UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FLEX LOGIX TECHNOLOGIES, INC.
Petitioner

v.

KONDA TECHNOLOGIES INC.
Patent Owner

Patent No. 10,003,553

PETITION FOR POST GRANT REVIEW
OF U.S. PATENT NO. 10,003,553

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I. INTRODUCTION

Flex Logix Technologies, Inc. ("Petitioner") requests post grant review ("PGR") of claims 1-20 of U.S. Patent No. 10,003,553 ("the '553 patent") (Ex. 1001), which, according to PTO records, is assigned to Konda Technologies, Inc. ("Patent Owner" or "PO"). For the reasons below and accompanying evidence, including the declaration of Dr. R. Jacob Baker (Ex. 1002), the challenged claims should be found unpatentable and canceled.

For one, all of the claims in the '553 patent are indefinite. In addition to the lack of clarity injected by many claim terms that do not appear anywhere in the specification outside of the claims, a person of ordinary skill in the art ("POSITA") would not have been able to determine the scope of any of claims 1-20 with reasonable certainty because of several substantial antecedent basis issues that infect the claims.[1]

Claims 1-20 are also invalid for lack of written description support. There

[1] Petitioner is concurrently filing additional petitions for PGR of the '553 patent demonstrating that, to the extent the claims can be understood, the claims are also unpatentable over the prior art, including Patent Owner's own previously-filed patent applications. The additional petitions are being filed out of an abundance of caution because of the statutory estoppel provisions.

are many claim features that are not supported by the disclosure of the '553 patent or the disclosures of any of its alleged priority applications. As demonstrated below, PO relies on "optional" claim language (e.g., "zero or more cross links" and characteristics that "may or may not" exist) to stretch the claims in an attempt to cover subject matter not disclosed. While the recitation of such features as apparently "optional" renders them meaningless for invalidity and infringement purposes, such features still must be supported by the written description such that a POSITA would have understood that the named inventor had possession of an invention that includes such features. But PO cannot show support for the overly-broad claims. Indeed, the disconnect between the claims and specification of the '553 patent makes clear that a POSITA would not have understood the named inventor to have had possession of what is recited in the claims.

Furthermore, because of the lack of direction and guidance to implement the claimed invention, including the absence of any working examples, and the amount of experimentation required, a POSITA would not have been able to make and use the claimed invention without undue experimentation, thus rendering the claims invalid for lack of enablement.

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

A. Real Parties-in-Interest

Petitioner identifies Flex Logix Technologies, Inc. as the real party-in-interest.

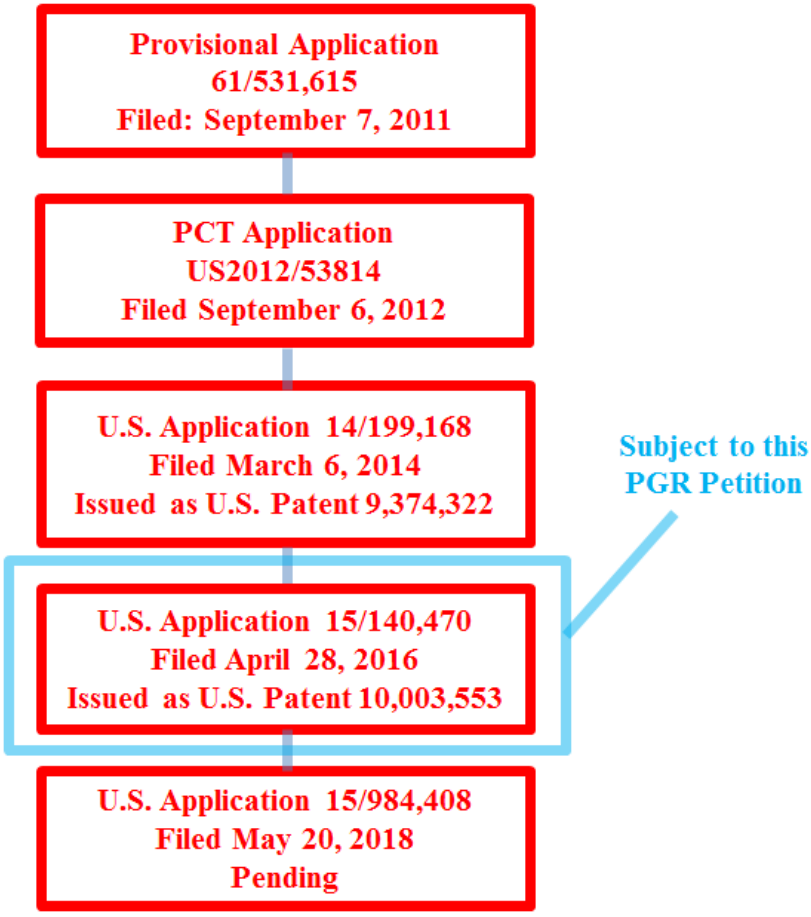
B. Related Matters

1. Lawsuit(s)

PO has asserted the '553 patent against Petitioner in *Konda Technologies Inc. v. Flex Logix Technologies, Inc.*, No. 5:18-cv-07581-LHK (N.D. Cal.). PO has also asserted U.S. Patent Nos. 8,269,523 ("the '523 patent"), 8,898,611 ("the '611 patent"), 9,529,958 ("the '958 patent"), and 10,050,904 ("the '904 patent") in the foregoing district court litigation.

2. Related Applications

The '553 patent is related to several patents and/or patent applications, as shown in the purported priority chain below:



3. Concurrently filed petitions

Petitioner is concurrently filing two other petitions for PGR of certain claims of the ’553 patent.

C. Counsel and Service Information

Lead counsel is Naveen Modi (Reg. No. 46,224), and Backup counsel are (1) Joseph E. Palys (Reg. No. 46,508), (2) Paul M. Anderson (Reg. No. 39,896), and (3) Quadeer A. Ahmed (Reg. No. 60,835). Service information is Paul Hastings LLP, 875 15th St. N.W., Washington, D.C., 20005, Tel.: 202.551.1700, Fax: 202.551.1705, email: PH-FlexLogix-Konda-PGR@paulhastings.com.

Petitioner consents to electronic service.

III. PAYMENT OF FEES UNDER 37 C.F.R. § 42.15(a)

The PTO is authorized to charge all fees due at any time during this proceeding, including filing fees, to Deposit Account No. 50-2613.

IV. TIME FOR FILING UNDER 37 C.F.R. § 42.202

The '553 patent issued on June 19, 2018, and this Petition is being timely filed no later than the date that is nine months after the date of the grant of the '553 patent.

V. GROUNDS FOR STANDING UNDER 37 C.F.R. § 42.204(a)

Petitioner certifies that the '553 patent is available for PGR and Petitioner is not barred or estopped from requesting PGR on the grounds identified herein.

As discussed below in Section IX, the '553 patent is eligible for PGR because it has at least one claim that is not entitled to a pre-AIA filing date.

VI. PRECISE RELIEF REQUESTED AND GROUNDS RAISED

A. Claims for Which Review is Requested

Petitioner respectfully requests review of claims 1-20 ("challenged claims") of the '553 patent, and cancellation of these claims as unpatentable.

B. Statutory Grounds of Challenge

The challenged claims should be canceled as unpatentable on the following grounds:

Ground 1: Claims 1-20 are unpatentable under AIA 35 U.S.C. § 112(b) as failing to particularly point out and distinctly claim the subject matter which the named inventor regards as the invention.

Ground 2: Claims 1-20 are unpatentable under AIA 35 U.S.C. § 112(a) as failing to satisfy the written description requirement.

Ground 3: Claims 1-20 are unpatentable under AIA 35 U.S.C. § 112(a) as failing to satisfy the enablement requirement.

VII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art ("POSITA") at the time of the alleged invention of the '553 patent 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. (Ex. 1002, ¶18.)[2] More education can supplement practical experience and vice versa. (*Id.*)

VIII. BACKGROUND

The '553 patent generally relates to switching networks that can be used to route signals between logic blocks included on an integrated circuit device such as an FPGA. (Ex. 1002, ¶¶20-50.)

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[2] Petitioner submits the declaration of Dr. R. Jacob Baker (Ex. 1002), an expert in the field of the '553 patent. (Ex. 1002, ¶¶3-13; Ex. 1003.)

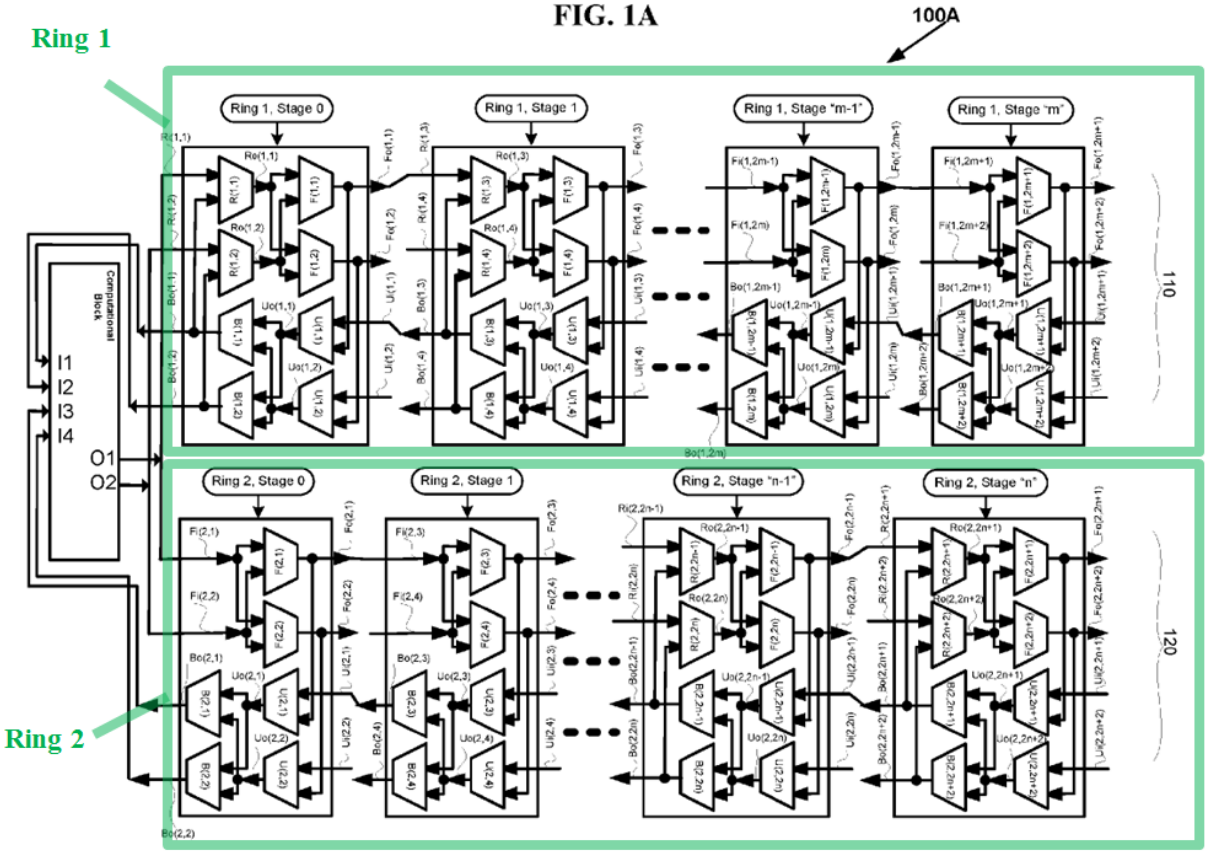
A. The ’553 Patent

The ’553 patent, which matured from the U.S. Application No. 15/140,470 (“the ’470 application”), acknowledges that multi-stage hierarchical networks were known and used in many applications at the time of the alleged invention, such as in “FPGA routing of hardware designs.” (Ex. 1001, 2:66-3:1, 4:47-48.) The ’553 patent states that known VLSI (very large scale integration) layouts for integrated circuits with such networks, such as the Benes network disclosed by *Wong* (Ex. 1008) are “inefficient and complicated.” (*Id.*, 3:2-4, 3:30-36.) For instance, the ’553 patent contends that prior art network layouts “require large area to implement the switches on the chip, large number of wires, longer wires, with increased power consumption, increased latency of the signal which effect the maximum clock speed of operation.” (*Id.,* 3:43-48; Ex. 1002, ¶¶31-32 (citing Ex. 1040).)

The ’553 patent alleges to disclose “[s]ignificantly optimized multi-stage networks, useful in wide target applications” where the “optimized multi-stage networks in each block *employ several rings* of stages of switches with inlet and outlet links.” (Ex. 1001, 3:58-67 (emphasis added).) As discussed below, PO touted this concept of “rings” in the ’553 patent family as an important distinction over PO’s earlier patent applications, and, not surprisingly, the claims in the applications to which the ’553 patent claims priority (and the originally filed

claims in the ’470 application itself) all include the “ring” concept. However, these “rings”—which (i) the ’553 patent describes as an important aspect of the alleged optimizations to the prior art multi-stage hierarchical networks, and (ii) PO touted as an important distinction over PO’s other applications—are not recited in the claims of the ’553 patent. (Ex. 1002, ¶¶33-38.)

