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Paper 37
Entered: March 16, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FLEX LOGIX TECHNOLOGIES INC.,
Petitioner,

v.

VENKAT KONDA,
Patent Owner.

Case PGR2019-00037
Patent 10,003,553 B2

Before PATRICK M. BOUCHER, CHARLES J. BOUDREAU, and NORMAN H. BEAMER, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Revised Motion to Amend
Denying Patent Owner's Motion to Exclude
35 U.S.C. § 328(a)

In response to a Petition filed by Flex Logix Technologies, Inc. ("Petitioner"), we instituted a post-grant review of claims 1–20 of U.S.

Patent No. 10,003,553 B2 (Ex. 1001, "the '553 patent"). Paper 13 ("Dec."). Venkat Konda ("Patent Owner")[1] did not file a Response to the Petition after institution of trial.[2] Instead, Patent Owner filed a Motion to Amend the claims, Petitioner filed an Opposition to that Motion, and we provided Preliminary Guidance under the Board's Motion to Amend Pilot Program. Papers 16, 18, 21. In our Preliminary Guidance, we "treat[ed] the Motion as contingent upon a finding in a final written decision that the challenged claims are unpatentable, and [did] not treat any of the original claims 1–20 as either canceled or withdrawn." Paper 21, 4. Nevertheless, because we noted that Patent Owner's intention regarding the contingency of his Motion was ambiguous, we advised Patent Owner to state expressly, should he file a Revised Motion to Amend, whether such a Motion "is contingent or noncontingent upon a finding in a final written decision that the challenged claims are unpatentable." *Id.*

Thereafter, Patent Owner filed a Revised Motion to Amend, which included a different set of proposed substitute claims. Paper 25 ("RMTA"). The Revised Motion to Amend expressly states that it "is contingent upon a

[1] The Petition identifies the owner of the '553 patent as Konda Technologies, Inc. Pet. 1. This appears to have been correct at the time the Petition was filed, on March 18, 2019. But on April 8, 2019, an assignment was recorded with the Office at reel/frame 048822/0867 assigning the '553 patent to Venkat Konda. This ownership is also reflected in Patent Owner's mandatory notices, filed on April 9, 2019. Paper 4.

[2] We note that, before institution of the proceeding, Patent Owner filed a Preliminary Response. Paper 5. Arguments directed to patentability of the challenged claims made in a preliminary response but not raised during the trial itself are deemed waived. *See In re NuVasive, Inc.*, 842 F.3d 1376, 1380–81 (Fed. Cir. 2016).

finding in a final written decision by the Board that the challenged claims 1-20 are unpatentable" and that the Revised Motion to Amend "is made on a contingent basis and is made in lieu of a response under 37 C.F.R. § 42.220 (2018) [(authorizing patent owners to file "a single response to a petition and/or decision on institution")]." *Id.* at 1. Petitioner opposes the Revised Motion to Amend. Paper 32 ("Opp. RMTA"). Patent Owner filed a Reply, and Petitioner filed a Sur-reply. Papers 33 ("Reply RMTA"), 36 ("Sur-reply RMTA").

In addition, Patent Owner filed a Motion to Exclude evidence, which Petitioner opposed, and in support of which Patent Owner filed a Reply. Papers 27, 34, 35. No oral hearing was held, as neither party requested one.

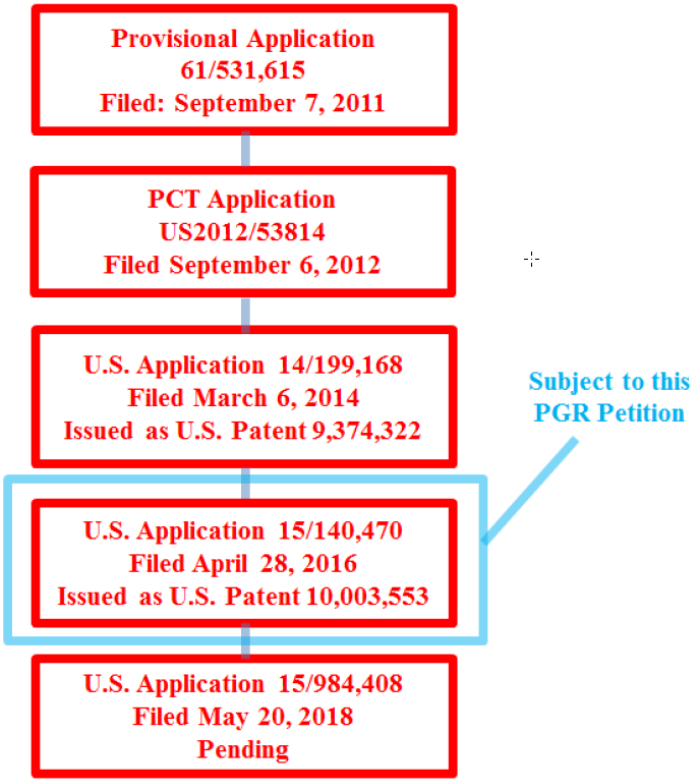
We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 328(a) as to the patentability of the claims on which we instituted trial.[3] Based on the record before us, Petitioner has shown, by a preponderance of the evidence, that claims 1–20 are unpatentable and that the substitute claims proposed by Patent Owner's Revised Motion to Amend are also unpatentable. In addition, for the reasons explained below, we deny Patent Owner's Motion to Exclude evidence.

I. BACKGROUND

A. The '553 Patent

[3] In the Institution Decision, we concluded that the '553 patent is eligible for post-grant review. Dec. 11–26. Patent Owner neither contests nor requests reconsideration of that conclusion, and we incorporate our analysis supporting that conclusion herein.

The '553 patent was filed on April 28, 2016 as U.S. Patent Appl. No. 15/140,470 ("the '470 application"), and claims the benefit of the following: (1) the March 6, 2014 filing date of U.S. Patent Appl. No. 14/199,168 ("the '168 application") (now issued as U.S. Patent No. 9,374,322 ("the '322 patent")); (2) the September 6, 2012 filing date of PCT/US12/53814 ("the '814 PCT application"); and (3) the September 7, 2011 filing date of Provisional Patent Appl. No. 61/531,615 ("the '615 provisional application"). Ex. 1001, 1:8–14; Ex. 1004, 1 (Certificate of Correction). A summary drawing provided by Petitioner is reproduced below. Pet. 4.



Petitioner's drawing summarizes certain claims to earlier filing dates and is similar to a drawing provided by Patent Owner that is in substantial agreement. *See* Paper 5, 7. Although the drawing also refers to U.S. Patent Appl. No. 15/984,408, that application is not relevant to this proceeding. In

addition, the ’553 patent recites that it incorporates the “entirety” of several additional patents and applications. Ex. 1001, 1:14–2:62.

The ’553 patent relates to multi-stage interconnection networks that find utility in multiple applications. *Id.* at 2:66–3:1. According to the ’553 patent, very large scale integration (“VLSI”) layouts for integrated circuits with such networks can be “inefficient and complicated.” *Id.* at 3:2–4. For example, prior-art networks of the type identified by the ’553 patent “require large area to implement the switches on the chip, large number of wires, longer wires, with increased power consumption, increased latency of the signals which [a]ffect the maximum clock speed of operation.” *Id.* at 3:43–48.

Accordingly, the ’553 patent discloses a number of configurations of multi-stage hierarchical networks. One example is illustrated in Figure 1A of the patent, reproduced below.

