

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMAZON.COM, INC. and
AMAZON WEB SERVICES, INC.,
Petitioner,

v.

SWARM TECHNOLOGY LLC,
Patent Owner.

IPR2022-00633
Patent 10,592,275 B2

Before MICHAEL R. ZECHER, GREGG I. ANDERSON, and
SCOTT B. HOWARD, *Administrative Patent Judges*.

ZECHER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
Dismissing Patent Owner's Contingent Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

Petitioner, Amazon.com, Inc. and Amazon Web Services, Inc. (collectively “Amazon”), filed a Petition requesting an *inter partes* review (“IPR”) of claims 1–17 of U.S. Patent No. 10,592,275 B2 (Ex. 1001, “the ’275 patent”). Paper 2 (“Pet.”). Patent Owner, Swarm Technology LLC (“Swarm”), filed a Preliminary Response. Paper 5. Taking into account the arguments presented in Swarm’s Preliminary Response, we determined that the information presented in the Petition established that there was a reasonable likelihood that Amazon would prevail with respect to challenging at least one of claims 1–17 of the ’275 patent as unpatentable. Pursuant to 35 U.S.C. § 314, we instituted this IPR on September 6, 2022, as to all challenged claims and all grounds raised in the Petition. Paper 8 (“Institution Decision” or “Dec. on Inst.”).

During trial, Swarm filed a Patent Owner Response (Paper 12, “PO Resp.”), Amazon filed a Reply to the Patent Owner Response (Paper 16, “Pet. Reply”), and Swarm filed a Sur-reply to the Reply (Paper 25, “PO Sur-reply”). Swarm also filed a Contingent Motion to Amend (Paper 11, “Mot.”) and Amazon filed an Opposition to the Contingent Motion to Amend (Paper 15). After receiving Preliminary Guidance (Paper 19) regarding Swarm’s Contingent Motion to Amend, Swarm filed a Reply to the Opposition to the Contingent Motion to Amend (Paper 24) and Amazon filed a Sur-reply to the Reply to the Opposition to the Contingent Motion to Amend (Paper 31). In addition, an oral argument was held on June 6, 2023, and a transcript of the hearing is included in the record. Paper 35 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–17 of the ’275 patent. For the reasons we identify below, we hold that Amazon has not demonstrated by a preponderance of the evidence that any of the challenged claims are unpatentable. As a result, we *dismiss* Swarm’s Contingent Motion to Amend as moot.

A. Real Parties in Interest

According to the Petition, Amazon.com, Inc. and Amazon Web Services, Inc. are the real-parties in interest (“RPIs”). Pet. 75. Swarm identifies itself as the only RPI. Paper 3, 1 (Swarm’s Mandatory Notices Under 37 C.F.R. § 42.8).

B. Related Matters

The parties identify the following district court cases involving the ’275 patent: (1) *Juniper Networks, Inc. v. Swarm Technology LLC*, No. 3:20-cv-03137 (N.D. Cal.) and (2) *Swarm Technology, LLC v Amazon.com, Inc.*, No. 2:21-cv-00438 (D. Az.). Pet. 75–76; Paper 3, 1–2. The parties also identify the following related IPR proceedings: (1) *Juniper Networks, Inc. v. Swarm Technology LLC*, IPR2021-01317 (involving U.S. Patent No. 9,146,777 B2 (“the ’777 patent”)), (2) *Juniper Networks, Inc. v. Swarm Technology LLC*, IPR2021-01445 (involving U.S. Patent No. 9,852,004 B2 (“the ’004 patent”)), (3) *Juniper Networks, Inc. v. Swarm Technology LLC*, IPR2022-00141 (involving the ’275 patent), and (4) *Amazon.com, Inc. and Amazon Web Services, Inc. v. Swarm Technology, LLC*, IPR2022-00283 (involving the ’004 patent). Pet. 75–76; Paper 3, 1–2. In addition, the parties identify U.S. Patent Application No. 16/788,122 as related to the ’275 patent. Pet. 75; Paper 3, 3.

C. The '275 Patent

The '275 patent is titled “System and Method for Swarm Collaborative Intelligence Using Dynamically Configurable Proactive Autonomous Agents.” Ex. 1001, code (54). The '275 patent generally is directed to “parallel-process computing, and collaborative intelligence, and particularly relates to a processing architecture which involves autonomous co-processors (such as robotic vehicles, Internet of Things (IoT) components, and networked devices) configured to proactively retrieve tasks from a task pool populated by a central processing unit.” *Id.* at 1:17–23.

According to the '275 patent, “[c]omputer processors traditionally execute machine coded instructions serially. To run a plurality of applications concurrently, a single processor interleaves instructions from various programs and executes them serially, although from the user’s perspective the applications appear to be processed in parallel.” Ex. 1001, 1:49–54. The '275 patent further states that “[t]rue parallel or multi-core processing, on the other hand, is a computational approach that breaks large computational tasks into individual blocks of computations and distributes them among two or more processors.” *Id.* at 1:54–57. “A typical multiprocessor system includes a central processing unit (‘CPU’) and one or more co-processors. The CPU partitions the computational requirements into tasks and distributes the tasks to co-processors. Completed threads are reported to the CPU, which continues to distribute additional threads to the co-processors as needed.” *Id.* at 1:63–2:1.

The '275 patent identifies a problem with using the CPU to control the distribution of tasks:

Presently known multiprocessing approaches are disadvantageous in that a significant amount of CPU bandwidth is consumed by task distribution; waiting for tasks to be completed before distributing new tasks (often with dependencies on previous tasks); responding to interrupts from co-processors when a task is completed; and responding to other messages from co-processors. In addition, co-processors often remain idle while waiting for a new task from the CPU.

Ex. 1001, 2:1–10. The ’275 patent purportedly addresses this problem using a system that reduces CPU management overhead and “more effectively harnesses and exploits available co-processing resources.” *Id.* at 2:11–15.

Figure 1 of the '275 patent is reproduced below.

