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Paper 10
Date: December 7, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ACTIV FINANCIAL SYSTEMS, INC.,
Petitioner,

v.

IP RESERVOIR, LLC,
Patent Owner.

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IPR2020-01010
Patent 10,062,115 B2

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Before JAMES A. WORTH, SCOTT C. MOORE, and RICHARD H. MARSCHALL, *Administrative Patent Judges.*

MARSCHALL, *Administrative Patent Judge*.

# DECISION
Granting Institution of *Inter Partes* Review
*35 U.S.C. § 314, 37 C.F.R. § 42.4*

## INTRODUCTION

ACTIV Financial Systems, Inc. ("Petitioner") filed a Petition (Paper 2, "Pet.") requesting institution of an *inter partes* review of claims 43 and 44 of U.S. Patent No. 10,062,115 B2 (Ex. 1001, "the '115 patent"). IP Reservoir, LLC ("Patent Owner") filed a Preliminary Response. Paper 7 ("Prelim. Resp."). Petitioner filed a Reply (Paper 8, "Pet. Reply"), to which Patent Owner filed a Sur-reply (Paper 9, "PO Sur-reply"). Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

Upon consideration of the Petition and for the reasons explained below, we determine that Petitioner has shown that there is a reasonable likelihood that it would prevail with respect to claims 43 and 44, the only challenged claims. As such, we institute an *inter partes* review of claims 43 and 44 on all grounds set forth in the Petition.

## BACKGROUND

### *A. Real Parties in Interest*

Petitioner states that it is the sole real party in interest. Pet. 8. Patent Owner states that its real parties in interest are itself and Exegy, Inc. Paper 4, 2.

### *B. Related Matters*

The parties identify the following district court proceeding involving the '115 patent: *Exegy Inc. v. ACTIV Financial System, Inc.*, No. 1:19-CV-02858 (N.D. Ill). Pet. 9; Paper 4, 2. Petitioner also identifies applications and patents related to the '115 patent, and related petitions for *inter partes* review involving patents with subject matter that overlaps with the '115 patent. Pet. 9.

*C. The '115 Patent*

The '115 patent issued on August 28, 2018, from an application filed on June 26, 2014. Ex. 1001, codes (22), (45). The '115 patent claims priority to a provisional application filed on December 15, 2008. *Id.* at code (60). The '115 patent discloses embodiments relating to "hardware-accelerating the processing of financial market depth data." *Id.* at code (57).

According to the '115 patent, "[e]xchanges disseminate market information, such as the appearance of new buy/sell offers and trade transactions, as streams of events known as market data feeds." Ex. 1001, 3:42–45. "Orders flow into the exchange where they are inserted into a sorted 'book' of orders, triggering the publication of one or more events on the market data feed." *Id.* at 3:51–53. The '115 patent describes an "order book" as a "sorted listing of limit orders for each financial instrument." *Id.* at 3:54–55.

The '115 is directed to the use of a coprocessor in a market data platform configured to construct and maintain order books in a manner traditionally performed by downstream components. Ex. 1001, 4:63–5:14. In one embodiment, a "ticker plant employs a coprocessor that serves as an offload engine to accelerate the building of order books." *Id.* at 5:9–11. With such an arrangement, "[f]inancial market data received on a feed into the ticket plant can be transferred on a streaming basis to the coprocessor for high speed processing." *Id.* at 5:11–14. Exchanges may publish market data feeds that update order books. *Id.* at 3:59–61. Such feeds typically use either "full order depth" or "price aggregate depth" data models. *Id.* at 4:1–11, Fig. 2(a) (full order depth feed), 2(b) (price aggregate depth feed).

The '115 patent discloses structures capable of speeding up the processing of market data, and employs coprocessor 840 to enable its

hardware-accelerating data processing. Ex. 1001, 9:56–60. The coprocessor includes reconfigurable logic device ("RLD") 802, which may be a field programmable gate array ("FPGA"). *Id.* at 10:13–19, Fig. 8. RLD 802 includes firmware application module ("FAM") chain 850 that performs specified data processing on streams of data. *Id.* at 10:24–34. One exemplary embodiment employs "data processing module 1100 for generating a stream view of processed limit order data" via a FAM pipeline 1200. *Id.* at 12:21–24. A "'limit order' refers to an offer to buy or sell a specified number of shares of a given financial instrument at a specified price." *Id.* at 3:56–58. Pipeline 1200 includes Order Normalization and Price Aggregation Module (ONPA) (1208) that receives parsed messages, updates corresponding limit order records, and normalizes messages based on the received limit order events. *Id.* at 18:3–25, Fig. 12(a). The ONPA also maintains price point records to support price aggregated views of the order book. *Id.* at 18:6–30. In this data structure, a record is maintained for each unique price and includes fields for the total shares and orders at each price point. *Id.*

The '115 states that in a "preferred embodiment, parallel engines update and maintain the order and price aggregation data structures in parallel." Ex. 1001, 20:25–32. The '115 refers to an engine that updates and maintains an order data structure as an "order engine," and an engine that updates and maintains a price-aggregated data structure as a "price engine." *Id.* In one preferred embodiment, these "data structures are maintained in the same physical memory" to maximize throughput of the system. *Id.* at 20:27–32.

*D. Challenged Claims*

Petitioner challenges independent claim 43 and dependent claim 44, which are reproduced below. Pet. 10.