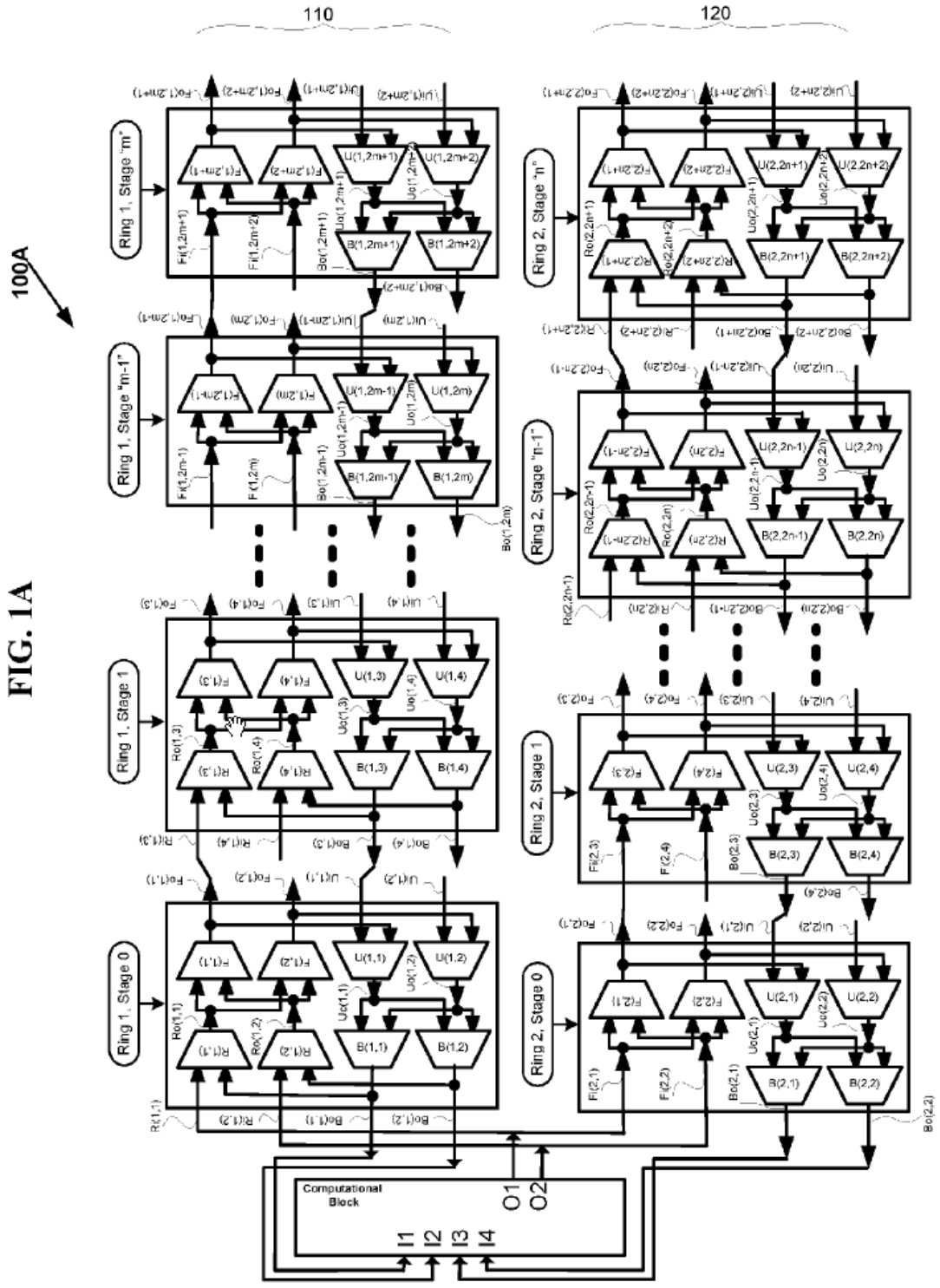


FIG. 1A

Figure 1A illustrates an exemplary partial multi-stage hierarchical network (or "block") in which each computational block has four inlet links I1, I2, I3,

I4 and two outlet links O1, O2. *Id.* at 8:57–62. For each computational block, a corresponding partial multi-stage hierarchical network has two "rings" 110, 120. *Id.* at 8:62–9:3. Ring 110 has inlet links Ri(1,1), Ri(1,2) and outlet links Bo(1,1), Bo(1,2). *Id.* at 9:4–6. Ring 120 similarly has inlet links Fi(2,1), Fi(2,2) and outlet links Bo(2,1), Bo(2,2). *Id.* at 9:5–6. The partial multi-stage hierarchical network thus has four inlet links and four outlet links corresponding to the two rings 110, 120. *Id.* at 9:6–9.

Several connections characterize the specific structure illustrated. First, outlet link O1 is connected to inlet link Ri(1,1) of ring 110 and also to inlet link Fi(2,1) of ring 120. *Id.* at 9:9–11. Second, outlet link O2 is connected to inlet link Ri(1,2) of ring 110 and also to inlet link Fi(2,2) of ring 120. *Id.* at 9:11–13. Third, outlet link Bo(1,1) of ring 110 is connected to inlet link I1. *Id.* at 9:14–15. Fourth, outlet link Bo(1,2) of ring 110 is connected to inlet link I2. *Id.* at 9:15–16. Fifth, outlet link Bo(2,1) of ring 120 is connected to inlet link I3. *Id.* at 9:17–18. Sixth, outlet link Bo(2,2) of ring 120 is connected to inlet link I4. *Id.* at 9:18–20. Because outlet link O1 is connected to both inlet link Ri(1,1) of ring 110 and inlet link Fi(2,1) of ring 120, and outlet link O2 is connected to both inlet link Ri(1,2) of ring 110 and inlet link Fi(2,2) of ring 120, the partial multi-stage hierarchical network has two inlet links and four outlet links (the counterparts of the four inlet links and two outlet links of the computational block). *Id.* at 9:20–26.

The drawing also illustrates multiple "stages." Ring 110 (i.e., ring 1) consists of m+1 stages, and ring 120 (i.e., ring 2) consists of n+1 stages. *Id.* at 8:65–9:1. For example, "ring 1, stage 0" has four inputs Ri(1,1), Ri(1,2), Ui(1,1), Ui(1,2) and four outputs Bo(1,1), Bo(1,2), Fo(1,1), Fo(1,2). *Id.* at

9:62–66. That stage also has eight 2:1 multiplexers R(1,1), R(1,2), F(1,1), F(1,2), U(1,1), U(1,2), B(1,1), B(1,2). *Id.* at 9:66–10:2. Multiplexer R(1,1) has two inputs Ri(1,1), Bo(1,1) and one output Ro(1,1). *Id.* at 10:2–3. Multiplexer R(1,2) has two inputs Ri(1,2), Bo(1,2) and one output Ro(1,2). *Id.* at 10:3–6. Multiplexer F(1,1) has two inputs Ro(1,1), Ro(1,2) and one output Fo(1,1). *Id.* at 10:5–6. Multiplexer F(1,2) has two inputs Ro(1,1), Ro(1,2) and one output Fo(1,2). *Id.* at 10:6–8. Multiplexer U(1,1) has two inputs Ui(1,1), Fo(1,1) and one output Uo(1,1). *Id.* at 10:9–10. Multiplexer U(1,2) has two inputs Ui(1,2), Fo(1,2) and one output Uo(1,2). *Id.* at 10:10–12. Multiplexer B(1,1) has two inputs Uo(1,1), Uo(1,2) and one output Bo(1,1). *Id.* at 10:12–13. Multiplexer B(1,2) has two inputs Uo(1,1), Uo(1,2) and one output Bo(1,2). *Id.* at 10:13–15. The patent also details the connections of other stages that appear in the drawing, some of which also have eight multiplexers and others of which have only six multiplexers. *Id.* at 10:16–12:59.

As illustrated by Figure 8 of the ’553 patent (not reproduced here), multiple blocks like those shown in Figure 1A may be arranged in a two-dimensional grid. *Id.* at 9:27–35. In such an arrangement, each block of the grid is part of the die area of a semiconductor integrated circuit so that the complete two-dimensional grid represents the complete die of the semiconductor integrated circuit. *Id.* at 9:36–39.

Figure 3 of the ’553 patent is reproduced below.