First, the ’553 patent’s disclosure emphasizes “rings.” Each of figures 1-15 of the ’553 patent illustrates, describes, or relates to the use of “rings” in a “multi-stage hierarchical network.” (Ex. 1002, ¶33 (citing Ex. 1001, 4:42-6:22, FIGs. 1-15, 8:56-9:3, 33:26-48).) Annotated figure 1 of the ’553 patent below shows two such “rings”:



(Ex. 1001, FIG.1 (annotated); Ex. 1002, ¶38.) Similarly, the figures that depict example "stages" in the '553 patent are described as illustrating portions of a "ring." (Ex. 1001, 4:56-5:3, 5:32-6:6, FIGs. 2A-2E, 9A-11C.)

Second, during prosecution of U.S. Application No. 14/199,168 ("the '168 application"), which issued as U.S. Patent No. 9,374,322 ("the '322 patent") (*see supra* Section II.B.2), PO explicitly defined "rings" and argued that the inclusion of such rings was a "key difference[]" with respect to PO's earlier alleged inventions disclosed in U.S. Patent No. 8,898,611 ("the '611 patent").

> *Current application discloses stages in rings where forward connecting links are feedback into backward*

> *connecting links through one or more multiplexers and also backward connecting links are feedback into forward connecting links through one or more multiplexers,* where US Patent No. 8,898,611 discloses folded and butterfly fat tree networks where in each stage only forward connecting links are feedback into backward connecting links. . . . *This is one of the key differences in the current invention* which allows the total number of stages to be made small to route the same hardware circuit benchmark.

(Ex. 1005, 97-98 (emphases added).)

> The ring concept disclosed in the current application is not a true ring, the term ring is used in the current invention since in each stage backward connecting links are feedback to forward connecting links and vice versa as opposed to only a U-turn in original multi-stage networks.

(*Id.*, 101; *see also* Ex. 1001, 2:33-38; Ex. 1002, ¶¶39-42.)

The claims of the '322 patent all include this "ring" concept. (Ex. 1035, 47:42-51:3.) Similarly, all of the claims of PCT Application No. PCT/US12/53814 ("the '814 PCT application") to which the '168 application claims priority also

include this "ring" concept. (Ex. 1006, 79-82 (1:3-4:23).)[3].) Indeed, the originally filed claims in the '470 application also include "rings" (Ex. 1004, 286-292) and further include specific limitations consistent with the definition PO provided for a "ring" during prosecution of the '168 application. (*Id*., 287 (82:13-18)[4]; Ex. 1002, ¶¶39-41.)

But in contrast to the originally filed claims in the '470 application, the issued claims in the '322 patent, and the claims in the 814 PCT application, new claims 21-40 that were added by amendment during prosecution of the '470 application and that issued as claims 1-20 in the '553 patent **do not** include "rings." (Ex. 1004, 77-84.)[5] In other words, issued claims 1-20 of the '553 patent

[3] The '814 PCT application as filed had errors in pagination such that the section that includes the claims restarts the pagination at page 1. Therefore, citations to the '814 PCT application include both a page number for the exhibit as well as the page and line numbers printed on the page identified within the exhibit.

[4] When appropriate, citations to the as-filed '470 application include page and line numbers corresponding to the application.

[5] While the Examiner noted in an Interview Summary that the newly presented claims would be reviewed for their compliance with 35 U.S.C. § 112, the claims were subsequently allowed without any further rejections. (Ex. 1004, 51, 25-32.)

are missing a feature that is not only highlighted in the specification as an alleged fundamental point of novelty, but was in fact touted by PO as a "key difference[]" between the disclosure of the '553 patent family and another patent family belonging to PO. (Ex. 1002, ¶42.)

B. Material Incorporated by Reference in the '553 Patent

The '553 patent attempts to incorporate by reference a list of more than 20 patents and patent applications. (Ex. 1001, 1:8-2:62; Ex. 1002, ¶37 (citing Exs. 1011-1034).) However, the incorporations by reference of these patents and applications provide no "detailed particularity [regarding] what specific material" they incorporate and do not "clearly indicate where that material is found" in the patents and applications. *Cook Biotech Inc. v. Acell, Inc.*, 460 F. 3d 1365, 1376 (Fed. Cir. 2006); *see also Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 906-07 (Fed. Cir. 2018) ("To incorporate material by reference, the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents.") (internal citations and quotation marks omitted). Indeed, even when material is properly incorporated, "[i]t is not sufficient for purposes of the written description

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The issued claims, however, do not comply with the requirements of 35 U.S.C. § 112. (*See infra* Section XII.)

requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to the modifications that the inventor might have envisioned, but failed to disclose." *D Three Enters., LLC v. Sunmodo Corp.*, 890 F.3d 1042, 1050 (Fed. Cir. 2018) (internal citation omitted).

The '553 patent simply identifies several patents and patent applications and states that the material is incorporated in its entirety without specifying any particular portions of the documents as being relevant. (Ex. 1001, 1:8-2:62) *Cook Biotech Inc.*, 460 F. 3d at 1376; *see also Nautilus, Inc. v. Icon Health & Fitness Inc.*, IPR2017-01408, 2018 WL 6318050, at *20 (PTAB Dec. 3, 2018) (allowing incorporation by reference where the incorporating language provided detail regarding what was disclosed in the incorporated by reference). Moreover, many, if not all, of those incorporated patents and applications also incorporate by reference other patents and applications. (*See, e.g.*, Ex. 1007, 5-6; Ex. 1006, 1-3 (1:5-3:6).) Without providing sufficient particularity such that a POSITA would recognize what is being incorporated by reference, the material incorporated by reference cannot be relied upon to remedy defects in the '553 patent, such as lack

of written description of the claimed subject matter under 35 U.S.C. §112, as discussed below.[6]

Indeed, any such reliance would impermissibly require a POSITA to look at the different embodiments disclosed in the various patents and make unspecified combinations of elements without any guidance as to what should be combined or how such combinations should be accomplished. *D Three Enters., LLC*, 890 F.3d at 1050. Patentees' attempts to show written description support by relying on an unspecified combination of teachings from incorporated material and the disclosure of the patent have repeatedly been rejected. *Nautilus, Inc.*, IPR2017-01408, 2018 WL 6318050 at *20-23 (rejecting PO's attempt to combine teachings from incorporated reference with disclosure of patent-at-issue in an effort to show written description support for disputed claim limitation, noting that "obviousness

[6] Elsewhere in the specification, the '553 patent describes certain prior art multi-stage networks disclosed in U.S. patents that were previously incorporated by reference. (Ex. 1001, 7:32-8:19.) But that portion of the specification simply notes that the alleged "optimization" techniques disclosed in the '553 patent may be implemented in certain prior art multi-stage networks, i.e., it does not rely on any concepts disclosed in the referenced U.S. patents for purposes of supporting the disclosure of the '553 patent. (*Id.*, 7:32-37.)

is not the standard for written description"); *Purdue Pharma L.P. v. Recro Tech., LLC*, 694 F. App'x 794, 797 (Fed. Cir. 2017) (affirming Board's finding that claims lack written description support and stating that "[t]o the extent that Purdue contends that a person of skill in the art would isolate and combine aspects from various embodiments in the specifications (including patents incorporated by reference involving a different drug) to obtain the claimed invention [for written description support], Purdue relies upon the wrong test."); *see also Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997) ("It is not sufficient for purposes of the written description requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to modifications that the inventor might have envisioned, but failed to disclose."); *Ariad Pharms., Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (en banc); *Trans Video Elecs., Ltd. v. Sony Elecs., Inc.*, 822 F. Supp. 2d 1020, 1027 (N.D. Cal. 2011).

Therefore, in light of the lack of particularity provided by the limited description of the material incorporated by reference in the '553 patent, the patents and patent applications incorporated therein should not be considered in determining whether the claims comply with the requirements of 35 U.S.C. § 112. Moreover, even if considered, the material incorporated by reference cannot cure the deficiencies identified herein. (*See infra* Section XII.)

IX. PGR ELIGIBILITY

The PGR provisions of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA") apply to patents subject to the first inventor to file provisions of the AIA, i.e., patents having at least one claim with an effective filing date on or after March 16, 2013. *Grunenthal GmbH v. Antecip Bioventures II LLC*, PGR2018-00001, Paper 17 at 9-10 (May 1, 2018). A claim in a U.S. application is entitled to the benefit of the filing date of an earlier filed U.S. or PCT application if the subject matter of the claim is disclosed in the earlier filed application in accordance with the written description requirement. *PowerOasis, Inc. v. T-Mobile USA, Inc*., 522 F.3d 1299, 1306 (Fed. Cir. 2008) (subject matter disclosed for first time in a continuation application does not receive benefit of the parent's filing date); *see also In re Gosteli*, 872 F.2d 1008, 1010–11 (Fed. Cir. 1989).

To comply with the written description requirement, the specification or earlier-filed application "must describe the invention sufficiently to convey to a person of skill in the art that the patentee had possession of the claimed invention at the time of the application, i.e., that the patentee invented what is claimed." *LizardTech, Inc. v. Earth Resource Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed Cir. 2005); *see also Lockwood*, 107 F.3d at 1572; *Allergan, Inc. v. Sandoz Inc*., 796 F.3d 1293, 1308-09 (Fed. Cir. 2015). "The test requires an objective inquiry in to

the four corners of the specification from the perspective" of a POSITA. *Ariad*, 598 F.3d at 1351. Whether the added subject matter is an obvious variant of the disclosed subject matter is irrelevant. *Lockwood*, 107 F.3d at 1572.

The chart above in Section II.B.2 shows that the '553 patent relates to two applications filed prior to March 16, 2013, namely the '615 provisional application (Ex. 1007) and the '814 PCT application (Ex. 1006). The '553 patent is eligible for PGR because it has at least one claim that is not entitled to the filing date of either the '615 provisional application or the '814 PCT application ("the two pre-AIA applications"). In particular, at least claims 1, 2, 4, 9, 11, 12, and 14 of the '553 patent include subject matter that is not disclosed in the two pre-AIA applications. *PowerOasis, Inc.*, 522 F.3d at 1306; *In re Gosteli*, 872 F.2d at 1010–11. (Ex. 1002, ¶¶52-75.)

Indeed, as demonstrated below in Section XII.B, all of claims 1-20 include features that are not supported by the two pre-AIA applications. For the sake of expediency, this section focuses on whether at least claims 1, 2, 4, 9, 11, 12, and 14 are entitled to a pre-March 16, 2013 filing date as these claims present certain features that on their face are not supported such that PGR eligibility is readily confirmed.

A. The Two Pre-AIA Applications Do Not Support Switches Configurable By a Flip Flop (Claim 9)

Claim 9 of the '553 patent, which depends from claim 1, recites "each switch configurable by an SRAM Cell or a Flash Cell or *a flip-flop*." (Ex. 1001, 50:31-32 (emphasis added).) A "flip-flop" is never mentioned in the two pre-AIA applications. (*See generally* Exs. 1006-1007.)

The disclosure of the '814 PCT application (including the claims) is limited to describing switches as being configurable by an SRAM Cell or a Flash Cell. (Ex. 1002, ¶53.) For example, the '814 PCT application indicates that in the context of "programmable integrated circuit embodiments," switches or crosspoints that determine how inlet links and outlet links are connected can be controlled by a "programmable cell." (Ex. 1006, 75 (75:4-10).) Specifically, the '814 PCT application discloses:

> In volatile programmable integrated circuit embodiments the programmable cell may be an *SRAM (Static Random Address Memory) cell.* In non-volatile programmable integrated circuit embodiments the programmable cell may be a *Flash memory cell.*

(*Id*., 75 (75:23-26) (emphases added).)

> In other embodiments all the *d* * *d* switches described in the current invention are also implemented using muxes

> of different sizes controlled by *SRAM cells* or *flash cells*
>
> etc.

(*Id*., 76 (76:4-6) (emphasis added); Ex. 1002, ¶53.)

Thus, the '814 PCT application does not disclose the "flip-flop" feature recited in claim 9. (Ex. 1002, ¶54.)

The '615 provisional application does not include any disclosure relating to a "flip-flop" and does not even describe configuring switches using SRAM and Flash cells. (*See generally* Ex. 1007; Ex. 1002, ¶54.)

Thus, neither of the two pre-AIA applications conveys to a POSITA that the named inventor had possession of the features claimed at the relevant time. Neither mentions a "flip-flop" in any respect, let alone in the context of controlling a switch as recited in issued claim 9.[7] Indeed, the first appearance of the term

[7] While the two pre-AIA applications generally purport to incorporate a number of additional patents/patent applications by reference, neither pre-AIA application includes any explanation regarding the relevance of the incorporated material. Thus, as discussed above, Patent Owner cannot rely on such incorporated material in an effort to make up for the lack of disclosure in the as-filed application disclosures. (*Supra* Section VIII.B.) In any event, none of the material

"flip-flop" was in a new claim 29 (which issued as claim 9) added January 8, 2018 during prosecution of the '470 application. (Ex. 1004, 63, 69 ("2018 January 08"), 80.) Therefore, claim 9 is not entitled to an effective filing date earlier than the April 28, 2016 filing date of the '470 application.[8] (Ex. 1002, ¶¶55-56.)

B. The Two Pre-AIA Applications Do Not Support Claims 1, 2, 4, 11, 12, and 14

Claim 4 of the '553 patent depends from claim 2, which in turn depends from claim 1. Similarly, claim 14 depends from claim 12, which in turn depends from claim 11. Each of claims 1, 2, 4, 11, 12, and 14 is not supported by the two pre-AIA applications, as discussed below. (Ex. 1002, ¶¶57-75.)

Claim 1 of the '553 patent recites in part:

> forward connecting links 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* …

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incorporated by reference supports the claimed "flip-flop" features. (Ex. 1002, ¶55, n.6.)

