any requirement that the two be mutually exclusive. *See* '032 patent at 4:61-67. Additionally, the patent discloses an HOT device which includes both short and long range communication systems, contrary to Wabtec’s proposed construction. *See id.* at 7:1-6.

3. “[first / second] wireless message”¹⁸

<p>Siemens No construction necessary.</p> <p>Alternative: Messages sent between two devices not connected by a wire.</p>
<p>Wabtec The first and second messages are sent with the same short range or long range communication system.</p>
<p>Court Messages sent between two devices not connected by a wire.</p>

Wabtec contends that messages sent to the EOT unit monitoring station and to the HOT unit must originate from the same short range or long range communication system. (D.I. 109 at 20-21) According to Wabtec, the patent does not enable a transceiver that is capable of both short and long range communication. (*Id.* at 21) Siemens asserts that, as with the '032 patent, there is no requirement in the '850 patent that precludes the EOT unit from having both short and

¹⁸This term appears in claims 1, 3-8, 10, and 13 of the '850 patent.

long range communication capability. (D.I. 107 at 24)

The Court agrees with Siemens. There is no requirement in the patent that short and long range communications must be mutually exclusive, or that the wireless messages be transmitted via one type of communication. *See* '850 patent at 4:63-66 (“In some embodiments, the transceiver 160 is a short range transceiver In other embodiments, the transceiver 160 may be suited for long range communications.”).

III. CONCLUSION

The Court construes the disputed terms as explained above. An appropriate Order follows.