> 43. An apparatus for applying specific computer technology to reduce latency and increase throughput with respect to streaming data enrichment, the apparatus comprising:
>
> a coprocessor that includes an order engine and a price engine;
>
> wherein the coprocessor is configured to receive streaming data representative of a plurality of limit order events pertaining to a plurality of financial instruments;
>
> wherein the order engine is configured to (1) access a plurality of limit order records based on the streaming limit order event data, and (2) compute updated limit order data based on the accessed limit order records and the streaming limit order event data;
>
> wherein the price engine is configured to (1) access a plurality of price point records based on the streaming limit order event data, and (2) compute updated price point data based on the accessed price point records and the streaming limit order event data;
>
> wherein the coprocessor is further configured to enrich the streaming limit order events with financial market depth data based on the computed updated limit order data and price point data; and
>
> wherein the order engine and the price engine are configured to perform their respective operations in parallel with each other as the limit order event data streams through the coprocessor.
>
> 44. The apparatus of claim 43 wherein the coprocessor comprises a member of the group consisting of a reconfigurable logic device, a chip-multi-processor (CMP), and a graphics processing unit (GPU), and wherein the order engine and the price engine are deployed on the member.

Ex. 1001, 35:25–55.

*E. Evidence and Asserted Grounds*

Petitioner asserts that claims 43 and 44 are unpatentable on the following ground (Pet. 10):

| Claim(s) Challenged | 35 U.S.C. § | Reference(s)/Basis |
|---|---|---|
| 43, 44 | 103(a) | Parsons[1] |

Petitioner also relies on the Declaration of Bernard S. Donefer. Ex. 1004 ("Donefer Declaration").

ANALYSIS

*A. Denial Under 35 U.S.C. § 325(d)*

Patent Owner argues that we should exercise our discretion to deny institution because the Examiner already considered Parsons during prosecution and Petitioner fails to point out how the Examiner erred in its evaluation of Parsons. Prelim. Resp. 11–18.

*1. Legal Background*

Section 325(d) provides that, in determining whether to institute an *inter partes* review, "the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office." The Board uses a two-part framework in determining whether to exercise its discretion under § 325(d), specifically:

> (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the

[1] US 2008/0243675 A1, published October 2, 2008 ("Parsons") (Ex. 1006).

> Office erred in a manner material to the patentability of challenged claims.

*Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH,* IPR2019-01469, Paper 6, 8 (PTAB Feb. 13, 2020) (precedential).

In applying the two-part framework, we consider several non-exclusive factors, including: (a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art; (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments. *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph). If, after review of factors (a), (b), and (d), we determine that the same or substantially the same art or arguments previously were presented to the Office, then factors (c), (e), and (f) relate to whether the petitioner demonstrates that the Office erred in a manner material to the patentability of the challenged claims. *Advanced Bionics*, Paper 6 at 10.

For the reasons set forth below, under the facts presented and arguments made, we decline to exercise our discretion under 35 U.S.C. § 325(d) to deny instituting trial.

*2. The Prosecution History and the Parties' Positions*

During prosecution, the Examiner rejected pending claims 1, 2, 41, and 43 as obvious based on Hamati (US 8,175,946 B2) and Kelleher (US 7,598,958 B1), and claims 3–22 were rejected as obvious based on Hamati, Kelleher, and Parsons. Ex. 1002, 1540–41. Dependent claims 3–22 ultimately depended from claim 1, and the rejections employing Parsons relied on aspects of Parsons that taught certain dependent claim limitations. *Id.* at 1540–48, 1684–87. In response to the rejections, the applicant substantially amended pending independent claims 1, 42, and 44, as well as certain dependent claims. *Id.* at 1684–1701. In the remarks accompanying the amendments, the applicant argued that Hamati fails to disclose "separate engines for accessing limit order records and price point records" and therefore fails to disclose the limitation "wherein the order engine and the price engine perform their steps in parallel with each other" as required by pending claim 1, and that Kelleher did not remedy this deficiency in Hamati. *Id.* at 1707. The applicant stated that pending "claim 42 is non-obvious over the Hamati/Kelleher combination for similar reasons." *Id.* Parsons was not addressed in the remarks, as it was not part of the combination the Examiner relied on to reject the pending independent claims. *Id.* Following the amendment, the Examiner issued a Notice of Allowance "in view of the claimed amendments and arguments" made by the applicant. *Id.* at 1720, 1724–26. Pending independent claim 42 and dependent claim 43 became independent claim 43 and dependent claim 44, respectively, upon issuance of the '115 patent. *Id.* at 1694–95; Ex. 1001, 35:25–55.

In the Petition, Petitioner acknowledges that Parsons was before the Examiner and therefore the first part of the *Advanced Bionics* framework is satisfied. Pet. 75. Petitioner argues that the second part of the *Advanced*

*Bionics* framework is not satisfied "because Ground 1 raises materially different arguments than those the Office previously considered, and the Examiner demonstrably failed to appreciate that the obvious implementations of Parsons relied upon herein meet the challenged claims." *Id.* (emphasis omitted).