[8] The '168 application, which is a post-AIA application, includes essentially the same disclosure as the '814 PCT application. (Ex. 1002, ¶55.) Thus, the '168 application also does not disclose the "flip-flop" feature. (*Id*.)

> backward connecting links 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, 49:27-40 (emphases added).)

To the extent the claims can be understood, claim 1 includes forward and backward connecting links that include *cross links* between switches connected from a switch in a stage in a subnetwork to a switch in the *same numbered stage* in one or more other subnetworks. (*Id.*) Claim 2 adds that those *cross links* are implemented as vertical links only, or horizontal links only, or both vertical links and horizontal links. (Ex. 1001, 49:41-45.) Claim 4 further limits the *cross links* that are horizontal links to either being of "substantially of equal length in the entire two-dimensional grid of rows and columns" or being "of a *hop length h*" "*where "h ≥ 0*." (*Id.,* 49:60-50:2.) Claim 4 also limits the cross links that are vertical links to either being of "substantially of equal length in the entire two-dimensional grid of rows and columns" or being "of a *hop length v*" "*where "v ≥ 0*." (*Id.*; Ex. 1002, ¶¶57-58.)

As set forth below, there is no disclosure of "forward connecting links" or "backward connecting links" that are "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" in the two pre-AIA applications, let alone disclosure of any such links that have the additional features recited in claims 2 and 4. (Ex. 1002, ¶59.)

1. Claim 1

The first appearance of a "*cross link*" "connected from a switch in a stage in a subnetwork to a switch in the *same numbered stage* in one or more other subnetworks" was on January 8, 2018 when claim 21 (which eventually issued as claim 1) was added during prosecution of the '470 application. (Ex. 1004, 69 ("2018 January 08"), 77-78; *see also id.*, 61-62; Ex. 1001, 48:62-49:40.) But the two pre-AIA applications do not provide written description support for the "cross links" features of claim 1. (Ex. 1002, ¶¶60-61.)

For example, outside of the Abstract[9] and the material incorporated by reference[10] in the specification of the '814 PCT application, the only mention of "cross links" in the specification is in the "Summary of the Invention":

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[9] The Abstract's referral to networks that "employ shuffle exchange links where outlet links of cross links from switches in a stage of a ring in one sub-integrated circuit block are connected to either inlet links of switches in the another stage of a ring in the same or another sub-integrated circuit block" is substantively the same as that contained in the cited portion from the specification. (Ex. 1006, Abstract, 5:3-8.)

> The optimized multi-stage networks with their VLSI layouts employ shuffle exchange links where outlet links of *cross links from switches in a stage* of a ring in one sub-integrated circuit block *are connected to either inlet links of switches in the another stage* of a ring in another sub-integrated circuit block *or inlet links of switches in the another stage* of a ring in the same sub-integrated circuit block so that said cross links are either vertical links or horizontal and vice-versa.

(Ex. 1006, 5 (5:3-8) (emphases added); Ex. 1002, ¶62.)

This isolated reference to "cross links" is limited to "cross links" connected "from switches in a stage" to switches in "*another* stage."[11] The same is true with

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[10] *See supra* n.7.

[11] To the extent that PO argues that "another stage" should be understood broadly such that it encompasses "a same stage" or "a different stage," such an argument would be inconsistent with the use of the "same" and "another" terms in the '553 patent and its family. For example, the '814 PCT application states "another stage of a ring *in the same or another* sub-integrated circuit block" (Ex. 1006, 83 (1:14-15) (emphasis added)), thereby making clear that "another" is used to mean "a different" and not "the same or a different." The '814 PCT application further states the cross links "are connected to either inlet links of switches in the another

respect to the "cross links" recited in the claims of the '814 PCT application, i.e., they recite "cross links connecting from a switch in a stage ... to a switch in *another stage*," where the cross links in the '814 PCT application are included in forward and backward connecting links that connect "from switches in lower stage to switches in the *immediate succeeding higher stage*" and "from switches in higher stage to switches in the *immediate preceding lower stage*," respectively. (Ex. 1006, 80 (2:4-13) (emphasis added).) Thus, the '814 PCT application does not describe any "cross link" that is "connected from a switch in a stage in a subnetwork to a switch in the *same numbered stage* in one or more other subnetworks" as recited in claim 1. (Ex. 1002, ¶64.)

Outside of the material incorporated by reference,[12] the '615 provisional application does not include any disclosure relating to a "cross link." (*See generally* Ex. 1007; Ex. 1002, ¶65.)

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stage of a ring *in another sub-integrated circuit block or* inlet links of switches in the another stage of a ring *in the same sub-integrated circuit block*." (*Id*., 5 (5:3-8) (emphases added).) Therefore, PO explicitly distinguishes between "same" and "another" in the context of the sub-integrated circuit blocks in the '553 patent and its family. (Ex. 1002, ¶63.)

[12] *See supra* n.7.

Accordingly, claim 1 is not entitled to an effective filing date earlier than the April 28, 2016 filing date of the '470 application.[13] (Ex. 1002, ¶65.)

2. Claim 2

Claim 2 depends from claim 1 and recites "*said cross links* between switches of stages in any two said subnetworks are connected as either vertical links only, or horizontal links only, or both vertical links and horizontal links." (Ex. 1001, 49:41-45.) The first appearance of the above-noted features of claim 2 in conjunction with the "cross links" of claim 1 was in newly added claim 22 (which issued as claim 2) submitted January 8, 2018 during prosecution of the '470 application. (Ex. 1004, 69 ("2018 January 08"), 79; *see also id.*, 62; Ex. 1001, 49:41-45; Ex. 1002, ¶67.)

As discussed above, no "cross links" having the characteristics recited in claim 1 are disclosed in the two pre-AIA applications. (*See supra* Section IX.B.1.) Thus, assuming the recitation of "said cross links" in claim 2 modifies the "zero or more cross links" recited in claim 1, it logically follows that these pre-AIA applications cannot support such "cross links" as further modified by claim 2.

[13] The '168 application also does not disclose the "same numbered stage" feature of claim 1. (Ex. 1002, ¶64; *see also supra* n.8.)

Therefore, claim 2 is not entitled to an effective filing date earlier than the April 28, 2016 filing date of the '470 application.[14] (Ex. 1002, ¶66.)

3. Claim 4

a) The "Substantially of Equal Length" Feature Is Not Supported

Claim 4 depends from claim 2 and recites "said horizontal links between switches in two said stages are *substantially of equal length* and said vertical links between switches in two said stages are *substantially of equal length* in the entire two-dimensional grid of rows and columns." (Ex. 1001, 49:60-65.) The first appearance of the above-noted features of claim 4 in conjunction with the above-discussed features of claims 1 and 2 was in newly added claim 24 (which issued as claim 4) submitted January 8, 2018 during prosecution of the '470 application. (Ex. 1004, 69 ("2018 January 08"), 78; *see also id.*, 62; Ex. 1001, 49:60-50:2; Ex. 1002, ¶68.)

As discussed above, no "cross links" as recited in claim 1 or as further characterized by claim 2 are disclosed in the two pre-AIA applications. (*See supra* Sections IX.B.1-2.) Thus, assuming the recitation of "said horizontal links" and

[14] The '168 application also does not disclose the features of claim 2. (Ex. 1002, ¶66; *see also supra* n.8.)

"said vertical links" in claim 4 further modifies the horizontal and vertical links recited in claim 2, which in turn modify the "zero or more cross links" recited in claim 1, it logically follows that these pre-AIA applications cannot support such "cross links" as further modified by claim 4. Therefore, claim 4 is not entitled to an effective filing date earlier than the April 28, 2016 filing date of the '470 application.[15] (Ex. 1002, ¶69.)

b) The "Hop Length" Features Are Not Supported

Claim 4 also recites "said horizontal links between switches in two said stages are substantially of a *hop length h* and said vertical links between switches in two said stages are substantially of a *hop length v* where $h \geq 0$ *and* $v \geq 0$." (Ex. 1001, 49:60-50:2.) As is the case for the other features recited in claim 4, assuming this feature regarding "hop length" further modifies the "cross links" as recited in claim 1 and further characterized by claim 2, no such cross links are disclosed in the two pre-AIA applications. (Ex. 1002, ¶70; *see supra* Section IX.B.1.)

Moreover, as discussed below, the claimed ranges of hop length "$h \geq 0$ *and* $v \geq 0$" are not supported by the two pre-AIA applications *in any context*. Indeed,

[15] The '168 application does not disclose the features of claim 4. (Ex. 1002, ¶69; *see also supra* n.8.)

prior to the filing of claim 24 during prosecution of the '470 application, there was no recitation of a hop length of "0" and only hop lengths ≥ 1 were previously described or claimed. (Ex. 1002, ¶71.)

The first appearance of a horizontal or vertical "hop length" "≥ 0" in relation to any link was in claim 24 (now claim 4) submitted January 8th, 2018 during prosecution of the '470 application. (Ex. 1004, 69 ("2018 January 08"), 79; Ex. 1001, 49:60-50:2.) But the specification of the '470 application explicitly states that each of the horizontal and vertical hop lengths is a positive number, therefore making a hop length of 0, which is included in the claimed ranges, outside the scope of the disclosure of the '470 application. (Ex. 1004, 253 (48:14-18) ("'Vx' denotes an external vertical hop wire … with 'x' vertical hop length, where 'x' is a positive integer."), 256 (51:10-14) ("'Hx' denotes an external horizontal hop wire … with 'x' horizontal hop length where 'x' is a positive integer."); 259 (54:6-8) ("In general the hop length of an external vertical hop wire can be *any positive number*. Similarly, the hop length of an external horizontal hop wire can be *any positive number*.") (emphases added).) Zero is not a positive number and therefore is not included in the disclosed ranges of hop-length. (Ex. 1002, ¶72.)

The same description of hop lengths being limited to positive numbers is present in the '814 PCT application (Ex. 1006, 47 (47:1-5), 49 (49:26-30), 52 (52:23-25)) and the '615 provisional application (Ex. 1007, 35 (31:9-13), 38 (34:5-

9), 41 (37:3-5).) None of the applications as filed, including the '470 application itself, mentions a "hop length" of "0," let alone such a hop length in the context of the "cross links" set forth in claim 1. (Ex. 1002, ¶73.)

Accordingly, claim 4 is not entitled to an effective filing date earlier than the April 28, 2016 filing date of the '470 application.[16, 17] (Ex. 1002, ¶74.)

4. Claims 11, 12, and 14

Claims 11, 12, and 14 recites features analogous to those discussed above with respect to claims 1, 2, and 4, respectively. For example, just like claim 1, claim 11 recites "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, 51:14-17, 51:25-28; *see also id.*, 49:30-33, 49:37-40.) Similarly, like claim 2, claim 12 recites that "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." (*Id.*, 51:32-36; *see also id.*, 49:41-45.) And claim 14, like claim 4, recites cross links that are horizontal links are of "substantially of equal length in the entire two-dimensional grid of rows and

[16] *See supra* n.7.

[17] The '168 application does not disclose the features of claim 4. (Ex. 1002, ¶73; *see also supra* n.8.)

columns" or being "of a *hop length h*" "*where "h ≥ 0*." (*Id.*, 51:51-52:7; *see also id.*, 49:60-50:2.) Claim 14, like claim 4, also recites that cross links that are vertical links are of "substantially of equal length in the entire two-dimensional grid of rows and columns" or being "of a *hop length v*" "*where "v ≥ 0*." (*Id.*, 51:51-52:7; *see also id.*, 49:60-50:2; Ex. 1002, ¶75.) Thus, for at least the same reasons discussed above, neither of the two pre-AIA applications conveys to a POSITA that the inventor had possession of the above-noted features set forth in claims 11, 12, and 14 at the relevant time.[18] Accordingly, claims 11, 12, and 14 are not entitled to an effective filing date earlier than the April 28, 2016 filing date of the '470 application.[19] (*Supra* Section IX.B; Ex. 1002, ¶75.)

C. AIA Applicability

As discussed above, at least claims 1, 2, 4, 9, 11, 12, and 14 of the '553 patent include subject matter that is not disclosed by a pre-March-16-2013 application. As such, the '553 patent is eligible for PGR. Further, because at least claims 1, 2, 4, 9, 11, 12, and 14 are not entitled to a priority date prior to March 16,

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[18] *See supra* n.7.

[19] The '168 application does not disclose the features of claims 11, 12, and 14. (Ex. 1002, ¶75; *see also supra* n.8.)

2013, every claim of the '553 patent is subject to the first-to-file provisions of § 102(a). *See MPEP* at § 2159.02.

X. CLAIM CONSTRUCTION

In a post grant review, claims are construed in accordance with the ordinary and customary meaning of such claims as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.200(b). In particular, claim terms are generally given their "ordinary and customary meaning," that is, "the meaning that the term would have to a POSITA in question at the time of the invention, i.e., as the effective filing date of the patent application." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (*en banc*). In the case that "the specification . . . reveal[s] a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess . . . the inventor's lexicography governs." *Id.* at 1316 (internal citation omitted).

The Board only construes the claims when necessary to resolve the underlying controversy. *Toyota Motor Corp. v. Cellport Systems,* Inc., IPR2015-00633, Paper 11 at 16 (August 14, 2015). Petitioner submits that for purposes of this proceeding, no term requires construction. (Ex. 1002, ¶51.)

XI. EARLIEST EFFECTIVE FILING DATE OF THE '553 PATENT

As discussed above, the two pre-AIA applications and the post-AIA '168 application do not provide adequate written description support for at least the "*same numbered stage*" feature in independent claims 1 and 11. (*Supra* Sections IX.B.1, IX.B.4.) Claims 2-10 and 12-20 depend from independent claims 1 and 11, and consequently are also not supported by the two pre-AIA applications and the post-AIA '168 application.