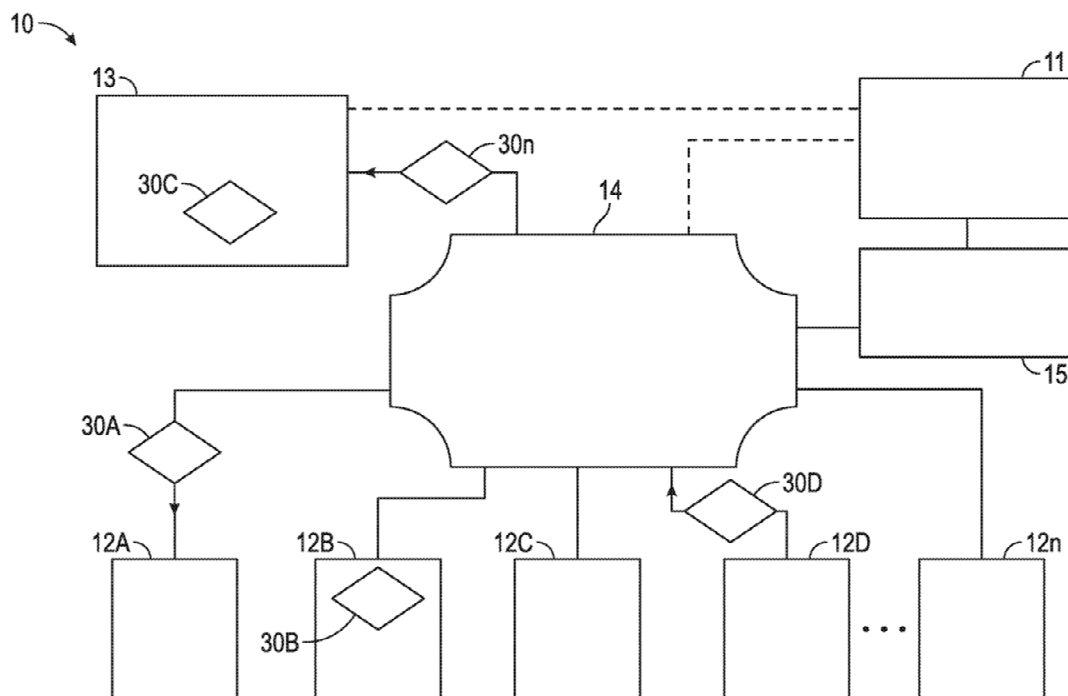


FIG. 1

Ex. 1001, Fig. 1. Figure 1 “is a schematic block diagram of a parallel processing architecture including a CPU, memory, task pool, and a plurality of co-processors configured to communicate through a fabric.” *Id.* at 3:64–67. More specifically, Figure 1 illustrates the following:

a single or multi-core CPU 11 and one or more solidarity or co-processing cells 12A-12[n] configured to communicate with a task pool 13 through a cross-bar switching fabric 14. The solidarity cells 12 may also communicate with each other through the switching fabric 14 or through a separate cell bus (not shown). CPU 11 may communicate with the task pool 13 directly or through the switching fabric 14. One or more memory units 15 each contain data and/or instructions.

Id. at 4:43–52.

C. Challenged Claims

Of the challenged claims, claims 1, 6, and 11 are independent. Independent claims 1 and 6 are each directed to “[a] collaborative intelligence system,” whereas independent claim 11 is directed to “[a] method of using collaborative intelligence to achieve an objective.” Ex. 1001, 14:24, 15:8, 16:25–26. Claims 2–5 directly depend from independent claim 1; claims 7–10 directly or indirectly depend from independent claim 6; and claims 12–17 directly depend from independent claim 11. *Id.* at 14:50–15:7, 16:8–11, 16:17–24, 16:42–64. Independent claim 1, reproduced below, is illustrative of the challenged claims.

1. A collaborative intelligence system, comprising:

a task pool;

a controller configured to populate the task pool with a plurality of first tasks and a plurality of second tasks;

a first co-processor configured to successively: proactively retrieve a first task from the task pool; process the first task; generate first resulting data; and update the task pool to reflect completion of the first task, all without any communication between the first co-processor and the controller; and

a second co-processor configured to successively: proactively retrieve a second task from the task pool; process the

second task; generate second resulting data; and update the task pool to reflect completion of the second task, all without any communication between the second co-processor and the controller;

wherein the collaborative intelligence system is configured to dynamically accept the first co-processor, the second co-processor, and an additional co-processor into the processing system on a plug-and-play basis without any communication with the controller;

the plurality of first tasks and the plurality of second tasks are associated with a common objective;

the first and second co-processors autonomously work together in solidarity with the task pool to complete the common objective.

Id. at 14:24–49.

D. Asserted Prior Art References

Amazon relies on the prior art references set forth in the tables below.

Name¹	Reference	Dates	Exhibit No.
Lurie	US 2007/0124363 A1	published May 31, 2007	1007
Chow	US 2005/0132380 A1	published June 16, 2005	1008
Sander	US 2012/0192201 A1	published July 26, 2012	1010

¹ For clarity and ease of reference, we only list the first named inventor.

Printed Publication	Exhibit No.
The Ethernet: A Local Area Network, Data Link Layer and Physical Layer Specifications (Sept. 30, 1980) (“Ethernet Specification”). All citations are to the native pagination.	1009
Gregory R. Andrews, Foundations of Multithreaded, Parallel, and Distributed Programming (2000) (“Andrews”). All citations are to the native pagination.	1011
Ali Marjovi et al., <i>Robotic Clusters: Multi-robot systems as computer clusters: A topological map merging demonstration</i> , 60 Robotics & Autonomous Sys. 1191 (2012) (“Marjovi”). All citations are to the native pagination.	1026

E. Asserted Grounds of Unpatentability

Amazon asserts that claims 1–17 of the ’275 patent would have been unpatentable based on the grounds set forth in the table below. Pet. 1–2, 14–71.

Claim(s) Challenged	35 U.S.C. § ²	Reference(s)/Basis
1, 3, 6, 11, 12, 14, 16, 17	103(a)	Lurie, Ethernet Specification
2, 7, 10, 13	103(a)	Lurie, Ethernet Specification, Andrews

² The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. §§ 102, 103 that became effective on March 16, 2013. Because the ’275 patent claims the benefit of the priority date of U.S. Patent Application No. 13/750,696—now the ’777 patent, which was filed before March 16, 2013, and neither party has argued that the provisions of the AIA apply, we apply the pre-AIA versions of the statutory bases for unpatentability. *See* Ex. 1001, code (63).

Claim(s) Challenged	35 U.S.C. §²	Reference(s)/Basis
4, 9, 15	103(a)	Lurie, Ethernet Specification, Andrews, ³ Chow
5	103(a)	Lurie, Ethernet Specification, Sander
8	103(a)	Lurie, Ethernet Specification, Andrews, Marjovi

Amazon supports its arguments in the Petition with the testimony of David Lowenthal (Ex. 1003 (Declaration of Dr. Lowenthal in support of Petition)) and Ingrid Hsieh-Yee, Ph.D. (Ex. 1005 (Declaration of Dr. Hsieh-Yee)). Amazon supports its arguments in the Reply with the testimony of Dr. Lowenthal. Ex. 1040 (Supplemental Declaration of Dr. Lowenthal in support of the Reply). Swarm supports its arguments in the Patent Owner Response with the testimony of Dr. Brent Nelson. Ex. 2014 (Declaration of Dr. Nelson in support of Patent Owner’s Response).

Swarm supports its argument in the Contingent Motion to Amend with the testimony of Dr. Nelson. Ex. 2006 (Declaration of Dr. Nelson in support of Contingent Motion to Amend). Swarm supports its arguments in the Reply to the Opposition to the Contingent Motion to Amend with the testimony of Dr. Nelson. Ex. 2019 (Supplemental Declaration of Dr. Nelson in support of Reply to the Opposition to the Contingent Motion to Amend).