FIG. 3A

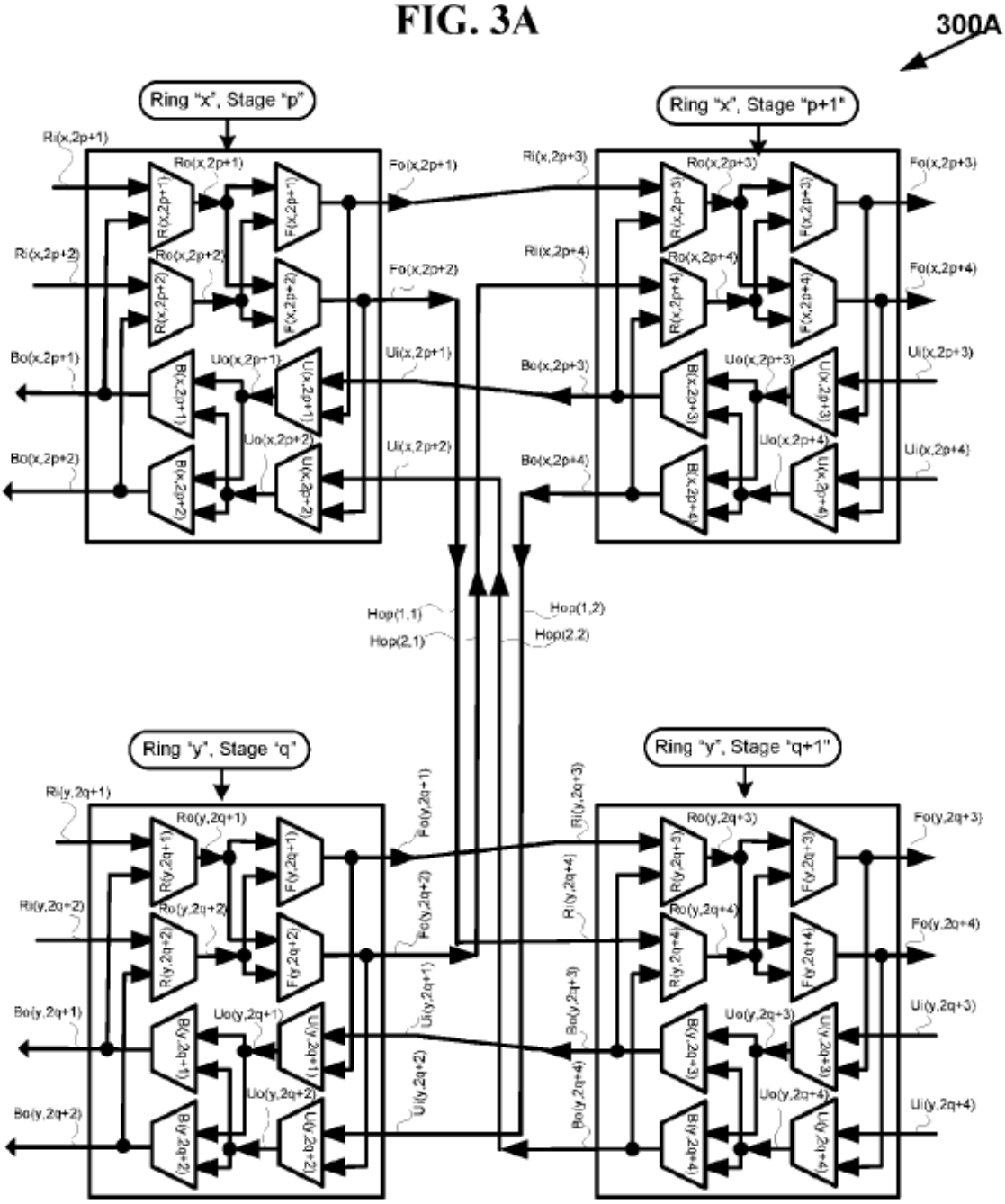


Figure 3A illustrates connections between two successive stages of a ring "x" and two successive stages of another ring "y." *Id.* at 20:42–48. Of particular relevance are the "hop" connections between the distinct rings: Hop(1,1) connects output Fo(x,2p+2) to input Ri(y,2q+4), Hop(1,2)

connects output Bo(x,2p+4) to input Ui(y,2q+2), Hop(2,1) connects output Fo(y,2q+2) to input Ri(x,2p+4), and Hop(2,2) connects output Bo(y,2q+4) to input Ui(x,2p+2). *Id.* at 22:15–26. The '553 patent explains that rings x and y "may or may not belong to the same block of the complete multi-stage hierarchical network." *Id.* at 22:29–30. If the rings belong to the same block, the hop connections are referred to as "internal hop wires"; conversely, if the rings belong to different blocks, they are referred to as "external hop wires." *Id.* at 22:29–40. External hop wires may be "horizontal wires or vertical wires," and the length of external hop wires, referred to as "hop length," is the "manhattan distance between the corresponding blocks," i.e. the sum of the vertical and horizontal differences separating the blocks. *Id.* at 22:40–63. Hop lengths are "positive integer[s]." *Id.* at 29:40–41, 32:18–19.

B. Illustrative Claim

Independent claim 1 of the '553 patent is illustrative of the claims challenged by the Petition, and is reproduced below.

> 1. A network implemented in a non-transitory medium comprising a plurality of subnetworks and a plurality of inlet links and a plurality of outlet links,
>
> said plurality of subnetworks arranged in a two-dimensional grid of rows and columns; and
>
> each subnetwork comprising y stages, where $y \geq 1$; and
>
> each stage comprising a switch of size $d_i \times d_o$, where $d_i \geq 2$ and $d_o \geq 2$ and each switch of size $d_i \times d_o$ having d_i incoming links and d_o outgoing links; and
>
> Said inlet links are connected to one or more of said incoming links of a said switch of a said stage of a said subnetwork, and said outlet links are connected to one of said

outgoing links of a said switch of a said stage of a said subnetwork; and

each subnetwork of the plurality of subnetworks may or may not be comprising the same number of said inlet links and may or may not be comprising the same number of said outlet links; each subnetwork of the plurality of subnetworks may or may not be comprising the same number of said stages; each stage may or may not be comprising the same number of switches; and each switch in each stage may or may not be of the same size, each multiplexer in each stage may or may not be of the same size and

Said incoming links and outgoing links in each switch in each stage of each subnetwork comprising a plurality of forward connecting links connected from switches in a stage to switches in another stage in same said subnetwork or another said subnetwork, and also comprising a plurality of backward connecting links connected from switches in a stage to switches in another stage in same subnetwork or another said subnetwork; and

Said forward connecting links comprising zero or more straight links connected from a switch in a stage in a subnetwork to a switch in another stage in the same subnetwork and also comprising zero or more cross links connected from a switch in a stage in a subnetwork to a switch in the same numbered stage in one or more other subnetworks, and

Said backward connecting links comprising zero or more straight links connected from a switch in a stage in a subnetwork to a switch in another stage in the same subnetwork; and also comprising zero or more cross links connected from a switch in a stage in a subnetwork to a switch in the same numbered stage in one or more other subnetworks.

Ex. 1001, 48:62–49:40.

C. Instituted Grounds of Unpatentability

Petitioner challenges claims 1–20 on the following grounds:

Claims Challenged	35 U.S.C. §	References/Basis
1–20	112(b)	Indefiniteness
1–20	112(a)	Written Description
1–20	112(a)	Enablement

Petitioner supports its challenges with a Declaration by R. Jacob Baker, Ph.D., P.E. Ex. 1002; *see also* Ex. 1003 (Curriculum Vitae of Dr. Baker).

D. Real Parties in Interest

The parties identify only themselves as real parties in interest. Pet. 3; Paper 4, 2.

E. Related Proceedings

The '553 patent was involved in *Konda Technologies Inc. v. Flex Logix Technologies, Inc.*, No. 5:18-cv-07581-LHK (N.D. Cal.). *See* Pet. 3. Subsequent to filing of the Petition, this action was dismissed without prejudice. Paper 10, 2 (representation by Petitioner). The '553 patent is also the subject of PGR2019-00040 and PGR2019-00042, for which a trial was instituted in the latter and denied in the former. PGR2019-00040, Paper 13; PGR2019-00042, Paper 14; Pet. 3–4. A final written decision in PGR2019-00042 ("the related PGR") is issued concurrently with the instant Decision.

II. ANALYSIS

A. Level of Skill in the Art

Petitioner contends that the relevant level of skill in the art is that possessed by a person who "would have had a master's degree in electrical engineering or a similar field, and at least two to three years of experience

with integrated circuits and networks." Pet. 6 (citing Ex. 1002 ¶ 18). Petitioner asserts that "[m]ore education can supplement practical experience and vice versa." *Id.* Patent Owner did not file a Response to the Petition and does not advocate for a particular level of skill in the art. *See* Paper 34, 7 (Petitioner observing that "Patent Owner has not challenged this skill level in this proceeding"); *see generally* Paper 16; RMTA.

We find Petitioner's proposal consistent with the level of ordinary skill in the art reflected by the prior art, particularly the prior art of record in the related PGR. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Therefore, for purposes of this Decision, we adopt Petitioner's unopposed position as to the level of ordinary skill in the art.

B. Claim Construction

For petitions filed after November 13, 2018, as here, the Board uses "the same claim construction standard that would be used to construe the claim 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." *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340, 51,340, 51,358 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018) (now codified at 37 C.F.R. § 42.100(b) (2019));*Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). The specification may reveal a

special definition given to a claim term by the patentee. *Phillips* at 1316. If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998).

Petitioner "submits that for purposes of this proceeding, no term requires construction." Pet. 31 (citing Ex. 1002 ¶ 51). Patent Owner does not take a position regarding construction of the challenged claims.