Thus, for purposes of this proceeding, the challenged claims are not entitled to an effective filing date any earlier than the April 28, 2016 filing date of the '470 application.

XII. DETAILED EXPLANATION OF GROUNDS

A. Ground 1: Claims 1-20 Are Indefinite

To avoid indefiniteness under 35 U.S.C. § 112(b), "a patent's claims, viewed in light of the specification and prosecution history, [must] inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instr., Inc.*, 134 S. Ct. 2120, 2129 (2014).[20]

[20] Prior to the rule change applying the *Phillips* claim construction standard (*supra* Section X), 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 únclear

Claims 1-20 of the '553 patent fail to meet this requirement for several reasons, as discussed below.

As an initial matter, several terms repeatedly recited in the challenged claims (e.g., "subnetwork," "incoming link," "forward connecting link," "backward connecting link," and "straight link") are not explained anywhere in the specification, drawings, and prosecution history of the '470 application.[21] (Ex. 1002, ¶76.) Thus, the specification does not provide guidance to a POSITA regarding these claim terms. (*Id.*) This, coupled with additional lack of clarity in the claims discussed below, would not have allowed a POSITA to determine the

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in describing and defining the claimed invention. *See Nippon Suisan Kaisha Ltd. v. Pronova Biopharma Norge AS*, PGR2017-00033, Paper 37 at 11-12, 14 (January 16, 2019), citing *In re Packard* 751 F.3d 1307, 1311 (Fed. Cir. 2014). The claims are indefinite even under the *In re Packard* standard because, as discussed below, the claims include words or phrases whose meaning is unclear. (*See infra* Sections XII.A.1-3.)

[21] While some of these terms may appear in other patents or patent applications incorporated by reference in the '470 application, there is no explanation in the specification as to the relevance of the documents being incorporated. (*See supra* Section VIII.B.)

scope of claims 1-20 with reasonable certainty. Accordingly, claims 1-20 are indefinite and do not comply with 35 U.S.C. § 112(b). (Ex. 1002, ¶¶76-147.)

For example, both independent claims 1 and 11 recite "each multiplexer in each stage may or may not be of the same size." But there is no antecedent basis for "each multiplexer," and a POSITA would not have been able to determine whether or not a multiplexer is required by the claims. (*See infra* Sections XII.A.1(b), XII.A.2(b).) Thus, for at least this reason and the additional reasons discussed below, independent claims 1 and 11 are indefinite. Moreover, in light of the indefiniteness issues in independent claims 1 and 11, which are not resolved by dependent claims 2-10 and 12-20, all of the dependent claims are also indefinite.

1. Claim 1

After reviewing claim 1 in light of the specification, drawings, and prosecution history of the '470 application, a POSITA would not have been able to determine the scope of claim 1 with reasonable certainty. (Ex. 1002, ¶¶78-101.) This is because, as highlighted below, claim 1 is replete with antecedent basis issues that lead to a myriad of possible different configurations of the claimed network:

> 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, and

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 x d_o, where $d_i \geq 2$ and $d_o \geq 2$ and each switch of size d_i x 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 (emphasis added).)

a) The "Said inlet links . . . and said outlet links" Phrase Is Indefinite

This highlighted phrase in claim 1 above includes several terms whose meaning is unclear such that a POSITA would not have been able to determine the

scope of the claim with reasonable certainty, rendering this claim indefinite. (Ex. 1002, ¶¶79-86.)

For example, a POSITA would not have been able to determine whether "said inlet links" are connected to the same "said one or more incoming links" of the same "a said switch" of the same "a said subnetwork," or whether there are separate, corresponding connections of each inlet link of the plurality of inlet links. And if there are separate connections, it is unclear whether the connections are between an inlet link and a corresponding one or more incoming links of the same or different switches, whether those switches are in the same or different stages, and whether those stages are in the same or different subnetworks. (*Id.*, ¶¶80-81.)

In other words, the "said incoming links of *a said* switch of *a said* stage of *a said* subnetwork" phrase lends itself to many different possible interpretations without any clear indication as to what the claim covers. For example, a POSITA would not have been able to determine whether the connections recited in this clause of claim 1 connect each of the inlet links to:

(i) incoming links of the *same* "a said switch" of the *same* "*a said* stage" of the *same* "*a said* subnetwork" or

(ii) incoming links of a *different* "a said switch" of the *same* "a said stage" of a different "a said subnetwork" or

(iii) incoming links of a *different* "a said switch" in *different* stages (corresponding to the different "said inlet links") of the *same* "a said subnetwork" or

(iv) incoming links of a *different* "a said switch" in a *different* "*a said* stage" of *different* subnetworks (corresponding to the different "said inlet links").

(*Id.*, ¶82.)

Notably, these four examples only illustrate a few of the possible interpretations of the claim language. (*Id.*, ¶83.) Moreover, the same lack of clarity with respect to "said inlet links" and the connections corresponding to those inlet links is also present for "said outlet links." (*Id.*, ¶¶84-85; *see, e.g.*, claim 1 (reciting "said outlet links are connected to one of said outgoing links of *a said* switch of *a said* stage of *a said* subnetwork") (emphasis added).) Confusing the scope of the claim even further, it is unclear in this portion of claim 1 whether the phrases "*incoming* links of *a said* switch of *a said* stage of *a said* subnetwork" and "*outgoing* links of *a said* switch of *a said* stage of *a said* subnetwork," when read together, are referring to the same switch of the same stage of the same subnetwork, a same switch of different stages of the same subnetwork, or different switches of different stages of different subnetworks, etc. (Ex. 1002, ¶85.)

Moreover, it would have been unclear to a POSITA which "inlet links" and which "outlet links" are being referred to in this clause. Prior to this recitation of "said inlet links" and "said outlet links," the claim recites "a plurality of inlet links" and "a plurality of outlet links." (Ex. 1002, ¶¶80, 83.) But when the claim first refers to the connections of the "said inlet links," the claim language does not provide any guidance as to whether the "said inlet links" refer to all of the previously recited "plurality of inlet links" or a subset thereof. This lack of clarity is further compounded by the recitation that these "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," as discussed above. Therefore, a POSITA would not have been able to determine with reasonable certainty whether the connection set forth here refers to a connection of all (or a subset) of the "plurality of inlet links."

The unascertainable scope of claim 1 is further evidenced by PO agreeing to amend a claim with similar indefiniteness issues in a pending related application while acknowledging the rejected claim is indefinite. Specifically, the Examiner rejected claim 1 of the pending related application as being indefinite because a similar recitation of "said inlet links" and "said outlet links" in that claim fails to provide proper antecedent basis for these terms because the claim previously recited a "plurality of inlet links" and a "plurality of outlet links." (Ex. 1037, 28 ("Regarding claim 1, the claim recites the limitation 'said inlet links' and 'said

outlet links' in line 15. There is insufficient antecedent basis for this limitation in the claim. Since the claim refer back to 'plurality of inlet links' recited in line, it is unclear whether the claim is referring back to the 'plurality of inlet links' or another inlet links. The same rejection applies to 'said outlet links' recited in line 16."); *see also id.*, 222-223 (showing rejected claim 1).)[22] In response, PO amended rejected claim 1 specifically "to fix the indefinite[ness] issues." (*Id.*, 6; *see also id.*, 8-10 (showing amended claim 1).)

[22] In the same Office Action, the Examiner rejected the same claim as being indefinite because it recites optional claim language which is the same or similar to language in claims 1 and 11 of the '553 patent. Specifically, the Examiner found such optional language "render[s] the scope of the claim(s) unascertainable." (Ex. 1037, 28 ("Regarding claim 1, the phrase 'may or may not be comprising the same number of said inlet links' renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by 'may or may not be comprising'), thereby rendering the scope of the claim(s) unascertainable."); *see also* Ex. 1038 at 4 (showing claims from another patent application related to the '553 patent rejected for being indefinite).)

In view of the foregoing, a POSITA would not have been able to determine the scope of the "Said inlet links . . . and said outlet links" phrase set forth in claim 1 with reasonable certainty. (Ex. 1002, ¶86.)

b) The "each multiplexer in each stage . . ." phrase Is Indefinite

Independent claim 1 recites "each multiplexer in each stage may or may not be of the same size." (Ex. 1001, 49:17-18.) But the term "multiplexer" does not appear anywhere else in claim 1, and it is unclear to what "each multiplexer" refers.[23] Thus, a POSITA would not have been able to determine whether claim 1 requires 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." Moreover, it would have been unclear to a POSITA whether "each multiplexer in each stage" means every multiplexer in every stage or every multiplexer in a particular stage. (Ex. 1002, ¶87.)

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[23] Notably, original claim 1 of the '470 application recites "each said switch comprising a plurality of multiplexers, and said each multiplexer is of size p : 1 where $p > 1$" (Ex. 1004, 286 (81:11-12)), but no such limitation is included in issued claim 1.

While the specification does indicate that multiplexers can be used in the switches for each stage, the specification does not provide any guidance as to how the ambiguities in this claim language should be understood. For example, the specification does not indicate that each switch in each stage is necessarily made up of multiplexers. (Ex. 1002, ¶88-89 (citing Ex. 1004, 215 (10:10-15), 282 (77:19-21), 312 (FIGs. 16A1-16A4)).) Therefore, it is unclear whether the scope of claim 1 requires any multiplexers at all, and if such multiplexers are required, it is unclear what is meant by "each multiplexer in each stage." (Ex. 1002, ¶89.)

Therefore, a POSITA would not have been able to determine the scope of the "each multiplexer in each stage may or may not be of the same size" phrase set forth in claim 1 with reasonable certainty. (Ex. 1002, ¶90.)

c) The "forward connecting links" and "backward connecting links" Phrases Are Indefinite

Based on the language of claim 1, a POSITA would not have been able to determine with a reasonable level of certainty whether there is any difference between a "forward connecting link" and a "backward connecting link." (Ex. 1002, ¶¶91-96.) As claim 1 recites, both forward connecting links and backward connecting links have the same characteristic in that they are "connected from switches in a stage to switches in another stage in same subnetwork or another said subnetwork." (Ex. 1001, 49:19-26; Ex. 1002, ¶92.) Unlike earlier-filed claims in

the ’470 application and other related applications (Ex. 1004, 286 (81:17-22); Ex. 1006, 79-80 (1:24-2:3); Ex. 1027, 64:53-59), claim 1 of the ’553 patent is not specific as to whether “another stage” for the forward connecting and backward connecting links is a succeeding stage or a preceding stage. As such, the scope of claim 1 is unclear. (Ex. 1002, ¶94.)

Dr. Baker demonstrates the lack of clarity of the scope of claim 1 using a hypothetical. (*Id.*, ¶93.) Assuming there are two links that are “connected from switches in a stage to switches in another stage in same subnetwork or another said subnetwork,” it is unclear if those two links alone can satisfy *only one* of the “a plurality of forward connecting links” and “plurality of backward connecting links” features recited in claim 1 or whether, in the alternative, those two links can serve as *both* the plurality of forward connecting *and* the plurality of backward connecting links. In other words, it is unclear whether at least four links that are “connected from switches in a stage to switches in another stage in same subnetwork or another said subnetwork” are required to meet these features or if two links may suffice. As such, a POSITA would not have been able to determine the scope of claim 1 with reasonable certainty. (*Id.*, ¶93.)

Moreover, the terms “forward connecting link” and “backward connecting link” are not found in the specification and drawings of the ’470 application outside of the material incorporated by reference, where such incorporated by

reference material only uses those terms in claims of related patents. (*See, e.g.*, Ex. 1027, 64:53-59; *see supra* Section VIII.B.) Therefore a POSITA reading the specification would not have found any disclosure that would clarify the meaning of these claim terms. (Ex. 1002, ¶95.)

Therefore, a POSITA would not have been able to determine the scope of claim 1 with reasonable certainty. (Ex. 1002, ¶96.)

d) The "cross links" included in the "forward connecting links" and "backward connecting links" Are Indefinite

Based on the language of claim 1, a POSITA would have understood that the configuration of the claimed "zero or more cross links" (included in the forward/backward connecting links) is not compatible with the configuration of the forward/backward connecting links themselves, and thus a POSITA would not have been able to determine the scope of claim 1 with reasonable certainty. (Ex. 1002, ¶¶97-101.) For example, claim 1 recites that each of "said forward connecting links" and "said backward connecting links" comprise "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, 49:27-40.) But in the previous clause of claim 1 discussed above in Section XII.A.1(c), claim 1 recites that both the "plurality of forward connecting links" and "plurality of backward connecting links" are "connected from switches in a stage to *switches in*

another stage in same said subnetwork or another said subnetwork." (*Supra* Section XII.A.1(c); Ex. 1001, 49:20-26; Ex. 1002, ¶98.)

Thus, a POSITA would not have been able to determine how links that are connected "from switches in a stage to *switches in another stage* in same said subnetwork or another said subnetwork," such as the claimed forward/backward connecting links, could comprise 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" such as the claimed cross links. In other words, a POSITA would not have been able to reconcile the configuration of the forward/backward connecting links with the configuration of the claimed cross links included in the forward/backward connecting links.[24] (Ex. 1002, ¶99.)

The as-filed disclosure of the '470 application does not clarify this ambiguity because, as discussed above, the specification only refers to "cross links" once. (Ex. 1004, 211 (6:4-9); *see also* Section IX.B.1; Ex. 1002, ¶100.) As also discussed above, the only mention of cross links is in reference to connections from switches in a stage to switches in another stage in either the same sub-integrated circuit block or another sub-integrated block. (*Supra* Section IX.B.1.) Thus, a POSITA would not have been able to determine how the claimed

[24] *See also supra* n.11.

forward/backward connecting links can include 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" as recited in claim 1. (Ex. 1002, ¶100.)