³ Although Amazon contends that “[c]laims 4 and 15 are unpatentable under 35 U.S.C. § 103[(a)] over Lurie in view of Ethernet Specification and Chow,” whereas “[c]laim 9 is unpatentable under 35 U.S.C. § 103[(a)] over Lurie in view of Ethernet Specification, Andrews, and Chow,” Amazon relies on Lurie, Ethernet Specification, Andrews and Chow in its substantive analysis of dependent claims 4, 9, and 15. *See* Pet. 2, 58–63. Accordingly, we consider Amazon’s reliance on Andrews for each of these dependent claims.

II. ANALYSIS

A. Claim Construction

In an IPR based on a petition filed on or after November 13, 2018, such as here, claim terms are construed using the same claim construction standard as in a civil action under 35 U.S.C. § 282(b). *See* 37 C.F.R. § 42.100(b) (2021). That is, claim terms generally are construed in accordance with their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art, in view of the specification and the prosecution history pertaining to the patent at issue. *See id.* The ordinary and customary meaning of a claim term “is its meaning to the ordinary artisan after reading the entire patent,” and “as of the effective filing date of the patent application.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313, 1321 (Fed. Cir. 2005) (en banc).

In its Petition, Amazon states that “[t]he prior art relied on in [the] Petition discloses the subject matter of the challenged claims under any reasonable construction, including their plain meaning.” Pet. 5 (citing Ex. 1003 ¶ 45). In its Patent Owner Response, Swarm identifies certain claim terms where there apparently is a dispute between the parties regarding their scope and meaning. PO Resp. 6–8. After reviewing the arguments and evidence presented by the parties during trial, we determine that the claim term “proactively” is the only term in controversy that requires us to determine its scope and meaning for purposes of determining whether Amazon has met its burden of demonstrating by a preponderance of the evidence that the challenged claims are unpatentable. *See, e.g., Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in

controversy, and only to the extent necessary to resolve the controversy” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

In its Patent Owner Response, Swarm contends that the claim term “proactively” is “properly understood to describe a co-processor configured to seek/obtain a new task as the co-processor becomes available to perform further processing.” PO Resp. 8. To support its proposed construction, we understand Swarm to rely on the disclosure in the specification of the ’527 patent at column 8, lines 35–38. *See, e.g., id.* at 27 (arguing that “the term ‘proactively retrieve’ is properly understood to mean that the co[-]processor retrieves a new task as soon as it is determined that the co-processor has available processing capacity” (citing Ex. 1001, 8:35–38)).

In its Reply, despite being put on notice that Swarm argues the claim term “proactively” has a particular meaning, Amazon does not provide an explicit construction for this claim term. *See* Pet. Reply 9–17. Instead, we understand Amazon to argue that one example of acting “proactively” in the context of the ’275 patent includes that “each co-processor may be configured (e.g., programmed) to periodically send an agent to monitor the task pool for available tasks appropriate to that co-processor.” *Id.* at 9 (quoting Ex. 1001, 2:48–51). Relying on the cross-examination testimony of Dr. Nelson, Amazon asserts that “periodically” in the above quoted disclosure of the ’275 patent “does not require acting on a fixed interval, but merely means the TCW ‘makes the determination to send it, and that happens on a possibly regular basis.’” *Id.* (quoting Ex. 1063, 128:17–129:7) (citing Ex. 1063, 129:15–130:5).

“In determining the meaning of [a] disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). There is a “heavy presumption” that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002). A claim term, however, “will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history.” *Id.* Although the patentee is free to define a specific claim term used to describe his or her invention, “this must be done with reasonable clarity, deliberateness, and precision.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Based on the fully developed trial record, we apply the ordinary and customary meaning of the claim term “proactively” and, therefore, we construe this claim term as initiating change rather than reacting to events (i.e., not being told to act or not reactionary). Beginning with the intrinsic evidence, both parties appear to agree that the ’275 patent does not define the claim term “proactively” with reasonable clarity, deliberateness, and precision. For example, during the oral hearing, counsel for Amazon indicated that the specification of the ’275 patent provides “some examples” of what it means to act “proactively,” but it does not provide a lexicographic definition. *See* Tr. 7:8–11:21. In the same vein, during oral argument, counsel for Swarm stated that “[w]e haven’t advocated for anything other than the plain and ordinary meaning of proactively.” *Id.* at 34:23–24. We

also take this opportunity to note that neither party takes the position that the claim term “proactively” was defined during prosecution of the application that issued as the ’275 patent.

With this in mind, we understand the parties to argue that the claim term “proactively” was not defined in the specification of the ’275 patent nor during prosecution and, as a result, both parties rely on its ordinary and customary meaning. The problem we face here is that neither party takes a definitive position as to what exactly constitutes the ordinary and customary meaning of the claim term “proactively.” At best, both parties direct us to examples of acting “proactively” in the specification of the ’275 patent. Based on these examples, we are left to speculate what the parties believe is the ordinary and customary meaning of the claim term “proactively” in the context of the ’275 patent.

For instance, on the one hand, Amazon directs us to the following disclosure in the specification of the ’275 patent: “[t]he term proactive *suggests* that each co-processor *may be* configured (e.g., programmed) to periodically send an agent to monitor the task pool for available tasks appropriate to that co-processor.” Ex. 1001, 2:48–51 (emphases added). But given the use of the language “suggests” and “may be,” together with the admission of counsel for Amazon during oral argument, this is just an example of acting “proactively” in the context of the ’275 patent. *See* Tr. 7:8–11:21. This example, however, falls squarely within our ordinary and customary meaning of initiating change rather than reacting to events (i.e., not being told to act or not reactionary) because the co-processor sends an agent to monitor the task pool for available tasks that it is capable of performing, without being notified to do so.

On the other hand, Swarm directs us to the following disclosure in the specification of the '275 patent: “[e]ach cell acts proactively in that it seeks a task 22 from the task pool 13 as soon as the cell becomes available for further processing.” Ex. 1001, 8:35–38. Once again, this is merely an example of acting “proactively” in the context of the '275 patent. This example, however, also falls squarely within our ordinary and customary meaning of initiating change rather than reacting to events (i.e., not being told to act or not reactionary) because the cell 12 seeks task 22 from task pool 13 as soon as it determines that it has available processing capacity. There is no indication that the task pool 13 first notifies cell 12 that it may seek or obtain task 22.

Swarm’s reliance on this cited example in the '275 patent is misplaced for an additional reason. Where possible, we presume that “an interpretation of a claim should be avoided if it would make the claim read like another one.” *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991). Such a presumption is applicable where one party is urging that an independent claim should be interpreted to be read as its dependent claim. *See SunRace Roots Enterprise Co., Ltd. v. SRAM Corp.*, 336 F.3d 1298, 1303 (Fed. Cir. 2003). Dependent claim 4 further limits independent claim 1 by reciting “wherein *the first co-processor is configured to determine when it has available processing capacity*, and to dispatch the first agent to the task pool in response to the determination.” Ex. 1001, 14:66–15:3 (emphasis added); *see also id.* at 16:17–21 (dependent claim 9 reciting a similar limitation, which further limits independent claim 6), 16:53–56 (dependent claim 15 reciting a similar limitation, which further limits independent claim 11). Stated differently, dependent claim 4 recites “the

first co-processor is configured to determine when it has available processing capacity,” whereas independent claim 1 only requires the “first co-processor configured to . . . proactively retrieve.” Here, the claim phrase “proactively retrieve” has a broader meaning than the claim phrase “determin[ing] when it has available processing capacity.” Consequently, the proactive retrieval required by the first co-processor of independent claim 1 need not determine whether the first co-processor has available processing capacity, as asserted by Swarm.