Because only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy, we do not expressly construe any claim term for purposes of this Decision. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

C. Indefiniteness

Under 35 U.S.C. § 112(b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." The Supreme Court has characterized such a definiteness requirement (under the pre-AIA version, which does not differ in respects germane to the issues before us) as "requir[ing] that a patent's claims, viewed in light of the specification and prosecution history, inform those skilled in the art about

the scope of the invention with reasonable certainty." *Nautilus, Inc. v. BioSig Instruments, Inc.*, 572 U.S. 898, 910 (2014).[4]

Petitioner identifies multiple aspects of independent claims 1 and 11 that it contends render those claims indefinite. Pet. 32–47. Among these, Petitioner's observation that both of those claims recite "each multiplexer in each stage may or may not be of the same size," without apparent antecedent basis, is most compelling. *See id.* at 41–42, 47; Ex. 1001, 49:17–18, 51:9–10. Because the term "multiplexer" is not otherwise recited in those claims, Petitioner contends that a person of ordinary skill in the art "would not have been able to determine whether claim[s] 1 [and 11] require[] one or more multiplexers in each of the stages where the multiplexers 'may or may not be of the same size' or whether only some of the stages include a multiplexer and only those multiplexers 'may or may not be of the same size.'" Pet. 41. In addition, Petitioner contends that "it would have been

[4] As Petitioner notes, "[p]rior to the rule change applying the *Phillips* claim construction standard . . . , the Board has also applied the *In re Packard* standard where a claim is held to be indefinite when it contains words or phrases whose meaning is unclear in describing and defining the claimed invention." Pet. 32–33 n.20 (citing *In re Packard*, 751 F.3d 1307, 1311 (Fed. Cir. 2014); *Nippon Suisan Kaisha Ltd. v. Pronova Biopharma Norge AS*, PGR2017-00033, Paper 37 at 11–12, 14 (PTAB Jan. 16, 2019)). The Office recently promulgated binding agency guidance that "the Board's approach to analyzing indefiniteness in AIA post-grant proceedings will now adhere to the approach used by the district courts, as set forth in *Nautilus*." *Approach to Indefiniteness Under 35 U.S.C. § 112 in AIA Post-Grant Proceedings*, available at https://www.uspto.gov/sites/default/files/documents/IndefinitenessMemo.pdf. We accordingly focus on the *Nautilus* standard herein. Nevertheless, we note that we would reach the same result if we applied the *Packard* standard.

unclear to a [person of ordinary skill in the art] whether 'each multiplexer in each stage' means every multiplexer in every stage or every multiplexer in a particular stage." *Id.* (citing Ex. 1002 ¶ 87).

Patent Owner does not dispute these contentions. On the record before us, we agree with Petitioner that "it is unclear whether the scope of claim[s] 1 [and 11] requires any multiplexers at all, and if such multiplexers are required, it is unclear what is meant by 'each multiplexer in each stage.'" *Id.* at 42 (citing Ex. 1002 ¶ 89). Claims 2–10 depend directly or indirectly from independent claim 1, and claims 12–20 depend directly or indirectly from independent claim 11. The dependent claims thus suffer from the same indefiniteness as the independent claims.[5] We accordingly conclude that Petitioner shows, by a preponderance of the evidence, that claims 1–20 are unpatentable under 35 U.S.C. § 112(b) as indefinite.

[5] In the Institution Decision, we noted that "Petitioner additionally contends that certain other phrases in independent claims 1 and 11 render those claims indefinite," and that "Petitioner makes similar arguments with respect to several dependent claims." Dec. 28, 30. For those additional contentions, we further noted a concern that "it is not apparent on the undeveloped record before us whether Petitioner's contentions improperly conflate indefiniteness with claim breadth" and invited the parties to develop the issues further. *Id.* at 29. Because the parties have effectively declined that invitation, such that the complete record before us is no more developed on those issues than was the preliminary record, and because we already conclude that Petitioner makes a sufficient showing that other aspects of the claims render them indefinite, we do not further address Petitioner's additional indefiniteness contentions.

F. Written Description

A patent specification must "contain a written description of the invention." 35 U.S.C. § 112(a). Whether a specification complies with the written-description requirement is a question of fact. *Regents of Univ. of Cal. v. Eli Lilly & Co.*, 119 F.3d 1559, 1566 (Fed. Cir. 1997). Petitioner challenges claims 1–20 as failing to satisfy this requirement. Pet. 59–82.

Petitioner identifies two aspects of independent claims 1 and 11 that it contends do not satisfy the written-description requirement of 35 U.S.C. § 112(a). First, Petitioner addresses the recitation in claims 1 and 11 of a "network . . . comprising a plurality of subnetworks," with "each subnetwork comprising y stages, where $y \geq 1$." *See* Ex. 1001, 48:62–67, 50:54–59. Because the inequality encompasses the case where $y = 1$, Petitioner contends that a person of ordinary skill in the art "would have understood claim[s] 1 [and 11] to cover a network that includes subnetworks that all include only a *single stage*," and supports that contention with testimony by Dr. Baker. Pet. 61 (citing Ex. 1002 ¶ 151). But according to Petitioner, "the disclosure of the ['553 patent] does not disclose any subnetwork with a single stage, let alone an entire network that includes only a single stage in every subnetwork." *Id.*

In supporting its contention, Petitioner observes that the '553 patent does not use the term "subnetwork" outside of the claims, but divides the disclosed networks into "blocks" made up of a number of stages, each including one or more switches. *Id.* According to Petitioner, "[t]o the extent that the 'subnetworks' recited in the claims correspond to 'blocks' or include the disclosed 'blocks,' the ['553 patent] makes clear that each block includes

at least two stages." *Id.* at 63. In describing Figures 1A and 8 of the '553 patent, the patent explains that the "partial *multi-stage* hierarchical network V_{Comb} (N_1,N_2,d,s) 100A consists of two rings 110 and 120, where ring 110 *consists of 'm+1' stages* . . . and ring 120 *consists of 'n+1' stages* . . . , where 'm' and 'n' are positive integers." Ex. 1001, 8:62–9:3 (emphases added). As such, according to Petitioner, "each block necessarily includes at least two stages for each ring and no block would only include a single stage." Pet. 64 (citing Ex. 1002 ¶ 154). On the record before us, we find Petitioner's assertion, which is supported by testimony of Dr. Baker, accurate.

In addition, as Petitioner incidentally observes, the title of the '553 patent is specifically directed to "multi-stage" networks: "Optimization of *Multi-Stage* Hierarchical Networks for Practical Routing Applications." *Id.*; Ex. 1001, code (54) (emphasis added). And, according to Petitioner, "[a]side from the last four figures that are not concerned with network hierarchy and instead illustrate particular switch implementations, *every figure* of the ['553 patent] is described as representing an embodiment or portion of an embodiment of a 'multi-stage' network." *Id.* (citing Ex. 1002 ¶¶ 155–56). We also find this assertion, which is further supported by testimony of Dr. Baker, accurate.

Petitioner acknowledges that the application that matured into the '553 patent originally included claims that encompass single-stage subnetworks. *Id.* at 64–65 (citing Ex. 1004, 286). But Petitioner contends that a person of skill in the art would nonetheless not have understood the inventor to have had possession of such an invention for the same reasons

summarized above. *Id.* at 65 (citing *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1349–50 (Fed. Cir. 2010) (en banc) ("[A]n adequate written description of a claimed genus requires more than a generic statement of an invention's boundaries.")).

Patent Owner does not respond to these arguments. Claims 2–10 depend directly or indirectly from independent claim 1, and claims 12–20 depend directly or indirectly from independent claim 11. The dependent claims thus suffer from the same lack of written-description support as the independent claims.[6] Because we agree with Petitioner's arguments, which are supported by the testimonial evidence of Dr. Baker, we conclude that Petitioner shows, by a preponderance of the evidence, that claims 1–20 are unpatentable under 35 U.S.C. § 112(a) for failing to comply with the written-description requirement.

[6] In the Institution Decision, we noted that Petitioner identified additional claim limitations that lack written-description support, including the recitation in independent claims 1 and 11 of "zero or more cross links connected from a switch in a stage in a subnetwork to a switch in the same numbered stage in one or more other subnetworks," the recitation in dependent claims 2 and 12 of cross links connected "as either vertical links only, or horizontal links only, or both vertical links and horizontal links," the recitation of zero hop-length limitations of claims 4 and 14, and the "flip flop" limitation of claim 9. Dec. 32–33 (citing Pet. 66–82). Because we conclude that Petitioner makes a sufficient showing with respect to the single-stage aspects of independent claims 1 and 11, we do not reach these additional issues.

G. Enablement

Petitioner challenges claims 1–20 as failing to satisfy the enablement requirement of 35 U.S.C. § 112(a). Pet. 82–87. To meet that requirement, the specification must teach a person of skill in the art how to make and use the full scope of the claimed invention without "undue experimentation." *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997) (internal citation omitted). In addressing whether claims 1–20 are enabled, Petitioner focuses on the single-stage subnetwork limitation encompassed by independent claims 1 and 11, and discussed above in connection with the written-description requirement. Pet. 83–87.

According to Petitioner, because the specification of the '553 patent does not disclose any subnetwork with a single stage, it "simply does not teach a [person of ordinary skill in the art] how to make and use at least '[a] network . . . comprising a plurality of subnetworks,' with 'each subnetwork comprising y stages, *where* $y \geq 1$,' as required by independent claims 1 and 11, and thus implicating all of challenged claims 1-20." *Id.* at 83–84 (citing Ex. 1002 ¶¶ 204–215). Because we agree with Petitioner's characterization of the claims as encompassing such a configuration, and because we also agree, on the record before us, that the written description of the '553 patent is directed to *multi-stage* networks, we find that Petitioner makes a sufficient showing. Claims 2–10 depend directly or indirectly from independent claim 1, and claims 12–20 depend directly or indirectly from independent claim 11. The dependent claims thus suffer from the same lack of enablement as the independent claims.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claims 1–20 are unpatentable under 35 U.S.C. § 112(a) for lack of enablement.