Accordingly, given this incompatibility in the claim language, a POSITA would not have been able to determine the scope of the claim 1 with reasonable certainty. (Ex. 1002, ¶101.)

2. Claim 11

Just like independent claim 1, independent claim 11 is replete with antecedent basis issues (*e.g.*, *see* discussion below in Sections XII.A.2(a)-(b)) such that a POSITA would not have been able to determine the scope of the claim with reasonable certainty. (*See supra* Section XII.A.1.) (Ex. 1002, ¶¶102-105.)

a) The "said inlet links . . . and said outlet links" phrase Is Indefinite

Just like claim 1, claim 11 recites:

> **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;

(Ex. 1001, 50:63-67 (emphasis added).)

Therefore, for the same reasons discussed above with respect to claim 1, a POSITA would not have been able to determine the scope of the "[s]aid inlet links

. . . and said outlet links" phrase set forth in claim 11 with reasonable certainty. (*See supra* Section XII.A.1(a); Ex. 1002, ¶¶103-104.)

b) The "each multiplexer in each stage . . ." phrase is indefinite

Just like claim 1, claim 11 recites "each multiplexer in each stage may or may not be of the same size." (Ex. 1001, 51:9-10.) Therefore, for reasons similar to those discussed above with respect to claim 1, a POSITA would not have been able to determine the scope of this phrase set forth in claim 11 with reasonable certainty. (*See supra* Section XII.A.1(b); Ex. 1002, ¶105.)

3. Dependent Claims 2-10 and 12-20

Claims 2-10 depend from independent claim 1, and claims 12-20 depend from independent claim 11. Thus, these claims incorporate the above-discussed indefinite features of independent claims 1 and 11. (Ex. 1002, ¶106; *supra* Section XII.A.1-2.) Moreover, the dependent claims do not resolve the above-established indefiniteness of independent claims 1 and 11. Therefore, claims 2-10 and 12-20 do not comply with the requirements of 35 U.S.C. § 112(b) for at least the same reasons as those discussed above with respect to independent claims 1 and 11.

Moreover, as discussed below, claims 2-10, 12-16, and 18-20 do not comply with the requirements of 35 U.S.C. § 112(b) for additional reasons. (Ex. 1002, ¶¶107-147.)

a) Claim 2

It is unclear what is meant by "said cross links between switches of stages…" as recited in claim 2. (Ex. 1001, 49:41-45.) This is because both the "forward connecting links" and the "backward connecting links" include "zero or more cross links." (*Id.*, 49:27-40; *supra* Section XII.A.1(d).) As such, it is unclear as to whether claim 2 is referring to cross links that are included in the forward connecting links, included in the backward connecting links, included in both the forward connecting links and backward connecting links, or some other cross links that are not recited in claim 1. (Ex. 1002, ¶¶107-108.)

The as-filed disclosure of the '470 application does not clarify this ambiguity because, as discussed above, the specification only refers to "cross links" once. (Ex. 1004 at 211 (6:4-9); *see also supra* Section XII.A.1(d).) Thus, the as-filed disclosure does not aid a POSITA in determining what is meant by "said cross links between switches of stages …" as recited in claim 2. (Ex. 1002, ¶109.)

Accordingly, a POSITA would not have been able to determine the scope of the claim 2 with reasonable certainty. (Ex. 1002, ¶110.)

b) Claims 3-4

Claims 3 and 4 depend from claim 2 and include all of the features of claim 2. Therefore, a POSITA reading the specification would not have been able to

determine the scope of claims 3 and 4 with reasonable certainty for the additional reasons discussed above with respect to claim 2. (*See supra* Section XII.A.3(a); Ex. 1002, ¶111.)

c) Claim 5

There is no antecedent basis for "said incoming cross links" and "said outgoing cross links" as those terms are recited in claim 5. (Ex. 1001, 50:3-6; Ex. 1002, ¶¶112-113.) As discussed above with respect to claim 2, the only cross links recited in claim 1 are the "zero or more cross links" included in each of the forward and backward connecting links. (*See supra* Sections XII.A.1(d), XII.A.3(a); *see also supra* Section IX.B.1.) No "incoming cross links" or "outgoing cross links" are recited in claim 1, and it is unclear whether the "incoming cross links" and "outgoing cross links" recited in claim 5 are included in the "zero or more cross links" recited in claim 1. And even if the "incoming cross links" and "outgoing cross links" recited in claim 5 are included in the "zero or more cross links" recited in claim 1, it is unclear whether they are included in the forward connecting links, the backward connecting links, or in both the forward and backward connecting links. (*See also supra* Section XII.A.3(a).) Moreover, the terms "incoming cross links" and "outgoing cross links" are not used in the as-filed disclosure of the '470 application, including in the originally filed claims. (Ex. 1002, ¶113.)

Accordingly, given this lack of clarity of the claim language in light of the disclosure of the ’470 application, a POSITA would not have been able to determine the scope of the claim 5 with reasonable certainty. (Ex. 1002, ¶114.)

d) Claim 6

Claim 6 recites “said one or more cross links” (Ex. 1001, 50:7-10), but claim 1 recites “zero or more cross links” and there is no antecedent basis for “said one or more cross links.” Moreover, as discussed above, there are two instances of “zero or more cross links” in claim 1— in each of the forward and backward connecting links. (*See supra* Section XII.A.3(a).) As such, it is unclear as to whether claim 6 is referring to cross links that are included in the forward connecting links, the backward connecting links, both the forward connecting links and backward connecting links, or some other cross links that are not recited in claim 1. (*Id.*; Ex. 1002, ¶¶115-116.) Moreover, the as-filed disclosure of the ’470 application does not clarify this ambiguity because, as discussed above, the specification only refers to “cross links” once but not in the context of any cross links included in each of the forward and backward connecting links, as required by claim 1. (Ex. 1004 at 211 (6:4-9); *see also supra* Sections XII.A.1(d), XII.A.3(a).) Accordingly, given this lack of clarity of the claim language in light of the disclosure of the ’470 application, a POSITA would not have been able to determine the scope of claim 6 with reasonable certainty.

e) Claim 7

Claim 7 depends from claim 6, and therefore a POSITA would not have been able to determine the scope of claim 7 with reasonable certainty for at least the same reasons discussed above with respect to claim 6. (*See supra* Section XII.A.3(d).) Moreover, claim 7 adds additional ambiguity. As was the case with claim 6, it is unclear as to what the "said one or more cross links" in claim 7 (Ex. 1001, 50:11-17) is referring to, as independent claim 1, from which claims 6 and 7 depend, recites "zero or more cross links" and not "one or more cross links." (Ex. 1002, ¶¶117-118.)

Moreover, a POSITA would not have understood what is meant by "said one or more cross links are connected between at least one same numbered stage in all said subnetworks," as recited in claim 7. As Dr. Baker explains, it is unclear how a link can be "connected between at least one same numbered stage" as recited in claim 7 because a link provides a connection between two points, and a link that is connected between "one same numbered stage" does not make sense as it only provides one point of connection. (Ex. 1002, ¶119.)

Accordingly, given this lack of clarity of the claim language in light of the disclosure of the '470 application, a POSITA would not have been able to determine the scope of the claim 7 with reasonable certainty. (*Id.*, ¶120.)

f) Claim 8

Claim 8 depends from claim 7, and therefore a POSITA would not have been able to determine the scope of claim 8 with reasonable certainty for at least the same reasons discussed above with respect to claims 1, 6, and 7. (Ex. 1001, 50:19-27; *See supra* Sections XII.A.1, XII.A.3(d)-(e).) Moreover, the language of claim 8 adds further lack of clarity. (Ex. 1002, ¶¶121-127.)

For instance, claim 8 recites "said one or more higher stages in a subnetwork" (Ex. 1001, 50:19-20, 24) but there is no mention of "higher stages in a subnetwork" in any of claims 1, 6, or 7 and therefore it is unclear to which "higher stages" claim 8 is referring. This, coupled with the possibility that the subnetwork may only include a single stage as covered by claim 1 ("each subnetwork comprising y stages, where $y \geq 1$"), would not allow a POSITA to determine what is meant by "said one or more higher stages" in the context of the claimed invention. Moreover, it is unclear what would constitute a "higher stage" in the context of a subnetwork that includes a plurality of stages, such that a POSITA would not have been able to determine the scope of claim 8 with reasonable certainty. (Ex. 1002, ¶¶123-124.)

Claim 8 also refers to "said number of rows" and "said number of columns" (Ex. 1001, 50:22-27), but the terms "number of rows" and "number of columns" do not appear in any of the claims from which claim 8 depends. It is unclear

whether the "number of rows" and "number of columns" refer to a number of rows and a number of columns in the two-dimensional grid recited in claim 1 or to something else (e.g., the number of rows and number of columns in a subnetwork). For this additional reason, a POSITA would not have been able to determine the scope of claim 8 with reasonable certainty. (Ex. 1002, ¶125.)

Furthermore, the language of claim 8 covers one condition if "said number of rows or said number of columns are small in number" (Ex. 1001, 50:22-23) and another condition if "said number of rows or said number of columns are large in number" (*id.*, 50:26-27). However, as Dr. Baker explains, a POSITA would have not been able to determine what constitutes a number of rows or columns being "large in number" or "small in number" because neither the claim itself nor the specification provides any guidance for making such a determination. (Ex. 1002, ¶126.)

The scope of claim 8 is also unclear because it requires two mutually-exclusive conditions to co-exist in some circumstances. In particular, a POSITA would not have been able to determine which recited feature applies if, for example, the number of rows is determined to be "small" while the number of columns is determined to be "large" (or vice-versa). In such an instance, the claim language indicates that "said one or more higher stages in a subnetwork *are not connected* to any other higher stages in another subnetwork" should apply as the

number of rows is small. But the claim language also requires that "said one or more higher stages in a subnetwork *are connected* to higher stages in another subnetwork" should *also* apply because the number of columns is large. As such, a POSITA would have understood claim 8 to be self-contradictory as it requires two mutually-exclusive conditions to co-exist for a "small" number of rows and a "large" number of columns (and vice-versa). The as-filed disclosure of the '470 application does not indicate to a POSITA that there cannot be a "large" number of rows (or columns) with a "small" number of columns (or rows). Therefore, a POSITA would not have been able to determine the scope of claim 8 with reasonable certainty. (Ex. 1002, ¶127.)

g) Claim 9

The scope of claim 9 is unclear because a POSITA would not have been able to determine whether "said buffers are either inverting or non-inverting" (Ex. 1001, 50:33-38) requires that all of the "plurality of buffers" in the network are inverting buffers, all of the buffers in the network are non-inverting buffers, or that the feature is satisfied as long as the buffers are all either inverting or non-inverting buffers (e.g., some can be inverting and some can be non-inverting). Therefore, a POSITA would not have been able to determine the scope of claim 9 with reasonable certainty. (Ex. 1002, ¶¶128-129.)

h) Claim 10

The scope of claim 10 is unclear because the disclosure of the '470 application provides no guidance on what the terms "fully populated" and "partially populated" recited in claim 10 mean in the context of the disclosed switches. (Ex. 1001, 50:46-53.) In addition, when claim 10 recites "said switches of size d_i x d_o are either fully populated or partially populated," it is unclear whether claim 10 requires that (1) all switches in all stages are fully populated or all switches in all stages are partially populated (i.e., if one switch is fully populated, they all are—otherwise, all switches must be only partially populated) or (2) all switches in all stages are fully populated or partially populated (i.e., as long as each switch is either partially populated or fully populated, this feature is satisfied). (Ex. 1002, ¶¶130-131.)

Moreover, it is unclear what is meant by "said plurality of subnetworks are either implemented in three or more dimensions or implemented in a 3D integrated circuit device" (Ex. 1001, 50:51-53) as recited in claim 10. The specification does not discuss implementing subnetworks in "three or more dimensions," and it is unclear whether "dimensions" as used in that phrase has the same meaning as "dimensions" in a "3D integrated circuit device" assuming that 3D refers to "three dimensions." Therefore, a POSITA would not have been able to determine the scope of claim 10 with reasonable certainty. (Ex. 1002, ¶132.)

i) Claim 12

Claim 12 recites "said cross links between switches of stages …" similar to claim 2. (Ex. 1002, ¶¶133-134; *supra* Section XII.A.3(a).) Therefore, for reasons similar to those discussed above with respect to claim 2, a POSITA would not have been able to determine the scope of claim 12 with reasonable certainty. (Ex. 1002, ¶¶134-135.) Indeed, because there are four instances of "zero or more cross links" in claim 11 (Ex. 1001 at 51:11-31) (unlike two such instances in claim 1), the reference to "said cross links" in claim 12 is even more unclear than the similar reference in claim 2, and a POSITA would not have been able to determine the scope of claim 12 with reasonable certainty. (*Id.;* Ex. 1001, 51:11-31.)

j) Claims 13-16

Claims 13-16 depend from claim 12 and include all of the features of claim 12. Therefore, a POSITA reading the specification would not have been able to determine the scope of claims 13-16 with reasonable certainty for the additional reasons discussed above with respect to claim 12. (*See supra* Section XII.A.3(i); Ex. 1002, ¶136.)