Turning to the extrinsic evidence, Amazon submitted two general-purpose dictionary definitions (albeit in conjunction with its Opposition to Swarm’s Contingent Motion to Amend) that further support according the claim term “proactively” an ordinary and customary meaning of initiating change rather than reacting to events (i.e., not being told to act or not reactionary). The American Heritage Dictionary of the English Language, 5th ed. (2011) defines “proactive” as “[a]cting in advance to deal with an expected difficulty; anticipatory.” Ex. 1065, 4.⁴ Similarly, Dictionary.com indicates that “proactive” is “the opposite of *reactive*” and then proceeds to define this term as “tending to initiate change rather than reacting to events.” Ex. 1066, 3–4. Although these two general-purpose dictionary definitions may be of less significant than the two examples of acting “proactively” in the specification of the ’275 patent that the parties identify above, they nonetheless appear to support applying the ordinary and customary meaning of “proactively” that we propose.

⁴ All references to the page number in Exhibit 1065 refer to the page numbers inserted by Amazon in the bottom, right-hand corner of each page.

Amazon also submitted a supplemental declaration of Dr. Lowenthal in support of its Reply, in which he provides testimony regarding the ordinary and customary meaning of the claim term “proactively.” Relying on testimony from his declaration in support of the Petition, Dr. Lowenthal testifies that “‘proactive’ by its plain and ordinary meaning refers to a co-processor that does not need to be told to act (e.g., Lurie’s TCWs retrieve tasks without needing to be told by the TCC).” Ex. 1040 ¶ 56 (citing Ex. 1003 ¶¶ 164–68, 173). Once again, although Dr. Lowenthal’s testimony may be of less significant than the two examples of acting “proactively” in the specification of the ’275 patent that the parties identify above, it nonetheless appears to support applying the ordinary and customary meaning of “proactively” that we propose.

Accordingly, upon weighing all the evidence bearing on the construction of the claim term “proactively,” we accord this claim term an ordinary and customary meaning of initiating change rather than reacting to events (i.e., not being told to act or not reactionary). Our construction finds support in the two examples of acting “proactively” in the specification of the ’275 patent that the parties identify above. Although less significant, the two general-purpose dictionary definitions and the supporting testimony of Dr. Lowenthal only serve to bolster our understanding of the ordinary and customary meaning of the claim term “proactively” as used in the challenged claims.

*B. Obviousness Over the Combined Teachings of
Lurie and Ethernet Specification*

Amazon contends that claims 1, 3, 6, 11, 12, 14, 16, and 17 of the ’275 patent are unpatentable under § 103(a) as obvious over the combined

teachings of Lurie and Ethernet Specification. Pet. 14–55. Amazon contends that the teachings of Lurie and Ethernet Specification account for the subject matter of each challenged claim, and provides reasoning as to why a person of ordinary skill in the art would have been prompted to combine the teachings of these references. *Id.* During trial, Swarm contends that Lurie alone or in combination with Ethernet Specification does not teach or suggest “a first co-processor configured to successively: proactively retrieve a first task from the task pool,” as recited in each of independent claims 1 and 6, and similarly recited in independent claim 11. PO Resp. 27–40; PO Sur-reply 4–5, 10–12.

Based on the fully developed trial record, we determine that Amazon has not shown by a preponderance of the evidence that claims 1, 3, 6, 11, 12, 14, 16, and 17 of the ’275 patent are unpatentable as obvious over the combined teachings of Lurie and Ethernet Specification. We begin our analysis with the principles of law that generally apply to an obviousness ground, an assessment of the level of skill in the art, followed by brief overviews of Lurie and Ethernet Specification, and then we address the dispositive issue with respect to independent claims 1, 6, and 11.

1. Principles of Law

A claim is unpatentable under § 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) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations, such as commercial success, long-felt but unsolved needs, failure of others, etc.). *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We analyze the asserted grounds based on obviousness with the principles identified above in mind.

2. *Level of Skill in the Art*

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. “The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). The “person having ordinary skill in the art” is a hypothetical construct, from whose vantage point obviousness is assessed. *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998).

Factors pertinent to a determination of the level of ordinary skill in the art include “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Envtl. Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 696 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). “Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case.” *Id.* at 696–97.

In its Petition, Amazon argues that a person of ordinary skill in the art “would have had a bachelor’s degree in computer science, computer engineering, or a related field, and about five years of industry or academic research experience in parallel or distributed computing, system architecture, or an equivalent.” Pet. 4–5 (citing Ex. 1003 ¶¶ 42–44). Amazon further argues that “[a] post-graduate degree or additional formal education can compensate for less experience, and vice-versa.” *Id.* In its Patent Owner Response, Swarm does not address the level of skill in the art. *See* PO Resp.

Accordingly, based on the fully developed trial record, we maintain our preliminary determination regarding the level of ordinary skill in the art. Dec. on Inst. 10–11. That is, we adopt Amazon’s proposed assessment of the level of ordinary skill in the art because it is consistent with the ’275 patent and the asserted prior art. We apply this assessment of the level of ordinary skill in the art in our obviousness evaluations below.

3. Overview of Lurie

Lurie is titled “Instrument-Based Distributed Computing Systems.” Ex. 1007, code (54). Lurie is directed to “providing an instrument-based distributed computing system that accelerates the measurement, analysis, verification and validation of data in the distributed computing environment.” *Id.* ¶ 2.

Lurie describes an “automatic [task] distribution mode” of a distributed computing environment. Ex. 1007 ¶ 19. Lurie includes technical computing client 250 (“TCC”), which “can be a technical computing software application that provides a technical computing and graphical modeling environment for generating block diagram models and to define mathematical algorithms for simulating models.” *Id.* ¶ 55. Lurie further

includes a number of technical computing workers 270A–N (“TCWs”), which “can be a technical computing software application that provides a technical computing environment for performing technical computing of tasks, such as those tasks defined or created by the [TCC] 250.” *Id.* ¶ 58.

In one embodiment, Lurie further describes Automatic Task Distribution Mechanism 260 (“ATD Mechanism”), which can be “one or more application software components to provide for the automatic [task] distribution of tasks from the [TCC] 250 to the [TCWs 270A–N].” Ex. 1007 ¶ 61. This embodiment is shown in Figure 3B, which is reproduced below.