Petitioner addresses *Becton, Dickinson* factors (c), (e), and (f) as the factors relevant to the second part of the *Advanced Bionics* Framework. Pet. 75–78. As to factor (c) (the extent that Parsons was considered during prosecution), Petitioner contends that "the Examiner never applied Parsons in rejecting claims 43–44" and that "the Examiner cited Parsons only for limitations (e.g., 'summary view' and 'ticker plant') not in claims 43–44." *Id.* at 75 (citing Ex. 1002, 66–67, 1540–48). Petitioner also contends that "Parsons materially differs from the Hamati-Kelleher combination," Parsons does not use the same "order engine" and "price engine" terms that appear in claims 43–44, there is no indication the Examiner recognized that Parsons discloses those limitations, and therefore "there is no overlap between arguments considered during prosecution and how Petitioner relies on Parsons." *Id.* at 75–76 (citing Ex. 1002, 1540, 1729; Ex. 1004 ¶¶ 142–149). As to factors (e) (whether Petitioner pointed out sufficiently how the Examiner erred) and (f) (the extent to which additional evidence warrants reconsideration of the prior art), Petitioner argues that "[t]he Examiner materially erred by failing to appreciate the full scope of Parsons's teachings relied upon herein" and failing to appreciate that Parsons's teachings render obvious "a coprocessor with order and price engines that perform their tasks in parallel." *Id.* at 77. Petitioner also points out that "new evidence" now before the Board, but not before the Examiner—namely, Petitioner's "new

expert declaration" from Mr. Donefer—"weighs against discretionary denial." *Id.* at 78 (citing Ex. 1004 ¶¶ 3–21, 97–141).

Patent Owner argues that the prosecution of the '115 patent reveals that the "Examiner was fully aware of the teachings of Parsons, having cited extensive teachings from Parsons in the Office action;" the Examiner recognized the advantages of Parsons, having relied on them "in nine sub-rejections involving Parsons;" and the "Examiner allowed the claims at issue here despite an intimate understanding of Parsons's teachings." Prelim. Resp. 5; *see also id.* at 5–9 (summarizing prosecution history). As to the *Becton, Dickinson* factors, Patent Owner argues that factor (c) favors denial because the teachings of Parsons were discussed repeatedly throughout '115 patent specification and the Examiner relied upon Parsons extensively in the rejections. *Id.* at 13–14 (citing Ex. 1001, 6:28–38, 12:35–43, 17:28–51, 23:39–64, 23:65–24:5, 28:46–49, 28:64–29:21; Ex. 1002, 1541–48). As to factor (e), Patent Owner argues that the Petition fails to explain why Parsons's "nonuse of the phrases 'order engine' and 'price engine' would have confused the Examiner to the point that he could not search for the same or similar structures or functionality that was simply named differently in Parsons." *Id.* at 15–16. Patent Owner contends that Petitioner's argument "amounts to pure speculation" that fails to point out how the Examiner erred. *Id.* at 16. Patent Owner also contends that "the Examiner did not err because the Examiner considered and asserted the same argument that Petitioner advances here." *Id.* In Patent Owner's view, Petitioner relies on Parsons's improved processing power as a rationale for its obviousness arguments, and the Examiner was already familiar with that rationale and relied upon it in the context of the rejections based on Parsons. *Id.* at 16–17 (citing Ex. 1002, 1548; Pet. 7). As to factor (f), Patent Owner argues that the factor favors

denial because the new expert declaration in support of the Petition does not "explain how the Examiner made an error during his evaluation of Parsons." *Id.* at 18.

In its Reply, Petitioner argues that Patent Owner's argument that Parsons was "extensively evaluated during prosecution ([Prelim. Resp.], 13) is misleading" because "Parsons was never applied to reject challenged claims 43–44, or to any claim that recited order and price engines at all, let alone the numerous other additional limitations added by amendment." Pet. Reply 1 (citing Ex. 1002, 1694–95). Petitioner also contends that the proper inquiry under factor (c) focuses on the extent that the Examiner evaluated Parsons in the manner that the Petition applies Parsons. *Id.* Petitioner argues that because the claims were amended after the rejections based on Parsons, the "record provides no indication of the extent to which—if at all—Parsons was evaluated to determine whether it taught an order engine, price engine or the apparatus recited in any challenged claim." *Id.* at 1–2. As to factor (e), Petitioner argues that only consideration of the merits of its challenges can determine whether the Examiner materially erred, and the failure of the Patent Owner to point out any deficiency in those challenges underscores their strength and the Examiner's error. *Id.* at 3 (citing Pet. 77–78; Prelim. Resp. 15–17).

In its Sur-reply, as to factor (c), Patent Owner again asserts that Parsons was extensively evaluated during prosecution, and that fact that Parsons was not used to reject the challenged claims here does not end the analysis. PO Sur-reply 1. As to factor (e), Patent Owner asserts that the burden is on Petitioner to sufficiently explain the Examiner error, and it has failed to do so by merely pointing out that Parsons did not use the same

terminology as the challenged claims. *Id.* at 3 (citing Ex. 1002, 1729; Pet. 5, 77; Prelim. Resp. 16–17).

*3. Discussion*

The parties agree that the first part of the *Advanced Bionics* framework is satisfied because the same art (Parsons) that forms the basis for the only challenge in the Petition was before the Examiner and used in various rejections during prosecution. Pet. 75; Prelim. Resp. 13. As part of our consideration of the second part of the *Advanced Bionics* framework, "whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims," we consider *Becton, Dickinson* factors (c), (e), and (f). *Advanced Bionics* at 8–9.