III. REVISED MOTION TO AMEND

Because we conclude that all of the challenged claims are unpatentable, we consider Patent Owner's Revised Motion to Amend.[7] *See* RMTA 1 (confirming that "this Revised Motion to Amend is contingent upon a finding in a final written decision by the Board that the challenged claims 1-20 are unpatentable"). "Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in" 35 U.S.C. § 326(d) and 37 C.F.R. § 42.221. *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential).[8] Accordingly, a patent owner must provide a claim listing reproducing each proposed substitute claim, and must make an initial

[7] Patent Owner filed what appear to be identical Declarations executed by himself as Exhibits 2004 (incorrectly filed as Paper 24) and 2009 in support of his Revised Motion to Amend and corresponding Reply. *See* RMTA 3 (noting filing of Exhibit 2004); Reply RMTA 3 (noting filing of Exhibit 2009). But Patent Owner does not cite substantively to either Declaration in his arguments, and we agree with Petitioner that, notwithstanding Patent Owner's attestation to his education and professional experience in the Declarations, Patent Owner's *pro se* arguments in the Revised Motion to Amend and corresponding Reply are not properly considered as supporting evidence. *See* Opp. RMTA 2; Sur-reply RMTA 2 n.1.

[8] While *Lectrosonics* expressly references an *inter partes* review, its analysis is equally applicable to motions to amend in a post grant review.

showing to demonstrate the following: (1) the amendment proposes a reasonable number of substitute claims; (2) the proposed claims are supported in the original disclosure (and any earlier filed disclosure for which the benefit of the earlier filing date is sought); (3) the amendment responds to a ground of unpatentability involved in the trial; and (4) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter. *See* 35 U.S.C. § 326(d); 37 C.F.R. § 42.221.

The Board also must assess the patentability of proposed substitute claims "without placing the burden of persuasion on the patent owner." *Aqua Prods., Inc. v. Matal*, 872 F.3d at 1328; *see Lectrosonics*, Paper 15 at 3–4 (discussing *Aqua Products* and the burden of persuasion). After *Aqua Products*, the Federal Circuit further clarified the burden of persuasion in *Bosch Automotive Service Solutions, LLC v. Matal*, 878 F.3d 1027 (Fed. Cir. 2017), *amended by Bosch Automotive Service Solutions, LLC v. Iancu*, No. 2015-1928 (Fed. Cir. Mar. 15, 2018). According to *Aqua Products*, *Bosch*, and *Lectrosonics*, a patent owner does not bear the burden of persuasion to show that the proposed substitute claims are patentable. Rather, ordinarily "the petitioner bears the burden of proving that the proposed amended claims are unpatentable by a preponderance of the evidence." *Bosch*, 878 F.3d at 1040 (as amended on rehearing); *Lectrosonics*, Paper 15 at 3–4. To determine whether a petitioner has proven the substitute claims are unpatentable, the Board focuses on "arguments and theories raised by the petitioner in its petition or opposition to the motion to amend." *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 51 (Fed. Cir. 2020).

For the reasons expressed below, we conclude that Patent Owner does not make a sufficient showing that (1) the proposed substitute claims are supported by the original or earlier disclosures; (2) the amendments to the claims respond to a ground of unpatentability involved in the trial; or (3) the amendments to the claims do not introduce new subject matter. We also conclude that Petitioner shows, by a preponderance of the evidence, that the proposed substitute claims are unpatentable under 35 U.S.C. § 112 as indefinite.

A. Proposed Substitute Claims

Patent Owner proposes a set of substitute claims in one-to-one correspondence with the set of original claims. RMTA App'x. That is, proposed claim 21 substitutes for original claim 1, proposed claim 22 substitutes for original claim 2, etc. through proposed claim 40 as a substitute for original claim 20. *Id.* Of the proposed substitute claims, claims 21 and 31 are independent, and the dependency of the remaining proposed claims tracks the dependency of the original claims as applied to the proposed substitute claims. *Id.*

Proposed substitute claim 21 is illustrative, and is reproduced below with underlining to indicate text added to original claim 1 and bracketing to indicate text removed from original claim 1.[9]

> 21. A multi-stage hierarchical network implemented in a non-transitory medium comprising a plurality of partial multi-stage hierarchical networks [subnetworks] and a plurality of inlet links and a plurality of outlet links,
>
> said plurality of partial multi-stage hierarchical networks [subnetworks] arranged in a two-dimensional grid of a plurality of rows and a plurality of columns; and
>
> each partial multi-stage hierarchical network [subnetwork] of said plurality of partial multi-stage hierarchical networks comprising a ring and said ring comprising a plurality of stages [[y stages, where $y \geq 1$]]; and
>
> one of said plurality of stages comprising an entry stage and one of said plurality of stages comprising a last stage; and
>
> each stage of said plurality of stages comprising a switch of size $d_i \times d_0$, where $d_i \geq 2$ and $d_o \geq 2$ and [each] said switch of size $d_i \times d_0$ having d_i inputs [incoming links] and d_0 outputs [outgoing links]; and said switch of size $d_i \times d_0$ further comprising a plurality of multiplexers of size $d \geq 2$ with each multiplexer of said plurality of multiplexers of size $d \geq 2$ comprising d inputs and an output; and

[9] We generally reproduce the claim in the form it appears in the Revised Motion to Amend. But we note certain alterations to Patent Owner's identification of changes because some differences from original claim 1 are not correctly identified in Patent Owner's version of proposed substitute claim 21. In addition, the claim differs from original claim 1 in certain trivial respects that are not identified as changes, namely with different italicization of certain quantities such as d_i instead of d_i or the use of a zero subscript in d_0 instead of an "o" subscript in d_o in certain instances. We do not consider such trivial differences meaningful since the intent of which quantities are referred to is unambiguously clear.

said multi-stage hierarchical network further comprising a plurality of internal connections and a plurality of external hop wires; and

each input of said d_i inputs of said switch of size $d_i \times d_0$ connected to either an internal connection of said plurality of internal connections or an external hop wire of said plurality of external hop wires; and

each output of said d_0 outputs of said switch of size $d_i \times d_0$ connected to either an internal connection of said plurality of internal connections or an external hop wire of said plurality of external hop wires; and

at least a first multiplexer of said plurality of multiplexers of a first said switch of size $d_i \times d_0$ where $d_i > d_o$ comprising more inputs than a second multiplexer of said plurality of multiplexers of the first said switch of size $d_i \times d_0$, or at least one input of a multiplexer of said plurality of multiplexers of said switch of size $d_i \times d_0$ of a first stage of said plurality of stages of said ring of a first partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks connected from the output of a multiplexer of said plurality of multiplexers of said switch of size $d_i \times d_0$ of a second stage of said plurality of stages of said ring of said first partial multi-stage hierarchical network or a second partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks, and

each inlet link of [S]said plurality of inlet links [are] is connected to one or more of said d_i inputs [incoming links] of [a] said switch of size $d_i \times d_0$ of [a] either said entry stage or said last stage of said plurality of stages of [a] one [said] partial multi-stage hierarchical network [subnetwork] of said plurality of partial multi-stage hierarchical networks, and each outlet link of[10] said plurality of outlet links [are] is connected to one of said d_0[11] outputs [outgoing links] of [a] said switch of size $d_i \times$

[10] The added text "each outlet link of" incorrectly omits underlining in Patent Owner's version of the claim. This text is not part of original claim 1.
[11] The added text "d_0" incorrectly omits underlining in Patent Owner's version of the claim. This text is not part of original claim 1.

d_0 of [a] either said entry stage or said last stage of said plurality of stages of [a] one said partial multi-stage hierarchical network [subnetwork] of said plurality of partial multi-stage hierarchical networks; and

[each subnetwork of the plurality of subnetworks may or may not be comprising the same number of said inlet links and may or may not be comprising the same number of said outlet links; each subnetwork of the plurality of subnetworks may or may not be comprising the same number of said stages; each stage may or may not be comprising the same number of switches; and each switch in each stage may or may not be of the same size, each multiplexer in each stage may or may not be of the same size and]

said ring of a first partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks comprising the same or different number of said plurality of stages as said ring of a second partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks; a first stage of said plurality of stages comprising said switch comprising the same or different number of said plurality of multiplexers as a second stage of said plurality of stages; a first multiplexer in said plurality of multiplexers of size $d \geq 2$ is the same or different size as a second multiplexer is said plurality of multiplexers of size $d \geq 2$; and

[Said incoming links and outgoing links in each switch in each stage of each subnetwork comprising a plurality of forward connecting links connected from switches in a stage to switches in another stage in same said subnetwork or another said subnetwork, and also comprising a plurality of backward connecting links connected from switches in a stage to switches in another stage in same subnetwork or another said subnetwork; and

Said forward connecting links comprising zero or more straight links connected from a switch in a stage in a subnetwork to a switch in another stage in the same subnetwork and also comprising zero or more cross links connected from a

switch in a stage in a subnetwork to a switch in the same numbered stage in one or more other subnetworks, and

Said backward connecting links comprising zero or more straight links connected from a switch in a stage in a subnetwork to a switch in another stage in the same subnetwork; and also comprising zero or more cross links connected from a switch in a stage in a subnetwork to a switch in the same numbered stage in one or more other subnetworks.]

each internal connection of said plurality of internal connections connected from the output of a first multiplexer of said plurality of multiplexers of size $d \geq 2$ of said switch of a first stage of said plurality of stages of said ring of a first partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks to one input of said *d* inputs of a second multiplexer of said plurality of multiplexers of size $d \geq 2$ of said switch of a second stage either succeeding or preceding to said first stage of said plurality of stages of said ring of said first partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks; and

each external hop wire of said plurality of external hop wires connected from said output of one multiplexer of said plurality of multiplexers of size $d \geq 2$ of said switch of a first two successive stages of said plurality of stages of said ring of a first partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks to one or more inputs of said *d* inputs of one or more multiplexers of said plurality of multiplexers $d \geq 2$ of said switch of said first two successive stages or a second two successive stages of said plurality of stages of said ring of a second partial multi-stage hierarchical network different from said first partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks.