Moreover, claim 15 recites "said one or more cross links are connected between at least one same numbered stage in all said subnetworks," similar to claim 7. (Ex. 1002, ¶137; *supra* Section XII.A.3(e).) Therefore, for reasons similar to those discussed above with respect to claim 7, a POSITA would not have

been able to determine the scope of this phrase set forth in claim 15 with reasonable certainty. (Ex. 1002, ¶137.)

Claim 16 depends from claim 15 and thus includes all of the features of claim 15. (Ex. 1002, ¶138.) Moreover, claim 16 recites features similar to those discussed above with respect to claim 8. (*Supra* Section XII.A.3(f); Ex. 1002, ¶138.) Therefore, for reasons similar to those discussed above with respect to claims 8 and 15, a POSITA would not have been able to determine the scope of claim 16 with reasonable certainty. (*Supra* Section XII.A.3(f); Ex. 1002, ¶138.)

k) Claim 18

Claim 18 recites features similar to those discussed above with respect to claim 10. (Ex. 1002, ¶¶139-140; *supra* Section XII.A.3(h).) Therefore, for reasons similar to those discussed above with respect to claim 10, a POSITA would not have been able to determine the scope of this phrase set forth in claim 18 with reasonable certainty. (Ex. 1002, ¶140; *supra* Section XII.A.3(h).)

l) Claim 19

It is unclear as to what "said one or more cross links" refers to in claim 19. (Ex. 1001, 52:39-43; Ex. 1002, ¶¶141-142.) Claim 11, from which claim 19 depends, does not recite "one or more cross links," and there is no antecedent basis for "said one or more cross links." There are four instances of "zero or more cross links" in claim 11, where some are included in the incoming links and some are

included in the outgoing links, and some connect switches in the same numbered stage and some connect switches in different numbered stages. (Ex. 1001, 51:11-31.) As such, it is unclear as to whether "said one or more cross links" as set forth in claim 19 is referring to all the cross links in claim 11, some unidentified subset of those cross links in claim 11, or some other cross links not recited in claim 11. Therefore, a POSITA would not have been able to determine the scope of claim 19 with reasonable certainty. (Ex. 1002, ¶142.)

In addition, claim 19 also refers to "the final stage" (Ex. 1001, 52:39-43), but there is no antecedent basis for "the final stage" as a "final stage" is not mentioned in claim 11. A POSITA reviewing the as-filed disclosure of the '470 application would not have been able to determine what is meant by "the final stage" as no such final stage is described or mentioned in the specification. For example, it is unclear whether the "final stage" corresponds to the highest numbered stage in a network or the last stage in the network before a connection is output from the network. (Ex. 1002, ¶143.) For at least these reasons, a POSITA would not have been able to determine the scope of claim 19 with reasonable certainty.

Moreover, a POSITA would not have understood how a link can be "connected between at least one same numbered stage." (Ex. 1001, 52:39-43.) As discussed above with respect to claim 7, a link provides a connection between two

points, and a link that is connected between "one same numbered stage" does not make sense as it only provides one point of connection. (*See supra* Section XII.A.3(e).) Therefore, a POSITA reading the specification would not have been able to determine the scope of claim 19 with reasonable certainty for this additional reason. (Ex. 1002, ¶144.)

m) Claim 20

Claim 20 depends from claim 19. Therefore, a POSITA reading the specification would not have been able to determine the scope of claim 20 with reasonable certainty for the additional reasons discussed above with respect to claim 19. (*See supra* Section XII.A.3(l); Ex. 1002, ¶¶145-146.)

Moreover, claim 20 recites features similar to those discussed above with respect to claims 8 and 16. (Ex. 1002, ¶147; *supra* Sections XII.A.3(f), (j).) Therefore, for reasons similar to those discussed above with respect to claims 8 and 16, a POSITA would not have been able to determine the scope of claim 20 with reasonable certainty. (Ex. 1002, ¶147; *supra* Sections XII.A.3(f), (j).)

B. Ground 2: Claims 1-20 Fail to Satisfy the Written Description Requirement

A patent specification must "contain a written description of the invention." 35 U.S.C. § 112(a); *Ariad*, 598 F.3d at 1344 (citing pre-AIA 35 U.S.C. § 112 ¶1). The written description requirement serves "to ensure that the patent applicant was in full possession of the claimed subject matter on the

application filing date." *Turbocare Div. of Demag Delaval Turbomachinery Corp. v. General Electric Co*., 264 F.3d 1111, 1118 (Fed. Cir. 2001). "When the applicant adds a claim or otherwise amends his specification after the original filing date, . . . the new claims or other added material must find support in the original specification." *Id.*

As discussed above, to comply with the written description requirement of § 112, the claimed invention must be sufficiently described in the specification to convey to a POSITA that the named inventor(s) had possession of the claimed invention at the time the application was filed. (*See supra* Section IX.) Whether the added subject matter is an obvious variant of the disclosed subject matter is irrelevant. (*Id.*)

As discussed below, claims 1-20 include features not disclosed in the specification such that a POSITA would not have understood that the named inventor had possession of the claimed invention at the time the '470 application was filed on April 28, 2016. (Ex. 1002, ¶¶148-203.)

1. Independent Claim 1

A POSITA would not have understood that the named inventor of the '553 patent possessed an invention with all of the features recited in claim 1 at the time of the alleged invention. (Ex. 1002, ¶¶149-169.)

a) "each subnetwork comprising y stages, where y ≥ 1"

Claim 1 recites "[a] network . . . comprising a plurality of subnetworks," with "each subnetwork comprising y stages, where y ≥ 1." (Ex. 1001, 48:62-67.) As such, a POSITA would have understood claim 1 to cover a network that includes subnetworks that all include only a *single stage*. (Ex. 1002, ¶151.) However, the disclosure of the '470 application does not disclose any subnetwork with a single stage, let alone an entire network that includes only a single stage in every subnetwork. Indeed, each embodiment disclosed in the '470 application includes a *multi-stage* network, as discussed below.

First, while the '470 application does not use the term "subnetwork" outside of the claims, the '470 application divides the networks disclosed into "blocks" made up of a number of stages, each including one or more switches in the same manner as the subnetworks recited in the claims. In particular, with reference to figures 1A and 8, the '470 application discloses the following:

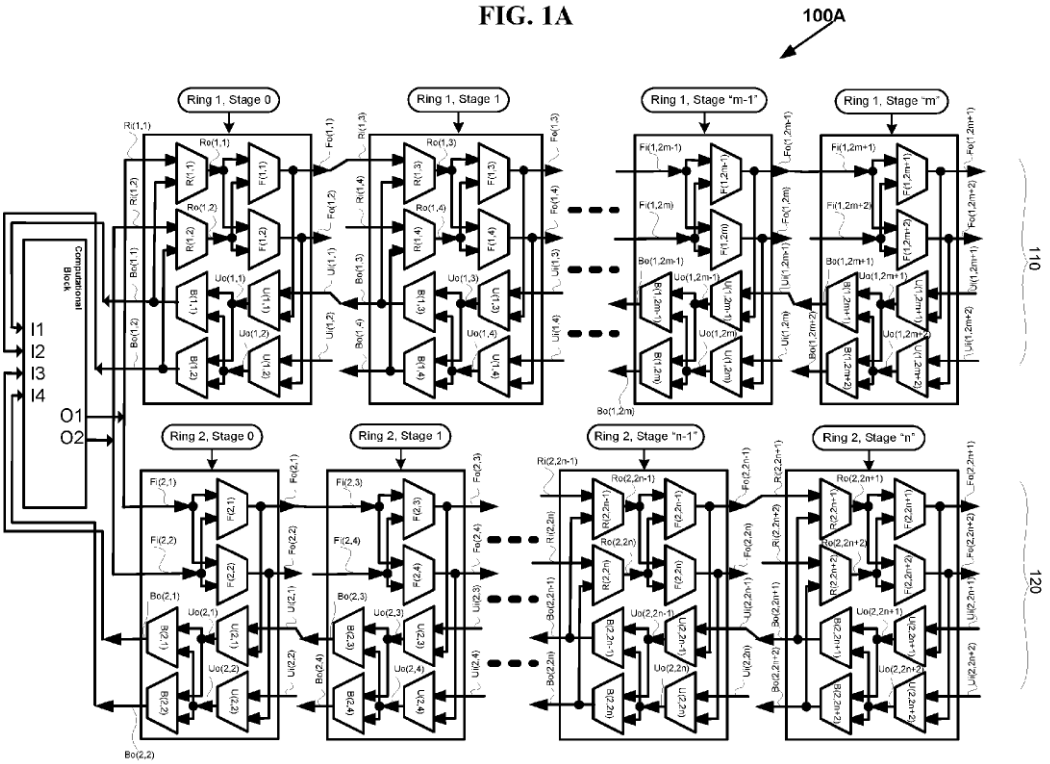
> In one embodiment, each block of *2D-grid 800* consists of one of the *partial multi-stage hierarchical network* VComb(N1,N2d,s) *100A* with 2 inlet links and 4 outlet links and the corresponding computational block with 4 inlet links and 2 outlet links. For example *block (1,1) of 2D-grid 800 consists of one of the partial multi-stage hierarchical network* VComb(N1,N2d,s) *100A* with 2 inlet links and 4 outlet links and the corresponding

> computational block with 4 Inlet links and 2 outlet links . . .
>
> Referring to *partial multi-stage hierarchical network* VComb(N1,N2d,s) *100A* in FIG. 1A, *the stage (ring 1, stage 0)* consists of 4 inputs namely . . . and 4 outputs . . .
>
> *The stage (ring 1, stage 1)* consists of 4 inputs . . . and 4 outputs . . .
>
> *The stage (ring 1, stage "m−1")* consists of 4 inputs . . . and 4 outputs. . .
>
> *The stage (ring 1, stage "m")* consists of 4 inputs . . . and 4 outputs . . .

(Ex. 1004, 220-223 (15:27-18:1) (emphases added); Ex. 1002, ¶152.)

As shown in figure 1A below, each block (e.g., partial multi-stage hierarchical network 100A) includes a plurality of stages.

FIG. 1A



(Ex. 1004, 277 (FIG. 1A); Ex. 1002, ¶153.)

To the extent that the "subnetworks" recited in the claims correspond to "blocks" or include the disclosed "blocks," the '470 application makes clear that each block includes at least two stages. For example, in the context of figures 1A and 8, the '470 application states that "*each block* of 2D-grid 800 consists of one of the partial *multi-stage hierarchical network VComb(N1,N2d,s) 100A*" (Ex. 1004 at 220 (15:27-30) (emphasis added)) and that the "partial *multi-stage* hierarchical network VComb(N1,N2d,s) 100A consists of two rings 110 and 120, where *ring*

110 consists of "m+1" stages namely (ring 1, stage 0), (ring 1, stage 1), . . . (ring 1, stage "m−1"), and (ring 1, stage "m"), and *ring 120 consists of "n+1" stages. . . , where 'm' and 'n' are positive numbers*." (*Id*. at 219-220 (14:22-15:2) (emphasis added).) Because each block includes rings that include a minimum of m+1 and n+1 stages where m and n are at least 1 (positive numbers), each block necessarily includes at least two stages for each ring and no block would only include a single stage. (Ex. 1002, ¶154.)

Indeed, the title of the '553 patent is "Optimization of *Multi-Stage* Hierarchical Networks for Practical Routing Applications," thereby confirming to a POSITA that the disclosed networks are *multi-stage* and therefore include a *plurality* of stages. (Ex. 1001, Title; Ex. 1004, 211 (6:4-9) ("The optimized multi-stage networks with their VLSI layouts…."), 211 (6:13-16) ("The optimized multi-stage networks provide high routability for broadcast, unicast and multicast connections…"), 215-219 (10:17-14:18), 226 (21:14-23).) Aside from the last four figures that are not concerned with network hierarchy and instead illustrate particular switch implementations, *every figure* of the '470 application is described as representing an embodiment or portion of an embodiment of a "multi-stage" network. (*Id*., 212-215 (7:4-10:15); Ex. 1002, ¶155-156.)

The original claims filed with the '470 application covered an embodiment with "each subnetwork comprising r rings, and said each ring comprising y_r stages,

where $r \geq 1$; $y_r \geq 1$." (Ex. 1004, 286 (81:7-8).) As such, the originally filed claims apply to a network that includes subnetworks including a single stage. (Ex. 1002, ¶159.) However, a POSITA would not have understood the named inventor of the '553 patent to have possession of such an invention for all the reasons discussed immediately above. *Ariad*, 598 F.3d at 1349-50 ("[A]n adequate written description of a claimed genus requires more than a generic statement of an invention's boundaries.") (citation omitted); *Enzo Biochem, Inc. v. Gen-Probe, Inc.*, 323 F.3d 956, 968 (Fed. Cir. 2002) (holding that generic claim language appearing in *ipsis verbis* in the original specification did not satisfy the written description requirement because it failed to support the scope of the genus claimed).

In particular, the as-filed specification and drawings of the '470 application and the materials incorporated by reference in the specification do not disclose any subnetwork with a single stage. *See Fiers v. Revel*, 984 F.2d 1164, 1170 (Fed. Cir. 1993) (rejecting the argument that "only similar language in the specification or original claims is necessary to satisfy the written description requirement"); *LizardTech*, 424 F.3d at 1346 (explaining that a specification cannot always support expansive claim language and satisfy the requirements of 35 U.S.C. § 112

"merely by clearly describing one embodiment of the thing claimed.")[25]

Therefore, a POSITA would not have understood that the named inventor had possession of an invention in which a network includes a plurality of subnetworks with "each subnetwork comprising y stages, where y ≥ 1" at the time the '470 application was filed because the specification repeatedly and consistently discloses "multi-stage" networks, and the only embodiments include a plurality of stages in each block as discussed above. (Ex. 1002, ¶¶151-159.)