As to factor (c),[2] the Examiner's reliance on Parsons during prosecution supports both parties' positions. Patent Owner correctly points out that Parsons was cited in the '115 patent specification and was used in several rejections during prosecution, even if those rejections were not made to the challenged claims here. Prelim. Resp. 13–14. On the other hand, Petitioner correctly notes that the rejections relying on Parsons not only involved different claims, but that those claims did not contain the key limitations that were added by amendment after the rejections in order to obtain allowance of the challenged claims here. Pet. Reply 1. The applicant successfully argued that the Hamati reference did not disclose separate order and price engines, and therefor did not disclose such engines operating in parallel, and the record does not reveal the extent to which the Examiner

[2] As noted above, *Becton, Dickinson* factor (c) relates to "the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection." *Becton, Dickinson*, Paper 8 at 17–18.

considered whether Parsons discloses those limitations, or whether the Examiner ever considered the specific portions of Parsons that Petitioner relies on in its challenges here.

This case does not lie on either end of the extremes that point clearly in favor or against discretionary denial. On one end of the spectrum are cases involving minimal evidence of Examiner consideration. On the other end of the spectrum are cases where the prior art in question is used in a rejection of a challenged claim in a manner similar to the way that the prior art is used in the petition. For example, if the Examiner had rejected claims 43 and 44 based in whole or in part on Parsons and found that Parsons discloses the order and price engines operating in parallel, but was later convinced, by amendment or further argument, that Parsons did not disclose those limitations, this factor would weigh strongly in favor of discretionary denial because the Petition relies on the same arguments expressly rejected by the Examiner when allowing the claims. Because the facts here lie somewhere in the middle of the two possible extremes, we consider factor (c) neutral.

Our consideration of factor (f)[3] leads to a similar result. We agree with Petitioner that we have considerably more evidence and facts before us than the Examiner had at its disposal during prosecution. The Petition contains a lengthy analysis of Parsons and its applicability to claims 43 and 44, supported by declarant testimony, none of which were available to the Examiner during ex parte prosecution. *See* Pet. 16–72; Ex. 1004. On the

[3] Factor (f) recites: "the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments." *Becton, Dickinson*, Paper 8 at 17–18.

other hand, the Examiner presumably could have read all of the voluminous prior art of record, including Parsons, and considered arguments similar to those raised in the Petition and the supporting statements from the declarant, and in that sense the evidence before us is not sufficiently new that this factor weighs strongly for or against denial of institution. We consider factor (f) neutral in this case.

Factor (e)[4] relates to the extent the Examiner may have erred, which gets to the crux of the second part of the *Advanced Bionics* framework and whether the Examiner "erred in a material manner." *Advanced Bionics,* Paper 6, 8. We agree with Petitioner that assessing this issue involves assessing the strength of the merits of the Petition, because the Examiner did not make any express findings as to Parsons that relate to the challenged claims. *See* Pet. Reply 2–3. We also agree with Petitioner that it need not explain *why* the Examiner failed to act in a certain way and need only establish *how* the Examiner erred. *See id.* at 3 (arguing that Patent Owner conflates *how* the Examiner erred with speculation as to *why* the Examiner may have erred); *see also* Prelim. Resp. 15–16 (Patent Owner arguing that Petitioner merely speculates that the Examiner may have erred because Parsons uses different terminology that the '115 patent).

As to the merits, which are discussed in more detail below, Petitioner argues that Parsons discloses or renders obvious all of the limitations of claim 43. The applicant gained allowance of claim 43 by alleging that Hamati fails to disclose "separate engines for accessing limit order records

[4] Factor (e) recites: "whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art." *Becton, Dickinson*, Paper 8 at 17–18.

and price point records" and therefore fails to disclose the limitation "wherein the order engine and the price engine perform their steps in parallel with each other." Ex. 1002, 1707 (emphasis omitted). Petitioner persuasively argues that Parsons discloses separate order and price engines, and that it would have been obvious to operate them in parallel on the same processor. *See* Pet. 20–49, 50–72. For example, the Petition explains that Parsons already discloses separate order and price engines on its order book server ("OBS"), on a single coprocessor, and that it would have been obvious to operate the engines in parallel based on other operations running in parallel on other coprocessors in Parsons. *See id.* at 20–49. In addition, in an alternative ground, the Petition explains that the order price engine on the OBS already runs in parallel with a price engine operating on another coprocessor in Parsons, and that it would have been obvious to put those two engines on the same coprocessor as Parsons suggests such a consolidation on a single RLD. *See id.* at 50–72. In both instances, the Petition persuasively relies on various similarities in the manner in which the '115 patent and Parsons describe the functionality of the engines to support Petitioner's arguments.[5]

Notably, when faced with these assertions in the Petition and Petitioner's argument that the Examiner erred in overlooking them, Patent Owner did not argue that these embodiments of Parsons fail to disclose separate order and price engines that operate in parallel, or otherwise contest

[5] The similarity between the descriptions makes sense, as Parsons and the '115 patent contain overlapping inventors, and the assignee of Parsons at the time of publication (Exegy Inc.) is a real party in interest here. Paper 4, 2. The '115 patent also incorporates Parsons by reference. *See* Ex. 1001, 1:21–24, 1:32–33.

any aspect of Petitioner's case on the merits. *See* Prelim. Resp. 1–18. The persuasive argument and evidence contained in the Petition fatally undermine the arguments the applicant made during prosecution in order to obtain allowance of the challenged claims, and therefore the Examiner's failure to appreciate these aspects of Parsons was highly material. *See* Ex. 1002, 1707. We view the merits of the challenges in the Petition as strong, and determine that Petitioner sufficiently pointed out the Examiner's failure to appreciate the full extent of Parsons, such that consideration of *Becton, Dickinson* factor (e) strongly weighs against discretionary denial.[6] Accordingly, because Petitioner established that the Examiner's failure to appreciate the full extent of Parson's disclosure resulted in a material error, the second part of the *Advanced Bionics* framework counsels against discretionary denial.