RMTA App'x 2–8.

Patent Owner contends that "[b]ecause the challenged claims have been cancelled and substitute claims are proposed, this constitutes a

'reasonable number of substitute claims.'" RMTA 12 (citing 37 C.F.R. § 42.221(a)(3)). Petitioner does not dispute this contention, and we agree with Patent Owner because there is only one proposed substitute claim per original challenged claim.

B. Support for Proposed Substitute Claims

New subject matter is any addition to the claims that lacks sufficient support in the subject patent's original disclosure. *See TurboCare Div. of Demag Delaval Turbomach. v. Gen. Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001) ("When [an] applicant adds a claim . . . , the new claim[] must find support in the original specification."). The Board requires that a patent owner show in a motion to amend that there is written-description support in the originally filed disclosure of the subject patent for each proposed substitute claim, and also set forth support in an earlier-filed disclosure for each claim for which the patent owner seeks the benefit of the earlier-filed disclosure's filing date. *See* 37 C.F.R. §§ 42.221(b)(1), 42.221(b)(2).

To support his contention that the proposed substitute claims have sufficient support, Patent Owner provides a chart that purports to identify support for the proposed substitute claims in the '470 application, the '168 application, the '814 PCT application, and/or the '615 provisional application. RMTA 15–22. As noted above, the '470 application is the patent application that matured into the '553 patent, and each of the other three applications is incorporated by reference into the '470 application. Ex. 1001 at code (21), 1:8–14; Ex. 1004, 1 (Certificate of Correction). These applications are also identified in Petitioner's drawing, reproduced

supra at 4, summarizing the '553 patent's claims for earlier effective filing dates.

Petitioner contends that Patent Owner's chart is inadequate because it "simply provides citations to blocks of text, and, despite specific guidance on this point, [Patent Owner] does not provide any explanation or supporting evidence to establish that the passages that are cited actually support the combination of limitations recited in the proposed substitute claims." Opp. RMTA 9 (citing RMTA 15–22; Paper 21, 9). In addition, Petitioner contends that "huge portions of the proposed substitute claims are grouped together with a large number of broad citations to the specification provided as alleged support, thereby obfuscating what language in the specification allegedly supports specific portions of the claims." *Id.*

Petitioner points to a specific example in which Patent Owner's chart "indicates that a portion of proposed substitute claim 21 spanning a page and a half ([RMTA,] Appendix, 3:4-4:17) is supported by a dozen citations to the '470 application. ([RMTA,] 16-17 (citing Ex. 1004[,] 212:21-22, 219:19-220:2, 223[:]25-28, 221:13-22, 235:16-236:3, 236:3-6, 233:7-11, 238:17-20, 238:20-242:8, 241:26-242:8, 245:9-17, 282:19-21 in attempting to show support for that portion of proposed substitute claim 21).)." Opp RMTA 9. We agree with these characterizations of Patent Owner's chart, and further agree that the mere citation of broad portions of the claims and allegedly supporting documents can be insufficient to carry Patent Owner's burden. *See Lectrosonics*, Paper 15 at 4; *see also* 37 C.F.R. § 42.221(d)(1) ("A patent owner bears the burden of persuasion to show, by a preponderance of the evidence that the motion to amend complies with the

requirement[] of . . . paragraph[] . . . (b)(2) [to identify support for the proposed substitute claims].") (effective for motions to amend filed on or after January 20, 2021). Such citations do not "provide *an explanation as to how* the cited portions of the original disclosure (and any earlier-filed disclosure Patent Owner relies on) supports the limitations of the substitute claims," as we advised Patent Owner to provide in our Preliminary Guidance.[12] *See* Paper 21, 9 (emphasis added).

In addition to this general criticism of Patent Owner's chart, Petitioner also provides a specific example for each of the proposed substitute independent claims in which Petitioner contends that "the cited portions do not provide written description support for that newly added portion" of the proposed substitute independent claims. Opp. RMTA 10. Specifically, proposed substitute claims 21 and 31 recite "each stage of said plurality of stages comprising a switch of size $d_i \times d_0$, where $d_i \geq 2$ and $d_o \geq 2$ and said switch of size $d_i \times d_0$ having d_i inputs and d_0 outputs." RMTA, App'x 3:9–11, 15:10–12. Patent Owner's chart does not address this recitation precisely, but instead addresses it as a mere part of much larger recitations that span about two pages. *See id.* at 16 (citing *id.*, App'x 3:4–4:17), 19 (citing *id.*, App'x 14:4–17:2). And as Petitioner accurately asserts, "none of

[12] We recognize that the proposed substitute claims are lengthy, and that our regulations impose page limits on motions to amend. *See* 37 C.F.R. § 42.24(a)(1)(vi). Nevertheless, in holding Patent Owner to his burden, we note that we authorized an enlargement of the page limit on Patent Owner's Motion to Amend. Ex. 3002.

the cited passages cited as allegedly supporting this large portion of claim 21 mentions switches of size $d_i \times d_0$ where $d_i \geq 2$ and $d_0 \geq 2$." Opp. RMTA 10.

In discussing this example, the parties focus on the statement in the '470 application that "[i]n other embodiments, all the d * d switches described in the current invention are also implemented using muxes of different sizes controlled by SRAM or flash cells etc." Ex. 1004, 282:19–21. Petitioner refers to this statement as "the only mention of switches" among the citations provided in Patent Owner's chart for the limitation, and as evidencing a lack of support for the specific requirements of a switch of size of $d_i \times d_0$, where $d_i \geq 2$ and $d_o \geq 2$. Opp. RMTA 10. Conversely, Patent Owner refers to the statement as being "**correctly** identified" by Petitioner as providing support, and thereby a concession that the limitation finds written-description support. Reply RMTA 9.

We agree with Petitioner that the statement does not provide adequate support for the limitation because it provides no indication of switch size, but instead merely states that switches can be implemented using muxes "of different sizes." We also agree with Petitioner that Patent Owner's effort to supplement his position that the limitation finds adequate support with still further citations in his Reply is unavailing. *See* Reply RMTA 9–11 (citing Ex. 1004, 233:12–19, 226:6–13); Sur-reply RMTA 8–9. On this point, Patent Owner expressly acknowledges that further reference in his Reply to support in various drawings "are not included" in his chart. Reply RMTA 11. We have nevertheless reviewed the additional passages Patent Owner identifies in the Reply, and agree with Petitioner that Patent Owner "fails to explain how the specific examples described in the application as filed (Ex.

1004) support the broad range of switch sizes recited in the claims where each switch has d_i inputs and d_0 outputs and d_i is any number greater than or equal to 2 and d_0 is also any number greater than or equal to 2." Sur-reply RMTA 8 (citing Ex. 1004, 233:12–19, 226:6–13).

Because proposed substitute claims 22–30 and 32–40 depend from proposed substitute claim 21 or 31, those claims suffer from the same issue. We thus conclude that Patent Owner does not make a sufficient showing that identifies adequate written-description support for any of the proposed substitute claims.

C. Responsiveness to a Ground of Unpatentability Involved in the Trial

In our Preliminary Guidance on Patent Owner's original Motion to Amend, we noted that Patent Owner's proposed claim amendments "go beyond the changes identified by Patent Owner and make wholesale changes to nearly all of original claims 1–20." Paper 21, 6. The same problem persists in Patent Owner's Revised Motion to Amend, and Patent Owner does not address this concern in his Revised Motion, despite it being highlighted in the Preliminary Guidance. Rather, Patent Owner merely asserts that "[t]he proposed substitute claims respond to an asserted ground of unpatentability," without explaining how they do so beyond merely reiterating what the asserted grounds are. RMTA 7.