Accordingly, claim 1 does not comply with the requirements of 35 U.S.C. § 112(a).

b) "cross links"

Claim 1 recites in relevant part "[s]aid forward connecting links . . . comprising zero or more *cross links* connected from a switch in a stage in a

[25] A network with all subnetworks having a single stage, as included in the claimed range, would also be incompatible with other parts of the claim such as "straight links connected from a switch in a stage in a subnetwork to a switch in another stage of the same subnetwork." (Ex. 1002, ¶¶157-158.) Indeed, a POSITA would not have been enabled to make and/or use the alleged invention of the '553 patent with a single-stage subnetwork without undue experimentation. (*Infra* Section XII.C.)

subnetwork to a switch in the *same numbered stage* in one or more other subnetworks" and "[s]aid backward connecting links . . . 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, 49:27-40 (emphasis added).) However, the disclosure of the '470 application does not disclose any 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 such that a POSITA would have understood that the named inventor had possession of the claimed invention at the time the '470 application was filed. (Ex. 1002, ¶¶160-169.) Indeed, to the extent "cross links" are understood, each embodiment disclosed in the '470 application includes cross links connected from a switch in a stage in a subnetwork to a switch in a *successive* stage in one or more other subnetworks, as discussed below. (Ex. 1002, ¶160; s*ee also supra* Section IX.B.1 (explaining the lack of written description for this feature in the alleged priority applications).)

First, the written description's mere mention of "cross links" in passing confirms that the named inventor only envisioned cross links to be connections from switches in a stage to switches in *another stage* in either the same sub-integrated circuit block or another sub-integrated block.

The optimized multi-stage networks with their VLSI

> layouts employ shuffle exchange links where outlet links of *cross links* from switches in a stage of a ring in one sub-integrated circuit block are connected to either inlet links of switches in the *another stage* of a ring in another sub-integrated circuit block or inlet links of switches in the *another stage* of a ring in the same sub-integrated circuit block so that said cross links are either vertical links or horizontal and vice-versa.

(Ex. 1004, 211 (6:4-9) (emphasis added); *see also id.*, 276 (Abstract); Ex. 1002, ¶161.)

None of the embodiments described or depicted in the figures of the '470 application includes cross links that are coupled between switches that are identified as being in the "same numbered stage" as recited in claim 1.[26] (Ex. 1002, ¶162.)

[26] Although the claim recites the "cross links" as optional features in light of the "zero or more cross links" language, a POSITA would have understood that the claim covers an embodiment where at least one cross link that is "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. 1002, ¶162, n.13.) Such an embodiment, however,

Second, the ’470 application (including any of the material incorporated therein) does not provide any support for cross links that are coupled between switches in the “same numbered stage” as recited in claim 1. Instead, as Dr. Baker explains, any mention of “cross links” in the incorporated material includes a clear explanation that the “cross links” are links between two *successive stages* in two different subnetworks. (Ex. 1002, ¶¶163-168.) Therefore, instead of potentially providing support for the claimed cross links between switches in the same stage, the material incorporated by reference demonstrates that the named inventor understood cross links to be between successive stages.

For example, the ’611 patent, which is incorporated by reference in the ’470 application (Ex. 1004, 207 (3:15-19)), discloses that “cross links” are links between two *successive stages* in two different rows (different subnetworks). (Ex. 1027, 9:36-40; Ex. 1002, ¶164.) The annotated excerpt of figure 1B of the ’611 patent below shows cross links between successive stages in different subnetworks.

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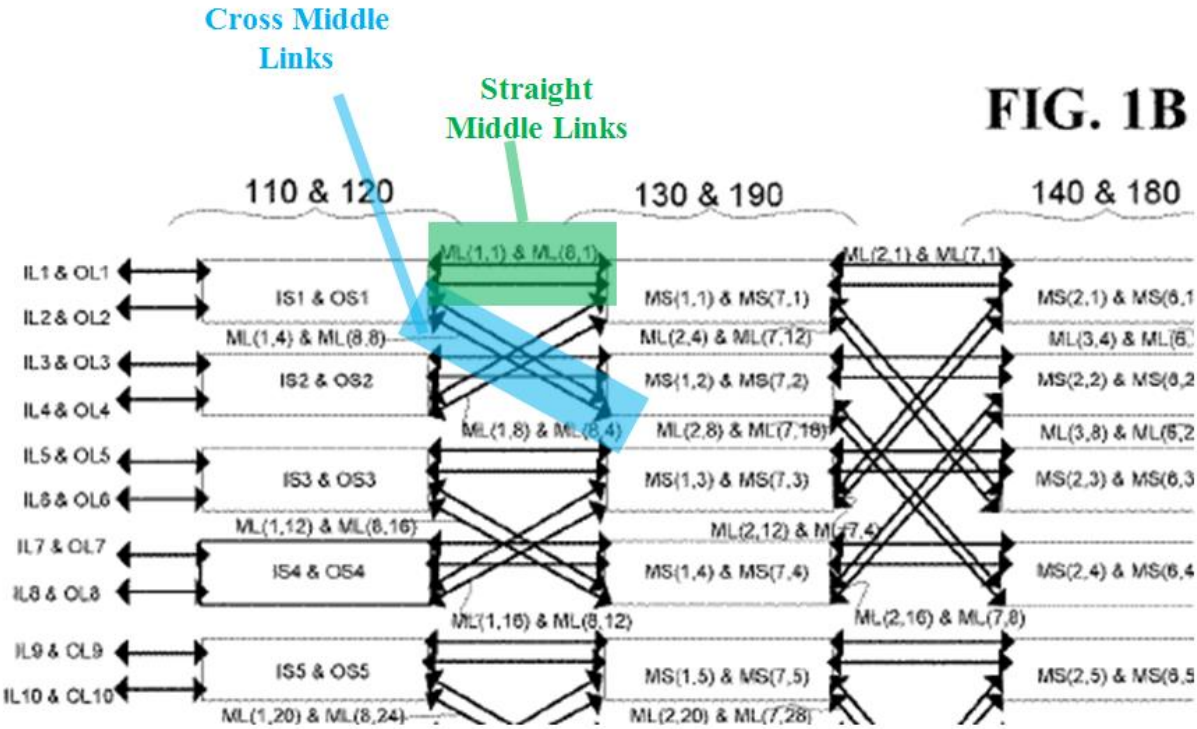
is not supported by the as-filed disclosure of the ’470 application as discussed in this section.



(Ex. 1027, FIG. 1B (excerpt, annotated); Ex. 1002, ¶165.)

Third, a POSITA's understanding of cross links being links between *successive stages* (and not the same stage, as claimed), as explained in the '611 patent, is reinforced by the language of claim 1 of the '553 patent. Specifically, as noted at the outset in this section, both the "forward connecting links" and the "backward connecting links" include "zero or more cross links" in claim 1. (Ex. 1002, ¶166.)

While "forward connecting links" and "backward connecting links" are not terms that are used in the as-filed disclosure of the '470 application, the directionality (e.g., forward or backward) of such links is suggested by the plain

and ordinary meaning of these claim terms. Indeed, a POSITA would not have understood a link that connects switches in the same stage as a "forward connecting link" or a "backward connecting link" as those terms are used in (i) the claims of the '470 application, (ii) the applications incorporated by reference in the '470 application, and/or (iii) the applications to which the '470 application purports to claim priority. (Ex. 1002, ¶¶164-168.)

Therefore, the as-filed disclosure of the '470 application would not have conveyed to a POSITA that the named inventor had possession of the features claimed at the relevant time, and thus claim 1 does not comply with the requirements of 35 U.S.C. § 112(a). (Ex. 1002, ¶169.)

2. Independent Claim 11

A POSITA at the time of the alleged invention would not have understood that the named inventor of the '553 patent possessed an invention with all of the features recited in claim 11. (Ex. 1002, ¶¶170-172.)

a) "each subnetwork comprising y stages, where y ≥ 1"

With respect to this feature, claim 11 recites in relevant part "[a] network . . . comprising a plurality of subnetworks," with "each subnetwork comprising y stages, where y ≥ 1," similar to the recitations in claim 1. Accordingly, for at least the same reasons discussed above with respect to claim 1, a POSITA would not have understood the named inventor had possession of the claimed invention at the

time the '470 application was filed. (*See supra* Section XII.B.1(a).) Thus, claim 1 does not comply with the requirements of 35 U.S.C. § 112(a). (Ex. 1002, ¶171.)

b) "cross links"

Claim 11 recites in relevant part "[s]aid incoming links . . . 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 "[s]aid outgoing links . . . 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," similar to the recitations in claim 1. (Ex. 1001, 51:11-31 (emphasis added).) Accordingly, for at least the first and second reasons discussed above with respect to claim 1, claim 11 does not comply with the requirements of 35 U.S.C. § 112(a).[27] (*See supra* Section XII.B.1(b); Ex. 1002, ¶172; *see also supra* Section IX.B.1.)

3. Dependent Claims 2-10 and 12-20

Claims 2-10 depend from independent claim 1 and claims 12-20 depend from independent claim 11. Thus, these claims incorporate the above-discussed

[27] The third reason discussed above with respect to claim 1 relates to the recitation of "[forward/backward] connecting links" in that claim. (*Supra* Section XII.B.1(b).) Claim 11 does not recite these terms.

features of claims 1 and 11 which are not supported by the as-filed disclosure of the '470 application. (Ex. 1002, ¶173; *supra* Sections XII.B.1-2.) Therefore, claims 2-10 and 12-20 do not comply with the requirements of 35 U.S.C. § 112(a) for at least the reasons discussed above with respect to independent claims 1 and 11.

Moreover, as discussed below, claims 2-5, 9, 10, 12-16, and 18-20 do not comply with the requirements of 35 U.S.C. § 112(a) for additional reasons. (Ex. 1002, ¶174.)

a) Claim 2

Claim 2 recites in relevant part "*said cross links* between switches of stages in any two said subnetworks are connected as either *vertical links only*, or *horizontal links only*, or *both vertical links and horizontal links*." (Ex. 1001, 49:41-45 (emphasis added).) And as noted above, claim 1 recites "[s]aid forward connecting links . . . comprising zero or more *cross links*" and "[s]aid backward connecting links . . . comprising zero or more *cross links*." (*Supra* Section XII.B.1(b); *see also supra* Section IX.B.2.)

Assuming that the recitation of "said cross links" in claim 2 modifies the "zero or more cross links" recited in claim 1, a POSITA would not have understood that the named inventor had possession of the claimed invention where such cross links have the additional features recited in claim 2. (Ex. 1002, ¶¶175-

177.) For example, the '470 application as-filed does not disclose cross links connected from a switch in a stage in a subnetwork to a switch in the same numbered stage in another subnetwork, where the "cross links between switches of stages in any two said subnetworks are connected as either vertical links only, or horizontal links only, or both vertical links and horizontal links" as recited in claim 2. (*Id.*; *supra* Section XII.B.1(b)) To the extent PO argues that the '470 application describes implementing the links between subnetworks as vertical and horizontal links, the disclosure of the '470 application does not disclose any such vertical/horizontal links in the context of cross links between same numbered stages, as claimed. (Ex. 1002, ¶177; *see also supra* Section IX.B.2)

Accordingly, claim 2 does not comply with the requirements of 35 U.S.C. § 112(a).

b) Claims 3-4

Claims 3 and 4 depend from claim 2 and thus incorporate all the features of claim 2 therein. As discussed above, the features set forth in claim 2 are not supported by the as-filed disclosure of the '470 application. (*Supra* Section XII.B.3(a).) Thus, claims 3 and 4 do not comply with the requirements of 35 U.S.C. § 112(a) for this additional reason. (Ex. 1002, ¶178.)

Moreover, with respect to claim 4, as discussed above, the '470 application and its alleged priority applications do not provide written description support for

the following features set forth in claim 4: "said horizontal links between switches in two said stages are *substantially of equal length* and said vertical links between switches in two said stages are *substantially of equal length* in the entire two-dimensional grid of rows and columns" or "said horizontal links between switches in two said stages are substantially of a *hop length h* and said vertical links between switches in two said stages are substantially of a *hop length v* where $h \geq 0$ *and* $v \geq 0$." (Ex. 1002, ¶¶179-181; s*upra* Sections IX.B.3(a)-(b).)

Accordingly, claim 4 does not comply with the requirements of 35 U.S.C. § 112(a) for this additional reason.

c) Claim 5

Claim 5 recites in relevant part "*said incoming cross links* and *said outgoing cross links* are connected through only one multiplexer at each switch." (Ex. 1001, 50:3-6.) While it would have been unclear what is meant by the "incoming cross links" and "outgoing cross links" recited in claim 5 (*supra* Section XII.A.3(c)), the only cross links recited in claim 1 are the "zero or more cross links" for which there is no written description support. (*Supra* Section XII.B.1(b).) Thus, assuming that the incoming cross links and outgoing cross links recited in claim 5 are included in the "zero or more cross links" of claim 1, there is no disclosure in the '470 application of any two such cross links having the additional feature of being "connected through only one multiplexer at each switch," as recited in claim

5. (Ex. 1002, ¶¶182-183.) Accordingly, claim 5 does not comply with the requirements of 35 U.S.C. § 112(a).

d) Claim 9

In addition to incorporating the unsupported features of claim 1, claim 9 does not comply with the requirements of 35 U.S.C. § 112(a) for at least two additional reasons. (Ex. 1002, ¶¶184-187.)