*4. Conclusion*

After considering the framework set forth in *Advanced Bionics* and the appropriate *Becton, Dickinson* factors, the particular circumstances of this case do not indicate that we should exercise our discretion under § 325(d) to deny institution.

*B. Level of Ordinary Skill in the Art*

Petitioner contends that a person having ordinary skill in the art would have had

[6] We view the merits as "strong" based in part on the unrebutted nature of Petitioner's case at this point, without hearing from Patent Owner on any of these issues. These impressions are preliminary in nature, and our view of the merits may change during trial. In addition, because factor (e) weighs strongly against discretionary denial, we would have reached the same result here even if we viewed factors (c) and (f) as slightly in favor of discretionary denial rather than as neutral.

> (1) a bachelor of science degree or higher in electrical engineering, computer engineering, or a similar field; (2) at least two years of experience working with financial computing systems; and (3) experience with systems having high throughput data streaming and processing requirements, for example systems for processing data feeds.

Pet. 13. Petitioner also contends that "[a]dditional education could have substituted for professional experience, and significant work experience could have substituted for formal education." *Id.* (citing Ex. 1004 ¶¶ 93–95). Patent Owner does not address Petitioner's proposal.

For purposes of this Decision, we preliminarily adopt Petitioner's asserted level of ordinary skill because it appears to be consistent with the problems addressed by the '115 patent and the prior art of record. The parties may continue to address this issue during trial. When doing so, the parties should make clear which portions of the respective proposals are in dispute, and the basis for any alterations to the proposal. In addition, both parties should address whether our adoption of the other party's proposal would alter the outcome of any of the issues in this case.

*C. Claim Construction*

We interpret claims in the same manner as in a civil action under 35 U.S.C. § 282(b) "including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b) (2019). Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Petitioner states that "[t]erms defined in the specification are given their defined meanings, and other terms are construed in accordance with their ordinary and customary meaning as understood by a POSA and the patent's prosecution history." Pet. 15. Petitioner does not propose any specific constructions for any claim terms, and our review of the record at this time does not reveal any terms in need of construction at this time.

*D. Obviousness of Claims 43 and 44 Based on Parsons*

Petitioner challenges claims 43 and 44 under 35 U.S.C. § 103 based on Parsons. Pet. 20–72. For these challenges, Petitioner cites to the asserted references and the Donefer Declaration. *Id.*

Petitioner breaks up its challenge into two independent challenges based on different aspects of Parsons, as discussed in more detail below. For the reasons that follow, Petitioner has shown, for each challenge, that there is a reasonable likelihood that it would prevail with respect to claims 43 and 44.

*1. Legal Standard*

A claim is unpatentable as obvious under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1156).

*2. Overview of Parsons*

Parsons relates to "systems for processing financial market data using reconfigurable logic." Ex. 1006, code (57). The system assigns various functional tasks to firmware pipelines to accelerate the processing speed of the system. *Id.* More specifically, the system employs RLDs in the form of FPGAs that process the financial market data at hardware speeds to reduce latencies. *Id.* ¶¶ 10–11. Parsons configures FAMs on its FPGAs to perform specific data processing tasks. *Id.* ¶ 45, Fig. 2. The FPGAs are connected to "a system's main processor 208" to enable offloading of certain tasks from main processor 208. *Id.* ¶¶ 39, 52, 56.

Parsons's Figure 6 is reproduced below.