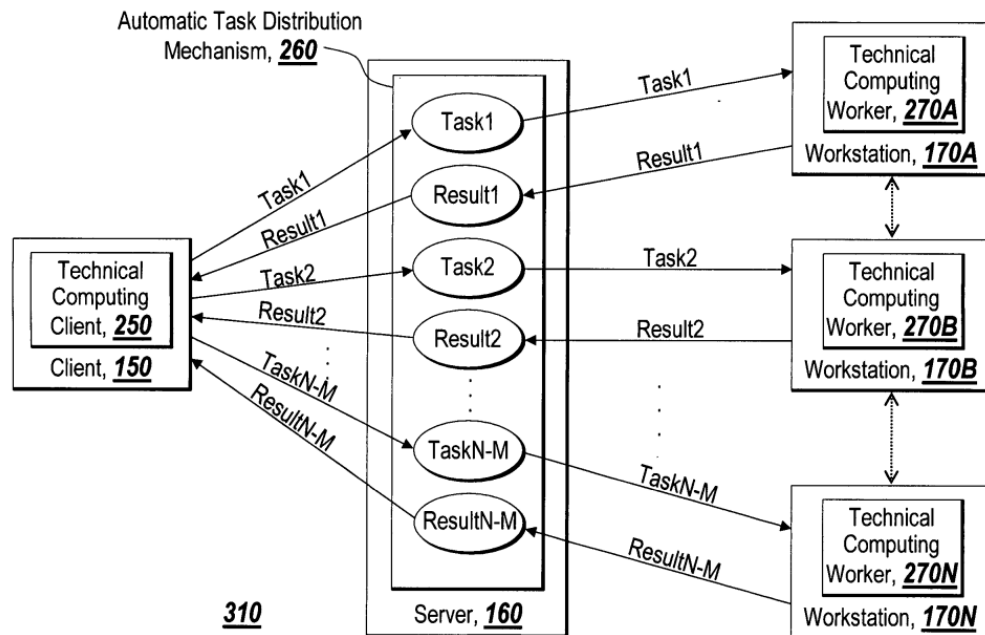


Fig. 3B

Figure 3B “is a block diagram of [Lurie’s] automatic [task] distribution mode” embodiment, which depicts (1) tasks and results flowing between TCC 250 and ATD Mechanism 260 and (2) tasks and results flowing between ATD Mechanism 260 and TCWs 270A–N. *Id.* ¶ 19, Fig. 3B. More specifically, ATD Mechanism 260 of the system “is intended to provide a

configuration where the user does not want to control which [TCW 270A–N] executes a particular task.” *Id.* ¶ 71. Instead, TCC 250 is in communication with ATD Mechanism 260, which, in turn, is in communication with TCWs 270A–N. *Id.* “Under this mode of operation, the [TCC] 250 is not required to have any specific knowledge of the [TCWs 270A–N], e.g., the name of the workstation running a [TCW 270A–N], or the availability of the [TCW 270A–N] to perform technical computing of a task.” *Id.* TCC 250 submits tasks to ATD Mechanism 260, which, in turn, makes them available to TCWs 270A–N. *Id.* ¶ 72. “A [TCW 270A–N] takes a task from the [ATD Mechanism] 260 for technical computing of the task, computes a result for the task and provides the result to the [ATD Mechanism] 260.” *Id.* TCC 250 is then able to obtain the results from ATD Mechanism 260. *Id.*

An alternative “batch mode” embodiment is illustrated in Figure 3C, which is reproduced below. Ex. 1007 ¶ 20.

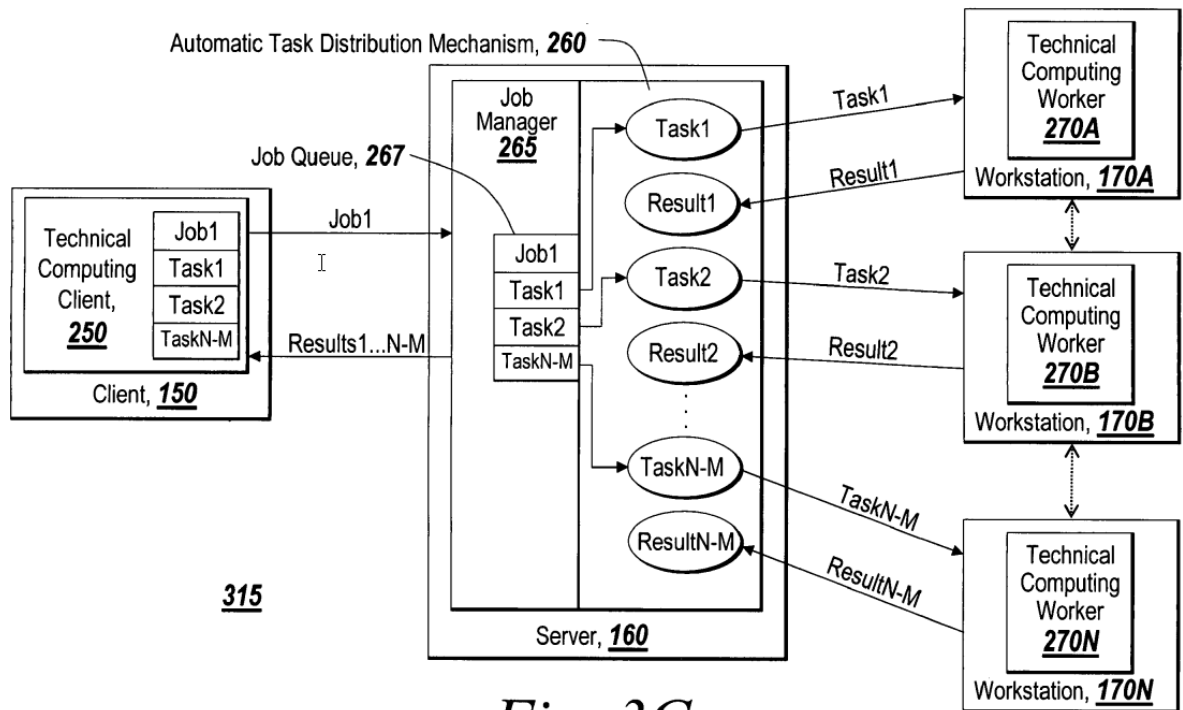


Fig. 3C

Figure 3C “is a block diagram of the batch automatic distribution mode of operation.” *Id.* The “batch mode . . . is intended to provide a configuration where the user can specify a group of related tasks as a job and provide the batch of tasks, or the job, to the [ATD Mechanism] 260.” *Id.* ¶ 73. In this embodiment, TCC 250 “is in communication with the job manager 265 on the server 160” and “[t]he job manager 265 interfaces and communicates with the [ATD Mechanism] 260 running on the same server 160.” *Id.* As with the Figure 3B embodiment, “[e]ach of the [TCWs 270A–N] is in communication with the [ATD Mechanism] 260.” *Id.*

In batch mode, “[i]nstead of submitting each task separately as depicted in FIG. 3B, the [TCC] 250 submits the job containing all the associated tasks to the job manager 265.” Ex. 1007 ¶ 74. “The job manager 265 obtains the tasks from the job and provides the tasks to the [ATD

Mechanism] 260 for [TCWs 270A–N] to take and compute results.” *Id.*

Lurie describes the operation of the components as follows:

For example, [TCC] 250 defines a job, Job1, with a set of three tasks: Task1, Task2 and TaskN-M. The [TCC] 250 then submits Job1 to the job manager 265. The job manager 265 obtains Job1 and obtains each of the tasks, Task1-TaskN-M from Job 1. Then, . . . the job manager 265 submits each of the tasks to the [ATD Mechanism] 260 for technical computing by a [TCW 270A–N]. [TCW] 270A may take Task1 from the [ATD Mechanism] 260, compute a Result1 for Task1 and provide the Result1 to the [ATD Mechanism] 260. [TCW] 270B and [TCW] 270N, in a similar fashion, compute and provide results for Task2 and TaskN-M respectively. The job manager 265 then obtains the set of results for the completed job of Job1 and provides the results of each of the tasks to the [TCC] 250.