Lectrosonics affords a degree of flexibility in the permissible scope of amendments proposed in a motion to amend. Specifically, in the context of *inter partes* reviews, *Lectrosonics* advises that it is not required "that every word added to or removed from a claim in a motion to amend be solely for

the purpose of overcoming an instituted ground." *Lectrosonics*, Paper 15 at 5. Even though challenges for *inter partes* reviews may be based only on "ground[s] that could be raised under section 102 or 103," a patent owner "also may include additional limitations [in proposing a claim amendment] to address potential § 101 or § 112 issues" once the proposed claim "includes amendments to address a prior art ground in the trial." 35 U.S.C. § 311(b); *Lectrosonics*, Paper 15 at 6; *see also Uniloc 2017 LLC v. Hulu, LLC*, 966 F.3d 1295, 1304–1307 (Fed. Cir. 2020) (holding that § 311(b) does not limit the Board's review of substitute claims proposed in an *inter partes* review). "Allowing an amendment to address such issues, when a given claim is being amended already in view of a 35 U.S.C. § 102 or § 103 ground, serves the public interest by helping to ensure the patentability of amended claims." *Lectrosonics*, Paper 15 at 6 (citing *Veeam Software Corp. v. Veritas Techs., LLC*, IPR2014-00090, Paper 48 at 26–29 (PTAB July 17, 2017)). But as Petitioner observes in opposition, the "Revised Motion once again makes wholesale changes to all of the claims, and the resulting set of substitute claims bears little resemblance to original claims 1-20 of the '553 patent." Opp. RMTA 3. For both proposed substitute independent claims 21 and 31, for example, multiple pages of text are inserted and multiple pages of text are deleted. *See* RMTA App'x 2–8, 14–21. We need not define the precise contours of how *Lectrosonics*'s flexibility might apply to post-grant reviews because we find the scope of the proposed amendments goes well beyond the intent and spirit of that flexibility.

Although Patent Owner contends that Petitioner is "simply wrong" that Patent Owner did not respond to all the issues raised in our Preliminary

Guidance, Patent Owner again does not provide sufficient *explanation* to carry his burden. Reply RMTA 4; *see Lectrosonics*, Paper 15 at 4*; see also* 37 C.F.R. § 42.221(d)(1) (assigning burden of persuasion to patent owner) (effective for motions to amend filed on or after January 20, 2021). Patent Owner's bald assertion that he "strictly adhered" to our Preliminary Guidance provides insufficient information to evaluate the assertion.

Because proposed substitute claims 22–30 and 32–40 depend from proposed substitute claim 21 or 31, those claims suffer from the same issue. We thus conclude that Patent Owner does not make a sufficient showing that the proposed substitute claims respond to a ground of unpatentability involved in the trial, in a manner contemplated by our regulations. We note that Patent Owner may wish to pursue alternative avenues for amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision as described in the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*, 84 Fed. Reg. 16,654 (Apr. 22, 2019), and footnote 15 of this Decision.

D. Scope of Proposed Substitute Claims

In addressing the scope of the proposed substitute claims, Patent Owner identifies a number of features that are indisputably narrowing. *See, e.g.*, RMTA 12–13 (substitution of "network" with "multi-stage hierarchical network" is clearly narrowing). Petitioner agrees. Opp. RMTA 7 (admitting that "[Patent Owner's] amendments may narrow certain aspects of the claims").

The problem with the proposed substitute claims, though, is that other amendments appear to be broadening, and Patent Owner provides insufficient explanation why such amendments are not broadening, despite having the burden to do so. *See Lectrosonics*, Paper 15 at 4; 37 C.F.R. § 42.221(d)(1) (assigning burden of persuasion to patent owner) (effective for motions to amend filed on or after January 20, 2021). In our Preliminary Guidance, we specifically noted that this problem arose through "the deletion of entire limitations, as well as the substitution of terms in other limitations." Paper 21, 6–7. As a specific example, we observed that the original Motion to Amend proposed to delete the following limitation from original claim 1:

> Said incoming links and outgoing links in each switch in each stage of each subnetwork comprising a plurality of forward connecting links connected from switches in a stage to switches in another stage in same said subnetwork or another said subnetwork, and also comprising a plurality of backward connecting links connected from switches in a stage to switches in another stage in same subnetwork or another said subnetwork[.]

Id. at 7. As we explained, the deletion of that limitation broadened original claim 1 in the specific respect of reading on a network including only forward connecting links or only backward connecting links. *Id.* Nevertheless, the Revised Motion to Amend continues to propose deleting the limitation without sufficient explanation how the claim is not thereby broadened in this respect. *See* Opp. RMTA 7 ("[E]ven though [Patent Owner's] amendments may have added certain narrowing features, the

substitute claims, which are broadened in other areas, would still read on networks that the original claims of the '553 patent would not.").

As another example, we observed that the original Motion to Amend proposed to substitute the terms "incoming link" and "outgoing link" with "input" and "output," respectively. Paper 21, 7. As we explained, this substitution broadened original claims 1 and 11 because the limiting term "link" was no longer part of the claim term, such that a non-link input or output would satisfy the claim limitation. *Id.* Again, notwithstanding this guidance, the Revised Motion to Amend continues to propose the same substitution. *See* RMTA App'x 3:10–11, 5:2–6, 15:11–12, 17:4–8. Patent Owner contends in his Reply that the respective terms are "equivalent," but such a contention does not respond to the specific concern that the terms are broadened without the limiting term "link." Reply RMTA 7. As Petitioner asserts, "the incoming and outgoing links in claim 1 correspond to connections between different switches . . . , whereas an 'input' and an 'output' do not themselves provide any connection and instead rely on 'internal connections' and 'external hop wires' recited in [proposed substitute] claims 21-40." Opp. RMTA 7. We thus agree with Petitioner that Patent Owner's "conclusory assertions that 'incoming link' and 'input' have the same meaning and 'outgoing link' and 'output' have the same meaning are unsupported." *Id.*

Because proposed substitute claims 22–30 and 32–40 depend from proposed substitute claim 21 or 31, those claims suffer from the same issues. We thus conclude that Patent Owner does not make a sufficient showing that the proposed substitute claims do not enlarge the scope of the claims.

E. Patentability of Proposed Substitute Claims

The following table summarizes the unpatentability ground Petitioner advances in its Opposition to the Revised Motion to Amend. Opp. RMTA 12–17; *see* Sur-reply RMTA 14 ("Petitioner need not and cannot address whether the substitute claims are enabled or whether the substitute claims are anticipated or rendered obvious by the prior art.").

Claims Challenged	35 U.S.C. §	References/Basis
21–40	§ 112(b)	Indefiniteness

In contending that the proposed substitute claims are indefinite, Petitioner highlights the following limitation recited in both proposed substitute independent claims 21 and 31:

> each stage of said plurality of stages comprising a switch of size $d_i \times d_0$ . . . ; and said switch of size $d_i \times d_0$ further comprising a plurality of multiplexers of size $d \geq 2$ with ***each multiplexer of said plurality of multiplexers of size d ≥ 2 comprising d inputs*** and an output.

RMTA App'x 3:9–13, 15:10–14 (emphasis added). Petitioner observes that each of proposed substitute independent claims 21 and 31 also recites the following:

> at least ***a first multiplexer*** of said plurality of multiplexers of a first said switch of size $d_i \times d_0$ where $d_i > d_o$ ***comprising more inputs than a second multiplexer*** of said plurality of multiplexers of the first said switch of size $d_i \times d_0$.

Id. at 4:7–9, 16:9–11 (emphases added). Petitioner contends that "[t]hese limitations are incompatible." Opp. RMTA 14. We agree.

According to Petitioner, the first limitation "requires each multiplexer of the plurality of multiplexers to have the same number of inputs (*d*) and be

the same size." *Id.* Patent Owner does not directly dispute this understanding of the limitation. *See* Reply RMTA 12–15. Instead, Patent Owner refers us to Figure 10B of the '553 patent and identifies a subset the multiplexers shown in that drawing, each of which has two inputs. *Id.* at 12–13. It thus appears that Patent Owner reads the limitation in the same manner as Petitioner with respect to the requirement that certain multiplexers be of the same size, as defined by the number of inputs.

The second limitation explicitly and unambiguously requires that a first multiplexer of the "plurality of multiplexers" have *more* inputs than a second multiplexer of the "plurality of multiplexers." For this limitation, Patent Owner observes that one of the multiplexers in Figure 10B of the '553 patent has three inputs, i.e. greater than the two inputs of the subset identified for the first limitation (and Patent Owner also observes that other switches have four or five inputs). *Id.* at 13.