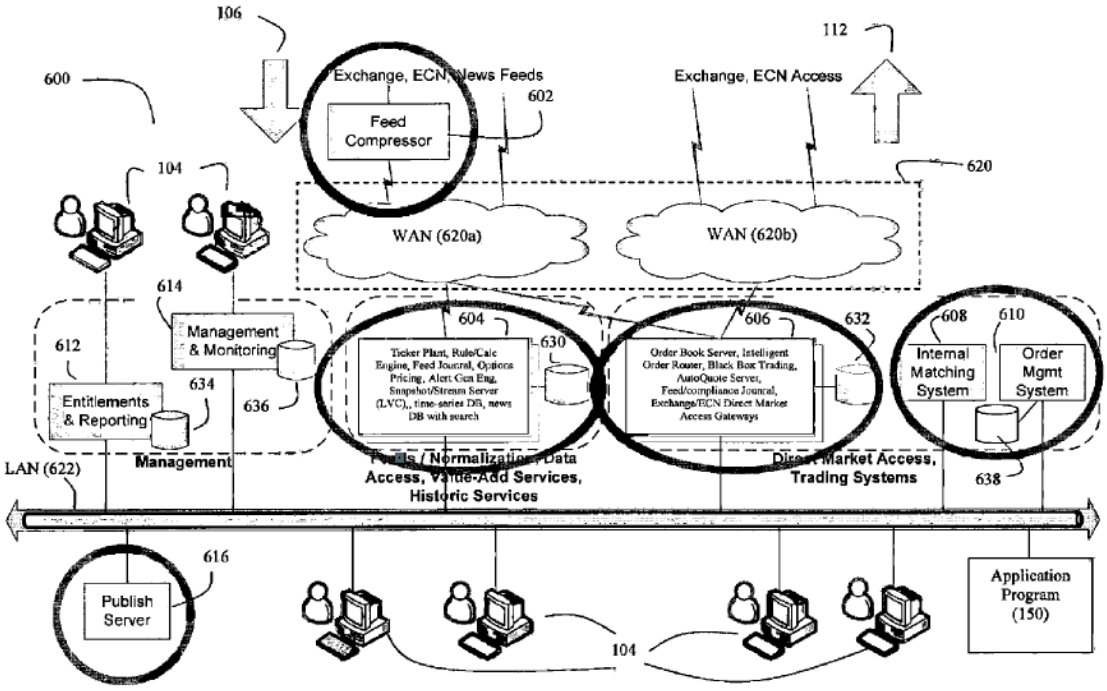


**Figure 6**

Figure 6 depicts "an exemplary architecture for a market data platform." Ex. 1006 ¶ 22. Market Data Platform 600 shown in Figure 6 consolidates functional units into fewer physical devices when compared to previous platforms, by offloading certain functions to RLDs, including devices 604,

606. *Id.* ¶¶ 56, 59. RLD 604 provides a Last Value Cache ("LVC") server that processes financial market data stream 106 in real time, while RLD 606 provides an "order book server" ("OBS") that also processes financial market data stream 106 in real time. *Id.* ¶¶ 56, 60–62, 71. The OBS and LVC servers both include caching modules that are configured to maintain a cache of financial instrument records as updates are reported by exchanges, where each caching module performs specific updates to keep the data up to date. *Id.* ¶¶ 60, 62, 71, 95–96, 125–132. The OBS employs an "order book cache update, retrieve and normalize (OBC)" FAM to update limit order records and price aggregation records for each financial instrument record stored in its cache. *Id.* ¶¶ 71, 96. The LVC server employs an LVC module, or "price summary LVC," that maintains records storing price point information related to financial instruments. *Id.* ¶¶ 62, 92, 126–127.

*3. Discussion of Obviousness Based on Parsons's Modified Order Book Server (OBS)*

Petitioner breaks its challenge to claims 43 and 44 into two independent parts. In the first part that we address in this section, Petitioner relies on a modified version of Parsons's OBS ("Modified-OBS"). *See* Pet. 20 (citing Ex. 1004 ¶¶ 112–116). Petitioner then applies the Modified-OBS to the limitations of the challenged claims. *Id.* at 27–50. Petitioner's proposed modifications to Parsons's OBS are particularly relevant to the last limitation of claim 43 that requires order and price engines "configured to perform their respective operations in parallel with each other."

*a) Petitioner's Proposed Modified-OBS*

Petitioner relies on Parsons's implementation of its OBS on device 606, also referred to as FPGA 402. Pet. 20 (citing 1004 ¶¶ 117, 127–134; Ex. 1006 ¶¶ 45, 52–53, 56, 69–71). According to Petitioner, "the OBS

pipeline receives data stream 106 to maintain order books for financial instruments," the order books are stored, and to access and update the order books in real-time, the "OBS pipeline implement the OBC as a caching module to update the financial instrument records." *Id.* at 21 (citing Ex. 1004 ¶ 118; Ex. 1006 ¶¶ 6, 71, 96). Petitioner contends that the OBC's cache "includes two data structures: (1) limit order sub-records storing 'a sorted list of the bids and offers associated with all outstanding orders' for each financial instrument; and (2) price-aggregated sub-records storing 'entries that are indicative of the total number of orders available at each price point.'" *Id.* (citing Ex. 1004 ¶¶ 119–121; Ex. 1006 ¶¶ 71, 96). Petitioner contends that these OBC sub-records are updated in real time based on information received from the message stream. *Id.* at 22 (citing Ex. 1004 ¶ 126; Ex. 1006 ¶¶ 6, 71, 96). According to Petitioner, the "OBC's reconfigurable logic configured to perform updates to the order and price-aggregated data structures meets the claimed 'order engine' and 'price engine,' respectively." *Id.* at 20 (citing Ex. 1004 ¶¶ 112–116).

Petitioner relies on Parsons's LVC for its teaching of update engines that operate in parallel with one another. Pet. 22–24. More specifically, Petitioner contends that "Parsons's LVC includes a Memory Manager configured to retrieve records from the LVC's cache . . . and load those records into record buffers for processing by a set of update engines." *Id.* at 22. Petitioner contends that the LVC "then retrieves and loads records for the next message in the stream so that multiple messages can be processed in parallel to achieve higher message throughput." *Id.* at 22 (citing Ex. 1004 ¶135; Ex. 1006 ¶¶ 125–134, Fig. 15(a)). According to Petitioner, "[w]hen different record types are maintained and updated, the processing may be distributed by assigning separate update engines the task of updating a

particular record, so that multiple records are updated by different engines operating in parallel." *Id.* at 23 (citing Ex. 1004 ¶¶ 136–139).