Id. When there are multiple jobs, “the job manager 265 may handle jobs in a first-in first-out manner. In this case, the job manager 265 does not process the next job until all the tasks from the current job have been processed by the [ATD Mechanism] 260.” *Id.* ¶ 75.

4. Overview of Ethernet Specification

Ethernet Specification “contains the specification of the Ethernet, a local area network.” Ex. 1009, i. Ethernet Specification “is intended as a design reference document, rather than an introduction or tutorial.” *Id.* Chapter 6 provides the “Ethernet Data Link Layer Specification.” *Id.* at 19–44. Figure 6-1 is reproduced below.

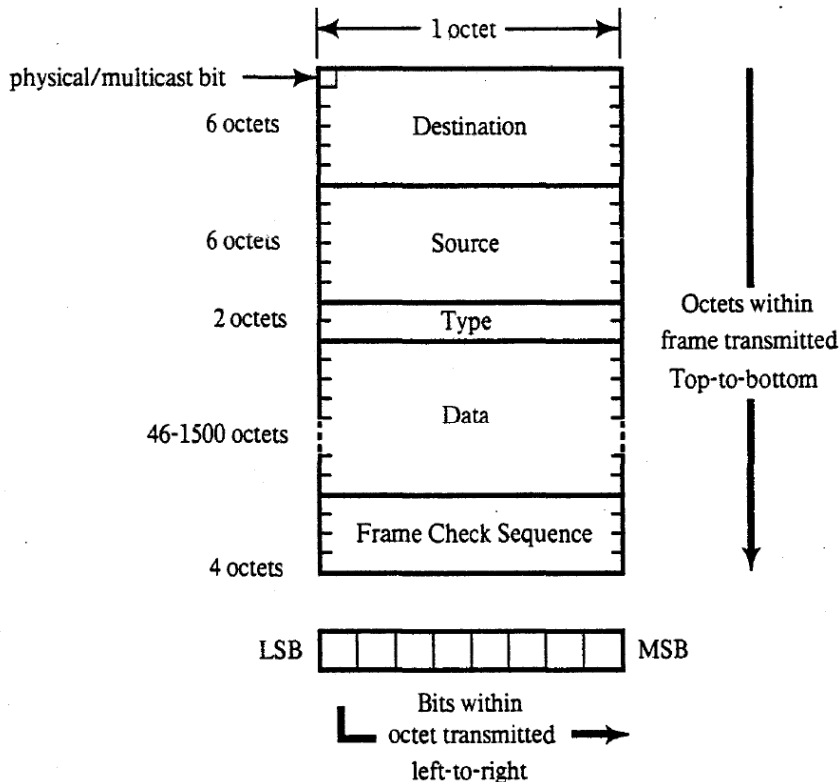


Figure 6-1: Data Link Layer Frame Format

Id. at 20. Figure 6-1 depicts a “Data Link Layer Frame Format,” which includes a destination, source, type, data, and frame check sequence. *Id.*

5. Claims 1, 6, and 11

Independent claims 1 and 6 each recite, in relevant part, “a first co-processor configured to successively: *proactively retrieve a first task from the task pool.*” Ex. 1001, 14:28–29, 15:12–13 (emphasis added).

Independent 11 recites a similar limitation. *Id.* at 16:40–41 (“proactively retrieving a task having a compatible task type from the task pool”). Our analysis below only focuses on the parties’ arguments directed to the italicized language regarding “proactively retriev[ing] a first task from the task pool” recited in each of independent claim 1 and 6, but our analysis equally applies to independent claim 11.

a. *“proactively retriev[ing] a first task from the task pool”*

In its Petition, Amazon argues that Lurie alone or in combination with the Ethernet Specification teaches this limitation. Pet. 23–29. More specifically, Amazon argues that one of Lurie’s TCWs 270A–N is a first co-processor which “‘takes,’ without being instructed by the TCC [250], ‘a task from the [ATD Mechanism 260]’ (i.e., task pool), to execute.” *Id.* at 23 (quoting Ex. 1007 ¶ 72) (citing Ex. 1003 ¶ 165). Amazon argues that “TCW (co-processor) then processes its task and generates the resulting data.” *Id.* (citing Ex. 1007 ¶ 72). Amazon further argues that the “TCW then ‘provides the result [back] to the [ATD Mechanism],’ thereby updating the ATD Mechanism (task pool) to reflect completion.” *Id.* (quoting Ex. 1007 ¶ 72) (citing Ex. 1003 ¶¶ 168–73) (alterations in original). According to Amazon, because the ATD Mechanism 260 “makes the results . . . available to the [TCC],” “the TCC (controller) and the TCWs (co-processors) do not communicate (as required by the claim), but instead rely on the ATD Mechanism as an intermediary.” *Id.* at 24 (quoting Ex. 1007 ¶ 61) (citing Ex. 1007 ¶¶ 61, 72, Figs. 3C, 6A; Ex. 1003 ¶¶ 167–74) (alteration in original).

In addition, when discussing ATD Mechanism 260, Amazon directs us to Lurie’s Figure 6A, which shows Object Exchange Repository 662. Pet. 24. Amazon then argues the following:

Lurie’s TCWs (co-processors) “register” with an object exchange repository, or space, in the ATD mechanism—not the TCC (controller)—to retrieve tasks. *As Lurie explains, “[a TCW] registers with the object exchange repository 662 to be notified when a task object appears.”* After the TCC “write[s] [a] task object” to the [object exchange] repository, a TCW “performs a take operation . . . to retrieve the submitted task.”

The TCW then processes the task, and “provides the results from the computation back to the object exchange repository. The TCC “is not required to have any specific knowledge of the [TCWs],” such as “the name of the workstation . . . or the availability of the [TCW].”

Id. at 24–25 (emphasis added) (quoting Ex. 1007 ¶¶ 71, 93, 94) (citing Ex. 1007 ¶¶ 91, 92; Ex. 1003 ¶ 176).

To the extent “[t]he term proactive suggests that each co-processor may be configured (e.g., programmed) to periodically send an agent to monitor the task pool for available tasks appropriate to that co-processor,” Amazon argues that Lurie in combination with Ethernet Specification teaches that the “TCWs ‘proactively retrieve’ tasks because Lurie is implemented over a network where each TCW has an agent that identifies available tasks appropriate to that TCW from the task pool . . . and retrieves an available, appropriate task to deliver to the TCW.” Pet. 26–27 (quoting Ex. 1001, 2:48–51) (citing Ex. 1007 ¶¶ 43, 81, 91; Ex. 1003 ¶ 183) (alteration in original). More specifically, Amazon argues that “[a] [person of ordinary skill in the art] would have understood that[,] when Lurie is implemented over Ethernet (or similar networking protocol), data frames act as agents of a TCW to retrieve tasks as described in the ’275 patent.” *Id.* at 28 (footnote omitted) (citing Ex. 1007 ¶ 93; Ex. 1003 ¶¶ 128, 184, 188–90).