But the proposed substitute claims do not distinguish between the recited "plurality of multiplexers." It is not possible for *each* multiplexer of the plurality of multiplexers to have the same number of inputs while also including a first multiplexer having more inputs than a second multiplexer. The claim language is thus not amenable to how Patent Owner would map it onto Figure 10B because that mapping requires identification of different pluralities of multiplexers that are not distinguished by the claim language. Although we have considered Patent Owner's identification of Figure 10B, Patent Owner does not resolve the difficulty because Patent Owner does not address how one of skill in the art would distinguish different pluralities of

multiplexers within the context of the claim language.[13] We accordingly agree with Petitioner that a person of ordinary skill in the art would not be able to understand the scope of proposed substitute independent claims 21 and 31 with reasonable certainty.

In a second example that Petitioner contends renders proposed substitute independent claim 21 indefinite, Petitioner highlights the following recitation proposed to be added:

> said ring of a first partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks comprising the same or different number of said plurality of stages as said ring of a second partial multi-stage hierarchical network of said plurality of partial multi-stage hierarchical networks; a first stage of ***said plurality of stages*** comprising said switch comprising the same or different number of said plurality of multiplexers as a second stage of ***said plurality of stages***; a first multiplexer in ***said plurality of multiplexers*** of size $d \geq 2$ is the same or different size as a second multiplexer is ***said plurality of multiplexers*** of size $d \geq 2$.

RMTA App'x 5:17–6:7 (emphases added). According to Petitioner, the antecedent bases for the emphasized recitations of "said plurality of stages" and "said plurality of multiplexers" are unclear. Opp. RMTA 15. As

[13] We do not agree with Patent Owner that this is simply a matter of "antecedent basis issues," as he contends. *See* Reply RMTA 12. In making that contention, Patent Owner appears to rely on our disagreement in our Preliminary Guidance with one of Petitioner's arguments with respect to the original Motion to Amend. *See id.* (citing Paper 21, 11). But the issue we addressed in that guidance was of a significantly different nature, involving whether the use of indefinite articles in referring to prepositional objects of phrases that were otherwise repeated in their entirety raised an antecedent-basis problem. Paper 21, 11.

Petitioner observes, proposed substitute claim 21 also recites that each of the rings in each partial multi-stage hierarchical network of the plurality of partial multi-stage hierarchical networks has a plurality of stages, and that each stage has a switch with a plurality of multiplexers. *Id.* (citing RMTA App'x 3:4–6, 3:9–13). We agree with Petitioner that "[i]t is unclear whether the 'said plurality of stages' [in the limitation reproduced above] refers to every 'plurality of stages' in every ring in every partial multi-stage hierarchical network or some other subset thereof." *Id.* at 15–16. We similarly agree with Petitioner that "it is unclear whether the 'said plurality of multiplexers' [in the limitation reproduced above] refers to every 'plurality of multiplexers' in every switch in every stage in every ring in every partial multi-stage hierarchical network or some subset thereof." *Id.* at 16.

Patent Owner replies that the antecedent bases for both the "said plurality of stages" and the "said plurality of multiplexers" are "clear":

> The first stage of **said plurality of stages** and second stage of **said plurality of stages** are not recited as comprising a specific ring or a specific partial multistage network, and could comprise one or more rings in one or more partial multi-stage hierarchical networks recited in substitute independent Claims 21 and 31. The same is true for "said plurality of multiplexers" as well.

Reply RMTA 14–15. We do not find this explanation sufficiently clarifying. Rather, we agree with Petitioner that this explanation instead "confirms that the claim is not specific as to which stages of which rings of which networks are addressed by the claim language." Sur-reply RMTA 13. Although we appreciate that Patent Owner may have in mind various permutations meant

to be captured by the proposed substitute claims, the language of the claims does not effectively capture those permutations such that it "inform[s] those skilled in the art about the scope of the invention with reasonable certainty." *See Nautilus*, 572 U.S. at 910.

We thus conclude that both examples identified by Petitioner illustrate indefiniteness, the first with respect to both proposed substitute independent claims 21 and 31, and the second with respect to proposed substitute independent claim 21. Because proposed substitute claims 22–30 and 32–40 depend from proposed substitute claim 21 or 31, those claims suffer from the same indefiniteness. We thus conclude that Petitioner shows, by a preponderance of the evidence, that proposed substitute claims 21–40 are unpatentable under 35 U.S.C. § 112(b) as indefinite.

IV. PATENT OWNER'S MOTION TO EXCLUDE[14]

Patent Owner requests that we exclude Exhibits 1002 and 1003 (Declaration and Curriculum Vitae of Dr. Baker) "and all the support presented in the Petition by Ex. 1002 and Ex. 1003." Paper 27, 4–5.[15] According to Patent Owner, Dr. Baker does not meet Petitioner's own

[14] We agree with Petitioner that Patent Owner's Motion to Exclude is procedurally improper because Patent Owner failed to timely object to the evidence within the timeframe mandated by our regulations. *See* 37 C.F.R. § 42.64(b). Nevertheless, in the interest of a complete record, we address the Motion on its merits.

[15] Patent Owner filed a Declaration in support of his Motion to Exclude as Exhibit 2011. Similar to Exhibits 2004 and 2009, this Declaration attests to Patent Owner's education and professional experience, but is not specifically cited or otherwise relied on in Patent Owner's Motion to Exclude.

proposed definition of a person of ordinary skill in the art (which we have adopted), because that definition requires "at least two to three years of experience with integrated circuits and *networks*." *Id.* at 3; Pet. 6 (citing Ex. 1002 ¶ 18); *see supra* § II.A. Patent Owner appears to base this contention on Dr. Baker's statement in his Declaration that "All of my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in designing, developing, researching, and teaching regarding circuit design and memory devices referenced in this declaration." Ex. 1002 ¶ 3. Evidently because Dr. Baker does not refer to experience with "networks" in this particular Declaration statement, Patent Owner infers that "Petitioner's witness by his own admission has no experience in **networks**." Paper 27, 4.

To be qualified as an expert, Dr. Baker does not necessarily need to be a person of ordinary skill in the art as to the precise subject matter of the patent at issue. Rather, a witness may qualify as an expert if he or she has "knowledge, skill, experience, training, or education" of a "scientific, technical, or other specialized" nature that is likely to help the Board "to understand the evidence or to determine a fact in issue." Fed. R. Evid. 702; *see also* PTAB Consolidated Trial Practice Guide, 34 (Nov. 2019), https://go.usa.gov/xpvPF ("CTPG") ("There is . . . no requirement of a perfect match between the expert's experience and the relevant field." (citing *SEB S.A. v. Montgomery Ward & Co.*, 594 F.3d 1360, 1373 (Fed. Cir. 2010))).

We consider the admissibility of Dr. Baker's testimony in light of this standard. We also note that, despite Patent Owner's concern with Dr. Baker's qualifications, Patent Owner did not cross-examine Dr. Baker regarding those credentials. *See* Paper 34, 6 n.4. As Petitioner points out, Patent Owner "identifies only one paragraph of Dr. Baker's declaration," and appears to draw an inference greater than is supported by the mere absence of the word "networks" in Dr. Baker's summary of his experience. We agree that Patent Owner's assertion that Dr. Baker has "no experience" in networks is overstated. *See id.* at 6. Indeed, Dr. Baker specifically testifies elsewhere in his Declaration to having "extensive experience in circuit designs for *networks*" and having published a textbook that includes sections covering the use of certain electronic components for "networking." Ex. 1002 ¶¶ 7, 9.

We agree with Petitioner, particularly in light of the sparse record in support of Patent Owner's position vis-à-vis the otherwise uncontested information in Dr. Baker's Curriculum Vitae, that Dr. Baker has sufficient education and experience to qualify as an expert in this proceeding and for the Board to rely on his testimony in understanding the evidence presented. We also agree with Petitioner that Patent Owner's challenge is directed to the sufficiency of Dr. Baker's testimony, rather than articulating a sufficient basis why it is inadmissible. *See* Paper 34, 4–6. In this context, we note that this proceeding has ultimately involved considerably more legal issues than technical issues such that our reliance on Dr. Baker's testimony has been relatively limited.

Accordingly, we deny Patent Owner's Motion to Exclude.

V. CONCLUSION

For the reasons above, Petitioner has shown by a preponderance of the evidence that claims 1–20 of the '553 patent are unpatentable, as summarized in the following table.

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–20	112(b)	Indefiniteness	1–20	
1–20	112(a)	Written Description	1–20	
1–20	112(a)	Enablement	1–20	
Overall Outcome			1–20	

The table below summarizes our conclusions as to Patent Owner's Revised Motion to Amend the claims.[16]

Motion to Amend Outcome	Claims
Substitute Claims Proposed in the Amendment	21–40
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21–40
Substitute Claims: Not Reached	

[16] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of his continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

VI. ORDER

It is

ORDERED that, based on a preponderance of the evidence, claims 1–20 of U.S. Patent No. 10,003,553 B2 are held to be unpatentable;

FURTHER ORDERED that Patent Owner's Revised Motion to Amend (Paper 25) is *denied*;

FURTHER ORDERED that Patent Owner's Motion to Exclude (Paper 27) is *denied*; 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.

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