Petitioner asserts that one of ordinary skill in the art would have been motivated to implement the OBS's OBC with the parallel processing technique employed on the LVC. Pet. 24–27. Petitioner contends that the OBC performs "cache access . . . like Parsons's other caching modules (including the LVC)" but Parsons does not describe how the OBC updates its data structures. *Id.* at 24 (citing Ex. 1004 ¶ 158; Ex. 1006 ¶ 93). Petitioner contends that one of ordinary skill in the art would have been motivated to employ the parallel processing techniques described with reference to the LVC within the OBC due to their similarity and to obtain higher throughput on the OBC, as Parsons teaches. *Id.* at 24–25 (citing Ex. 1004 ¶¶ 158–170; Ex. 1006 ¶¶ 10–15, 71, 95–96, 125–134, 162). Petitioner argues that distributing update operations to the OBC's order and price-aggregated sub-records to different "update engines operating in parallel would have merely been the use of the known technique using parallel update engines configured to update different record types to yield the predictable result of increasing throughput." *Id.* at 25 (citing Ex. 1004 ¶ 167). After this modification, the resulting "OBC employs an order engine (that updates the order records) and a price engine (that updates the price-aggregated records) operating in parallel." *Id.* at 26 (citing Ex. 1004 ¶ 168). This "Modified-OBC" forms the basis for the "Modified-OBS" that Petitioner asserts discloses every limitation of the challenged claims.

Patent Owner does not specifically address any of Petitioner's arguments and evidence on these points, except to broadly argue that the "Examiner did not err because the Examiner considered and asserted the same argument that Petitioner advances here" as part of Patent Owner's

§ 325(d) argument. *See* Prelim. Resp. 16. Based on our review of the current record, Petitioner establishes sufficiently that one of ordinary skill in the art would have been motivated to modify Parsons's OBC to implement parallel processing similar to that Parsons's already employs in its LVC, such that the Modified-OBC, and the Modified-OBS that contains the Modified-OBC, employs an order engine and price engine operating in parallel with one another.

*b) Application of Modified-OBS to Claims 43 and 44*

Petitioner contends that Parsons's Modified-OBS discloses or renders obvious all of the limitations of claims 43 and 44. Pet. 27–50. In support of its assertions, Petitioner cites to specific portions of Parsons that allegedly support its contentions, along with support from the Donefer Declaration for each limitation. *See id.* Patent Owner does not specifically address any of Petitioner's argument and evidence on these issues. For several limitations, Petitioner contends that claim 43 recites operations performed by order and price engines that the '115 patent acknowledges are conventional. *Id.* at 14.

We have reviewed Petitioner's arguments and evidence in support of its assertion that Parsons's Modified-OBS discloses or renders obvious all of the limitations of claims 43 and 44.[7] For example, Petitioner argues that "[a]n FPGA implementing Parsons's Modified-OBS," such as device 606, discloses "a coprocessor that includes an order engine and a price engine." Pet. 28–31. Petitioner also argues that the Modified-OBS receives "financial data stream 106," which meets the claim limitation requiring receipt of "streaming data representative of a plurality of limit order events." *Id.* at

[7] Claim 43 is block quoted above, and Petitioner provides an annotated version of the claims at the end of its Petition. Pet. 80–81.

31–33. For the limitations requiring the order and price engines to perform specified functions such as accessing records and computing updated data for the order and price records, Petitioner argues that Parsons's Modified-OBS pipeline, as described above in the overview of Parsons, discloses these limitations. *Id.* at 33–42. As to the limitation requiring the coprocessor to "enrich the streaming limit order data," Petitioner contends that Parsons's Modified-OBC, part of the Modified-OBS, discloses the "same message enriching" as the '115 patent discloses, which involves modifying or appending fields in limit order messages with updates. *Id.* at 43–46. The final limitation requires the order and price engines to operate "in parallel with each other as the limit order even data streams through the coprocessor," and Petitioner contends that the Modified-OBS, where the parallel processing used in the LVC is incorporated into the OBS, satisfies this limitation. *Id.* at 47–49.

As to dependent claim 44, which covers coprocessors that are RLDs, Petitioner contends that the "FPGA on which the Modified-OBS coprocessor is implement" is characterized by Parsons as an RLD and satisfies this limitation. Pet. 49. In addition, because the Modified-OBS processor includes the Modified-OBC containing the order and price engines, those engines are deployed on the RLD as required by claim 44.

Based on the current record, Petitioner establishes sufficiently that the Modified-OBS discloses or renders obvious all of the limitations of claims 43 and 44.

*c) Conclusion*

Based on our review of the current record, Petitioner has established sufficiently that the one of ordinary skill in the art would have been motivated to modify Parsons's OBS to operate its order and price engines in

parallel, and that the Modified-OBS discloses or renders obvious all of the limitations of claims 43 and 44. Accordingly, we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail with respect to claims 43 and 44 based on Parsons's Modified-OBS.

*4. Discussion of Obviousness Based on Parsons's TPS Deployed on an FPGA*

Petitioner also relies on a second, distinct challenge to claims 43 and 44. Although our analysis of the challenge based on the Modified-OBS above results in institution on all challenges in the Petition, including this one, we provide a brief analysis of this challenge to aid the parties during trial.

For this challenge, Petitioner argues that Parson's OBC contains an order engine, Parson's LVC contains a price engine, which already operate in parallel with one another, and it would have been obvious to deploy them together on a modified Ticker Plant System ("TPS") pipeline on the same FPGA to satisfy the first limitation of claim 43 requiring "a coprocessor that includes an order engine and a price engine."