In its Patent Owner Response, Swarm contends that, although Lurie’s Object Exchange Repository 662 illustrated in Figure 6A appears to describe one of TCWs [270A–N] “taking” a task from ATD mechanism 260 in a manner similar to how a co-processor in the ’275 patent retrieves a task from the task pool, “the similarity is only superficial.” PO Resp. 28–29 (citing

Ex. 2014 ¶¶ 54–56). Instead, Swarm argues that Lurie discloses the following:

“[a] [TCW] 270 registers with the object exchange repository 662 to be notified when a task object appears in the object exchange repository 662. After the [TCC] 250 writes the task object, the object exchange repository 662 sends a notification to [TCW] 270 informing of the task object being available in the object exchange repository 662. The [TCW] 270, in response to the notification, performs a take operation on the object exchange repository 662 to retrieve the submitted task object.”

Id. at 29 (quoting Ex. 1007 ¶ 93) (first alteration in original). Based on these cited disclosures, Swarm asserts that Lurie’s TCWs 270A–N do not retrieve tasks proactively because each “TCW [270A–N] must register with the Object Exchange Repository [662] and only retrieves a task in response to a notification from the Object Exchange Repository [662], and not when it becomes available for further processing.” *Id.* (citing Ex. 1001, 8:37–38). Stated differently, Swarm assert that “Lurie does not describe any embodiment where a TCW [(e.g., 270A)] proactively retrieves a task from the Object Exchange Repository [662] without a predicate instruction or notification to do so.” *Id.* at 30 (citing Ex. 2014 ¶¶ 54–56).

In its Reply, Amazon disagrees with Swarm’s argument that Lurie’s system “only retrieves a task in response to a notification.” Pet. Reply 11 (citing PO Resp. 29). According to Amazon, Lurie’s TCWs 270A–N register only once and ATD mechanism 260 provides only one kickoff notification that initially starts the processing. *Id.*; *see also* Tr. 16:18–17:13 (during oral argument, counsel for Amazon appears to refer to this notification as a “kickoff notification”). Amazon argues that Lurie’s kickoff notification does not describe repeatedly sending notifications each time any

one of the TCWs 270A–N completes a task. Pet. Reply 11–12 (citing Ex. 1007 ¶¶ 86, 87, 99). Rather, Amazon argues that, after the TCWs 270A–N receive a kickoff notification indicating that tasks first become available or otherwise appear in ATD mechanism 260, each TCW repeatedly retrieves and processes tasks until all the tasks have been completed. *Id.* at 12 (citing Ex. 1007 ¶¶ 86–88, 95–97, 128, Figs. 5B–5D; Ex. 1040 ¶¶ 56–76). Amazon then argues that, upon reading Lurie, a person of ordinary skill in the art would have understood that it discloses a textbook bag-of-tasks technique with a kickoff notification to start the process, after which each TCW “repeatedly takes a task from the bag and executes it.” *Id.* at 12–13 (citing Ex. 1011, 135; Ex. 1053, 338–40, 427, 429, 561–63, Pet. 18; Ex. 1003 ¶¶ 168, 225; Ex. 1040 ¶¶ 14, 59–70). Amazon also argues that a person of ordinary skill in the art would have understood that Lurie’s kickoff notification initiates its bag-of-tasks process that reduces redundant message traffic by making repeated task availability notifications unnecessary. *Id.* at 13 (citing Ex. 1040 ¶¶ 71–76).

In its Sur-reply, Swarm maintains its position that Lurie’s TCWs 270A–N do not “proactively” retrieve tasks because each TCW requires a predicate instruction prior to obtaining a task. *See* PO Sur-reply 3. As further support for its argument, Swarm directs us to our Preliminary Guidance, in which we preliminarily determined that each of Lurie’s TCWs 270A–N does not proactively interrogate ATD mechanism 260 without first receiving a notification to do so. *Id.* at 4–5 (citing Paper 19, 16–17).

Based on the fully developed trial record, we agree with Swarm that Amazon has not demonstrated that Lurie alone or in combination with Ethernet Specification teaches or suggests “proactively retriev[ing] a first

task from the task pool.” Amazon’s position regarding “proactively” retrieving is based primarily on Figure 6A of Lurie, reproduced below. *See* Pet. 24–25.

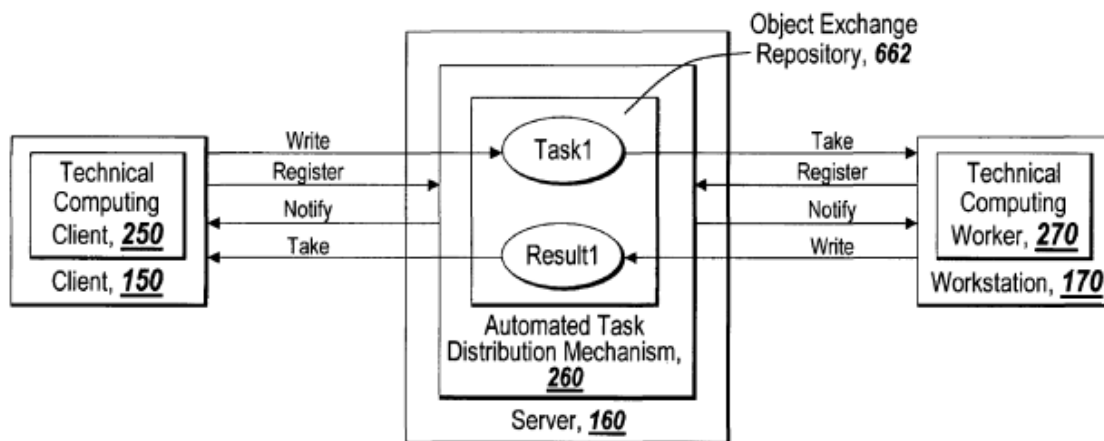


Fig. 6A

Figure 6A illustrates a block diagram of the ATD mechanism 260, including object exchange repository 662 that handles task distribution to TCW 270 registered with ATD mechanism 260. Ex. 1007 ¶¶ 26, 92. Lurie discloses that TCW 270 registers with object exchange repository 662 to be notified when a task becomes available or otherwise appears in object exchange repository 662. *Id.* ¶ 93. In response to receiving the notification, TCW 270 retrieves the task by performing either a take operation on, or read operation from, object exchange repository 662. *Id.* Based on these disclosures, we find that Lurie’s object exchange repository 662 located within ATD mechanism 260 sends a kickoff notification to TCW 270 when a task

becomes available or otherwise appears. In response to this kickoff notification, TCW 270 takes the task from object exchange repository 662.⁵

Amazon's declarant, Dr. Lowenthal, provides testimony that supports our finding above. In his supplemental declaration in support of the Reply, Dr. Lowenthal testifies that, "[c]ertainly, Lurie initially sends an initial notification of 'one or more tasks . . . becoming available.' After that, . . . TCW [270] will obtain and process a first task." Ex. 1040 ¶ 58 (quoting Ex. 1007 ¶ 86) (citing Ex. 1007 ¶¶ 87, 88) (second two alterations in original). He also testifies that the "one initial notification . . . kick[s] off the procedure" because it "informs all registered TCWs [270] that one or more tasks are available." *Id.* ¶ 59. We credit the aforementioned testimony of Dr. Lowenthal's because it is consistent with the disclosures in Lurie that we highlight above, most notably the kickoff notification.