*a) Petitioner's Proposed Modification Deploying OBS and LVC on the Same TPS Pipeline on an FPGA*

Petitioner contends that Parsons's platform 600 consolidates certain functions on RLDs, "including device 604 on which the LVC server is implemented, and device 606 on which the OBS is implemented." Pet. 50 (citing Ex. 1004 ¶¶ 271–275; Ex. 1006 ¶¶ 11–15, 56, 60, 70, 162). Petitioner contends that the LVC server and OBS already operate in parallel to reduce latency. *Id.* Petitioner contends that "Parsons makes clear that Fig. 6's system is merely illustrative, and that a POSA 'may choose to deploy less than all the functionality described herein in reconfigurable

logic,' and may arrange a device to include 'some … subset of the functions listed in Fig. 6.'" *Id.* at 51 (quoting Ex. 1006 ¶ 165) (alternation in original). Petitioner also contends that "Parsons suggests that over time it may be possible to consolidate 'all functionality shown in Fig. 6 [including the OBS and LVC] on a single system 200' with a single FPGA." *Id.* at 52 (quoting Ex. 1006 ¶ 165) (alteration in original).

Petitioner argues that one of ordinary skill in the art "would have been motivated to include Parson's OBC in the ticker plant pipeline of FIG. 11 and consolidate the OBS and LVC on a single FPGA." Pet. 53 (citing Ex. 1004 ¶¶ 276–287). Petitioner contends that such a modification would produce numerous efficiencies, including reduced hardware requirements due to consolidating functions on a single FPGA, reduced redundancy by sharing FAM modules, and reduced processing. *Id.* (citing Ex. 1004 ¶¶ 279, 283; Ex. 1006 ¶¶ 92, 136–138, 162); *see also id.* at 53–56 (providing additional reasons supporting the motivation to modify Parsons). Petitioner also contends that one of ordinary skill in the art would implement the OBS on Parsons's ticker plant FAM pipeline with "minimal and straightforward changes," calling the resulting modified FAM pipeline the "Ticker Plant Server (TPS)." *Id.* at 56–59.

Patent Owner does not specifically address Petitioner's arguments and evidence on these points. Based on our review of the current record, Petitioner establishes sufficiently that one of ordinary skill in the art would have been motivated to modify Parsons by consolidate the OBS and LVC on the same FPGA (the "TPS" on an FPGA).

*b) Application of the TPS on an FPGA to Claims 43 and 44*

Petitioner contends that once Parsons is modified to have the TPS on an FPGA, Parsons discloses or renders obvious all of the limitations of

claims 43 and 44. Pet. 60–72. In support of its assertions, Petitioner cites to specific portions of Parsons that allegedly support its contentions, along with support from the Donefer Declaration for each limitation. *See id.* Patent Owner does not specifically address any of Petitioner's argument and evidence on these issues.

We have reviewed Petitioner's arguments and evidence in support of its assertion that the TPS on an FPGA discloses or renders obvious all of the limitations of claims 43 and 44. For several other limitations, Petitioner refers back to its analysis for the challenge based on the Modified-OBS because those assertions apply equally to this challenge. Pet. 59. The proposed modification addresses the first limitation of claim 43 requiring a coprocessor that contains both an order engine and a price engine because the TPS includes the OBC's order engine and the LVC's price engine functionality. *Id.* at 60–61. Petitioner's remaining arguments largely track previous arguments, except that this challenge relies on the LVC's price engine and related functionality rather than the OBS's price engine. *See id.* at 61–66. As to the limitation requiring the coprocessor to "enrich the streaming limit order data," Petitioner contends that the OBC on the TPS operates in the same way as in the Modified-OBS coprocessor, and the LVC also updates streaming order events in the message stream with updated price information. *Id.* at 66–69. As to the final limitation requiring the order and price engines to operate "in parallel with each other as the limit order even data streams through the coprocessor," Petitioner contends that the two engines "are arranged as parallel FAMs in the TPS pipeline and thus perform their respective operations in parallel." *Id.* at 69.

As to dependent claim 44, Petitioner contends that the TPS coprocessor is implemented on an FPGA, and that both the order and price

engines are deployed on the FPGA, which satisfies claim 44's requirements. Pet. 72.

Based on the current record, Petitioner establishes sufficiently that that once Parsons is modified to have the TPS on an FPGA, Parsons as so modified discloses or renders obvious all of the limitations of claims 43 and 44.

*c) Conclusion*

Based on our review of the current record, Petitioner has established sufficiently that the one of ordinary skill in the art would have been motivated to modify Parsons to deploy its OBS and LVC on the same FPGA, resulting in the TPS on an FPGA, and that the TPS on an FPGA discloses all of the limitations of claims 43 and 44. Accordingly, we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail with respect to claims 43 and 44 based on modifying Parsons to include the TPS on an FPGA.

CONCLUSION

Because Petitioner has shown that there is a reasonable likelihood that it would prevail with respect to at least one of the challenged claims, we institute an *inter partes* review of all challenged claims on all presented challenges.

At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claims or any underlying factual and legal issues.

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 43 and 44 of U.S. Patent No. 10,062,115 B2 is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of U.S. Patent No. 10,062,115 B2 shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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