As we explain in the claim construction section above, we accord the claim term "proactively" an ordinary and customary meaning of initiating change rather than reacting to events (i.e., not being told to act or not reactionary). *See supra* Section II.A. Contrary to our construction, Lurie's TCW 270 only takes a task after receiving a kickoff notification and, therefore, it is not acting proactively. That is, Lurie's TCW 270 reacts to the kickoff notification that a task is available or otherwise appears in object exchange repository 662 rather than initiates change by seeking a task from object exchange repository 662 without being notified to do so.

⁵ Indeed, regardless if Lurie's system is operating in automated task distribution mode or batch mode, Lurie's TCWs 270A–N only take a task after receiving a kickoff notification. *Compare* Ex. 1007 ¶ 86, Fig. 5B (steps 538, 540, 542–544), *with id.* ¶ 87, Fig. 5C (steps 538, 540, 542, 544).

We do not agree with Amazon’s argument that Lurie’s TCWs 270A–N are capable of retrieving tasks, without notification, because Lurie’s system executes a textbook bag-of-tasks technique with an initial kickoff notification to start the process, after which each TCW repeatedly retrieves a task from the bag and completes it until all tasks have been completed. *See* Pet. Reply 11–13. Even assuming that Amazon is correct in that Lurie’s system executes a textbook bag-of-tasks technique, Amazon fails to appreciate that each TCW 270A–N still requires a kickoff notification before it begins retrieving and completing tasks. As we explain above, because Lurie’s TCWs 270A–N require a kickoff notification to retrieve a first task, it does not matter that they can retrieve and complete additional tasks without further notifications. In our view, Lurie’s TCWs 270A–N are reactive—not proactive—because they require receipt of a kickoff notification to retrieve a first task.

In summary, based on the fully developed record, Amazon’s proposed combination of Lurie and Ethernet Specification does not teach or suggest “a first co-processor configured to successively: proactively retrieve a first task from the task pool,” as recited in each of independent claims 1 and 6, and similarly recited in independent claim 11. Accordingly, Amazon has not demonstrated by a preponderance of the evidence that the subject matter of independent claims 1, 6, and 11 would have been obvious over the combined teachings of Lurie and Ethernet Specification.

6. Claims 3, 12, 14, 16, and 17

By virtue of their dependency, claims 3, 12, 14, 16, and 17 include the same limitations as at least one of independent claims 1 and 11. Amazon does not present additional arguments and evidence with respect to these

dependent claims that remedy the deficiency in its analysis of the combined teachings of Lurie and Ethernet Specification. *See* Pet. 50–55. Accordingly, for the same reasons we identify above, Amazon has not demonstrated by a preponderance of the evidence that the subject matter of dependent claims 3, 12, 14, 16, and 17 would have been obvious over the combined teachings of Lurie and Ethernet Specification.

C. Remaining Obviousness Grounds

Amazon also contends that (1) claims 2, 7, 10, and 13 of the '275 patent are unpatentable under § 103(a) as obvious over the combined teachings of Lurie, Ethernet Specification, and Andrews; (2) claim 4, 9, and 15 of the '275 patent are unpatentable under § 103(a) as obvious over the combined teachings of Lurie, Ethernet Specification, Andrews, and Chow; (3) claim 5 of the '275 patent is unpatentable under § 103(a) as obvious over the combined teachings of Lurie, Ethernet Specification, and Sander; and (4) claim 8 of the '275 patent is unpatentable under § 103(a) as obvious over the combined teachings of Lurie, Ethernet Specification, Andrews, and Marjovi. Pet. 56–71. Amazon does not present additional arguments and evidence with respect to these remaining grounds that remedy the deficiency in its analysis of the combined teachings of Lurie and Ethernet Specification. *See id.* Accordingly, for the same reasons we identify above, Amazon has not demonstrated by a preponderance of the evidence that (1) claims 2, 7, 10, and 13 of the '275 patent are unpatentable under § 103(a) as obvious over the combined teachings of Lurie, Ethernet Specification, and Andrews; (2) claim 4, 9, and 15 of the '275 patent are unpatentable under § 103(a) as obvious over the combined teachings of Lurie, Ethernet Specification, Andrews, and Chow; (3) claim 5 of the '275 patent is unpatentable under

§ 103(a) as obvious over the combined teachings of Lurie, Ethernet Specification, and Sander; and (4) claim 8 of the '275 patent is unpatentable under § 103(a) as obvious over the combined teachings of Lurie, Ethernet Specification, Andrews, and Marjovi.

D. Swarm's Contingent Motion to Amend

Swarm's Contingent Motion to Amend is contingent on us determining that originally challenged claims 1 and 3 of the '275 patent are unpatentable. Mot. 1. As we discuss above, because Amazon has not demonstrated by a preponderance of the evidence that claims 1 and 3 of the '275 patent are unpatentable under § 103(a) as obvious, Swarm's request to amend originally challenged claims 1 and 3 and replace them with proposed substitute claims 18 and 19 is *dismissed* as moot.

III. CONCLUSIONS

Based on the fully developed record, Amazon has not demonstrated by a preponderance of the evidence that claims 1–17 of the '275 patent are unpatentable under § 103(a) as obvious. A summary of our conclusions is set forth in the table below.

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 3, 6, 11, 12, 14, 16, 17	103(a)	Lurie, Ethernet Specification		1, 3, 6, 11, 12, 14, 16, 17
2, 7, 10, 13	103(a)	Lurie, Ethernet Specification, Andrews		2, 7, 10, 13
4, 9, 15	103(a)	Lurie, Ethernet Specification, Andrews, Chow		4, 9, 15
5	103(a)	Lurie, Ethernet Specification, Sander		5
8	103(a)	Lurie, Ethernet Specification, Andrews, Marjovi		8
Overall Outcome				1–17

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	18, 19
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	
Substitute Claims: Not Reached	18, 19

IV. ORDER

In consideration of the foregoing, it is
ORDERED that claims 1–17 of the '275 patent have not been shown
to be unpatentable;

FURTHER ORDERED that Swarm's Contingent Motion to Amend is
dismissed as moot; and

FURTHER ORDERED that, because this is a Final Written Decision,
parties to this proceeding seeking judicial review of our decision must
comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2022-00633
Patent 10,592,275 B2

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