First, claim 9 recites that "*said cross links are implemented in two or more metal layers***.**" (Ex. 1001, 50:28-30.) The '553 patent does not use the term "metal layers" or provide any teaching regarding implementing links in metal layers outside of the claims, and nothing in the specification discusses implementing cross links "in two or more metal layers," let alone in the context of the cross links recited in claim 1. (Ex. 1002, ¶185.)

The original claims filed with the '470 application covered an embodiment where "said horizontal cross links and vertical cross links are implemented in two or more metal layers." (Ex. 1004, 289 (84:3-4) (original claim 8).) But the cross links recited in original claim 1, from which original claim 8 depends, are very different than the cross links recited in claim 1 of the '553 patent. (*Supra* Sections IX.B.1, XII.B.1(b).) Moreover, a POSITA would not have understood the named inventor of the '553 patent to have possession of such an invention for the reasons discussed immediately above. In particular, the '470 application as-filed does not

disclose any cross links that "are implemented in two or more metal layers." A POSITA would not have understood that the as-filed disclosure of the '470 application discloses this feature because it never discloses any cross links "implemented in two or more metal layers" in conjunction with the specific subject matter recited in claim 1. (Ex. 1002, ¶186.)

Second, claim 9 recites that "each switch is configurable by an SRAM cell or a Flash Cell or a *flip-flop*." But as discussed above, the as-filed disclosure of the '470 application (including the materials incorporated by reference therein) does not make any mention of a "flip flop," let alone a flip flop used to "configure" a switch. (*Supra* Section IX.A; Ex. 1002, ¶187).)

Accordingly, claim 9 does not comply with the requirements of 35 U.S.C. § 112(a) for these additional reasons.

e) Claim 10

In addition to incorporating the unsupported features of claim 1, claim 10 does not comply with the requirements of 35 U.S.C. § 112(a) for additional reasons. (Ex. 1002, ¶¶188-190.)

For example, a POSITA would not have understood that the named inventor of the '553 patent was in possession of an invention that includes a programmable integrated circuit device that includes a network with switches, where those switches are "either fully populated or partially populated" as recited in claim 10.

(Ex. 1001, 50:46-48.) The '470 application as-filed does not use the terms "fully populated" or "partially populated" outside of the claims, and nothing in the specification discusses "fully populated or partially populated" switches or how they are used in any of the disclosed networks. (Ex. 1002, ¶189.)

The original claims filed with the '470 application covered an embodiment where "said switches of size d_i x d_o are either fully populated or partially populated." (Ex. 1004, 290 (85:7-8) (original claim 17).) However, a POSITA would not have understood the named inventor of the '553 patent to have possession of the invention as set forth in claim 10 for the reasons discussed immediately above. In particular, the '470 application as-filed does not disclose any switches that are "fully populated or partially populated." (Ex. 1002, ¶190.)

f) Claim 12

Claim 12 recites in relevant part "*said cross links* between switches of stages in any two said subnetworks are connected as either *vertical links only*, or *horizontal links only*, or *both vertical links and horizontal links*," similar to claim 2. (Ex. 1001, 51:32-36 (emphasis added).) At least to the extent that dependent claim 12 modifies the "zero or more cross links" that connect to "a same numbered stage" recited in claim 11 (*supra* Section XII.B.2(b)), the disclosure of the '470 application as filed does not support this feature as discussed above with respect to claim 2. (Ex. 1002, ¶¶191-192; s*upra* Section XII.B.3(a).) Accordingly, claim 12

does not comply with the requirements of 35 U.S.C. § 112(a).

g) Claims 13-16

Claims 13-16 depend from claim 12 and thus incorporate all the features of claim 12 therein. As discussed above, the features set forth in claim 12 are not supported by the as-filed disclosure of the '470 application. (*Supra* Section XII.B.3(f).) Thus, claims 13-16 do not comply with the requirements of 35 U.S.C. § 112(a) for this additional reason. (Ex. 1002, ¶193.)

Moreover, additional features recited in claim 14 are not supported by the as-filed disclosure of the '470 application. For example, claim 14 recites in relevant part "*said horizontal links* between switches in two said stages are substantially of a *hop length h* and *said vertical links* between switches in two said stages are substantially of a *hop length v[,] where* $h \geq 0$ *and* $v \geq 0$," similar to claim 4. (Ex. 1001, 51:51-52:7.) Thus, the disclosure of the '470 application as filed does not support this feature as discussed above with respect to claim 4. (Ex. 1002, ¶194; s*upra* Section XII.B.3(b).)

Similarly, additional features recited in claim 15 are not supported by the as-filed disclosure of the '470 application. For example, claim 15 recites in relevant part "*said one or more cross links* are connected between at least one *same numbered stage in all said subnetworks***.**" (Ex. 1001, 52:8-11 (emphasis added).) Thus, to the extent that dependent claim 15 is understood to modify the "zero or

more cross links" that are connected between at least one "same numbered stage," the disclosure of the '470 application as filed makes no mention of cross links that connect switches in the same numbered stage, let alone such a cross link connection that is made in the same numbered stage for *every subnetwork* in the network. (Ex. 1002, ¶195; *see also supra* Section XII.A.3(j) (discussing indefiniteness of claim 15).)

Claim 16 depends from claim 15 and thus incorporates all the features of claim 15 therein. As discussed above, the features set forth in claim 15 are not supported by the as-filed disclosure of the '470 application. Thus, claim 16 does not comply with the requirements of 35 U.S.C. § 112(a) for this additional reason. (Ex. 1002, ¶196.)

h) Claim 18

Claim 18 recites features similar to those set forth in claim 10. Thus, claim 18 does not comply with the requirements of 35 U.S.C. § 112(a) for reasons similar to those given above with respect to claim 10. (*See supra* Section XII.B.3(e); Ex. 1002, ¶¶197-198.)

i) Claim 19

Claim 19 recites in relevant part "*said one or more cross links* are connected between at least one *same numbered stage in all said subnetworks*, and *said same numbered stage may be any stage including the final stage*." (Ex. 1001, 52:38-42

(emphasis added).) Thus, to the extent that dependent claim 19 is understood to modify the "zero or more cross links" that are connected between at least one "same numbered stage" in claim 11, the disclosure of the '470 application as filed makes no mention of a cross link connection that is made in the same stage *in all said subnetworks* in the network. Furthermore, there is no disclosure in the '470 application as-filed with respect to same-stage cross links being implemented at any particular stage such as the claimed "final stage." (Ex. 1002, ¶¶199-200*; see also supra* Section XII.A.3(l) (discussing indefiniteness of claim 19).) Therefore, claim 19 does not comply with the requirements of 35 U.S.C. § 112(a).

j) Claim 20

Claim 20 depends from claim 19 and thus incorporates all the features of claim 19 therein. As discussed above, the features set forth in claim 19 are not supported by the as-filed disclosure of the '470 application. (*Supra* Section XII.B.3(i).) Thus, claim 20 does not comply with the requirements of 35 U.S.C. § 112(a) for this additional reason. (Ex. 1002, ¶¶201-202.)

Moreover, additional features recited in claim 20 are not supported by the as-filed disclosure of the '470 application. For example, claim 20 recites in relevant part "said one or more higher stages in a subnetwork are connected to higher stages in another subnetwork by *said one or more cross links* when said number of rows or said number of columns are large in number." (Ex. 1001,

52:49-52 (emphasis added).) To the extent that dependent claim 20 is understood to modify the "zero or more cross links" that are connected between at least one "same numbered stage" as recited in claim 11 (*supra* Section XII.B.2(b)), the disclosure of the '470 application as filed makes no mention of cross links that connect to the same numbered stage that also provide connections between "said one or more higher stages in a subnetwork" and "higher stages in another subnetwork" as recited in claim 20. (Ex. 1002, ¶203; *see also supra* Section XII.A.3(m) (discussing indefiniteness of claim 20).)

Therefore, claim 20 does not comply with the requirements of 35 U.S.C. § 112(a).

C. Ground 3: Claims 1-20 Fail to Satisfy the Enablement Requirement

To meet the enablement requirement of 35 U.S.C. § 112, the specification must teach a POSITA 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). "When a range is claimed, there must be reasonable enablement of the scope of the range." *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1244 (Fed. Cir. 2003). It is not enough for the specification to "provide[] a starting point from which one of skill in the art can perform further research in order to practice the claimed invention." *Nat'l*

Recovery Techs., Inc. v. Magnetic Separation Sys., Inc., 166 F.3d 1190, 1198 (Fed. Cir. 1999).

Factors to be considered in determining whether undue experimentation is required include the amount of direction or guidance presented, the presence or absence of working examples, the state of the prior art, and the quantity of experimentation necessary. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). However, analysis of all the "*Wands*" factors is not required; "they are illustrative, not mandatory. What is relevant depends on the facts" of the particular case. *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1213 (Fed. Cir. 1991); *Wyeth v. Abbott Labs.*, No. 08-1021 (JAP), 2012 WL 175023, at *12 (D.N.J. Jan. 19, 2012) (holding that there was undue experimentation when "a substantial amount of experimentation would be required" to practice the invention), *aff'd sub nom. Wyeth & Cordis Corp. v. Abbott Labs.*, 720 F.3d 1380, 1386 (Fed. Cir. 2013) ("Here, the specification similarly discloses only a starting point for further iterative research.").

Here, PO "has not enabled preparation of [the claimed invention] sufficient to support its all-encompassing claims." *Amgen, Inc.*, 927 F.2d at 1213. The '553 patent specification simply does not teach a POSITA 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. (Ex. 1002, ¶¶204-215.)

Specifically, independent claims 1 and 11 cover a network that includes subnetworks that all include only a *single stage*, i.e., y=1 in the phrase "each subnetwork comprising y stages, where y ≥ 1." (Ex. 1002, ¶205.) However, as discussed above and further discussed below, the disclosure of the '470 application does not disclose any subnetwork with a single stage, let alone an entire network that includes only a single stage in each subnetwork. (*See supra* Section XII.B.1(a).)

To the extent there is any guidance provided in the disclosure of the '470 application to make and/or use the claimed invention, it is all directed to *multi-stage* networks. (*Id.*) Thus, the '470 application is devoid of any guidance or working examples of a network that includes subnetworks that all include only a *single stage*, as covered by independent claims 1 and 11. (Ex. 1002, ¶¶204-206.)

Moreover, a network with all subnetworks having a single stage, as included in the claimed range, would have been incompatible with other parts of the claim such as "straight links connected from a switch in a stage in a subnetwork to a switch in *another stage of the same subnetwork*." (*Id.*, ¶207.) In particular, a POSITA would have understood that if all of the subnetworks in a network include a single stage, then there could be no "straight links connected from a switch in a

stage in a subnetwork to a switch in *another stage of the same subnetwork*," as covered by independent claims 1 and 11. As such, these are plainly and unambiguously incompatible features and no amount of experimentation would have led a POSITA to make and/or use the claimed single-stage subnetwork with the claimed straight links that connect multiple stages within a subnetwork to each other. (*Id.*) *Auto. Techs. Int'l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1281, 1284 (Fed. Cir. 2007) (affirming holding of invalidity due to non-enablement of electronic side impact sensors when the specification extensively discussed how to make and use mechanical side impact sensors and discussing the excessive quantity of experimentation necessary, including the expert's discussion of how a "'great deal of experimentation' would have been necessary to make an electronic side impact sensor after reading the specification of the '253 patent").

The realization of a network made up of subnetworks all having a single stage, as encompassed by claim 1, is further complicated by the numerous optional features recited in the claim (e.g., in the form of "may or may not be" or "zero or more"). Such optional features result in an unreasonable number of different possible configurations of the network that would be covered by claim 1. (Ex. 1002, ¶208.) Thus, a POSITA would have had to perform an unreasonably large amount of trial and error experimentation in any effort to arrive at the claimed invention, particularly where the network includes a plurality of single-stage

subnetworks. A POSITA would have had to perform such experimentation without guidance or examples in the disclosure of the '470 application. As exemplified by the incompatibility between the claimed "straight links" and the single-stage subnetworks, even an unreasonable amount of experimentation, which would have been far beyond what a POSITA would have considered routine, would not have led to a POSITA being able to practice the claimed invention. (*Id.*) *US Endodontics, LLC v. Gold Standard Instruments, LLC*, PGR2015–00019, Paper 54 at 27-30 (Dec. 28, 2016) (finding claims not enabled because of the undue amount of experimentation required to practice the claimed range).

Furthermore, the materials incorporated by reference in the disclosure of the '470 application do not cure this deficiency. None of those materials provide any explanation of a network with a plurality of single-stage subnetworks. (Ex. 1002, ¶209.) Plus, the '470 application would not have provided any direction or guidance to a POSITA regarding the relevance of the incorporated material in relation to how to make and/or use the claimed invention. (*Id.*; *supra* Section VIII.B.)

The related prior art also would not have guided a POSITA to make and/or use the claimed invention without undue experimentation. (Ex. 1002, ¶210.) Just like the '553 patent, the prior art disclosed multi-stage networks for implementing FPGAs and did not include any guidance or examples for implementing single-

stage subnetworks, as claimed. (*Id.*, ¶¶210-215 (citing Exs. 1008-1010).) Accordingly, the state of the prior art at the time of the alleged invention would not have minimized the undue experimentation required to implement the claimed invention with single-stage subnetworks.

In view of the foregoing, independent claims 1 and 11 and dependent claims 2-10 and 12-20 are unpatentable because the disclosure of the '470 application does not enable a POSITA to make and/or use a network with a plurality of single-stage subnetworks, as covered by claims 1-20.

XIII. CONCLUSION

For the reasons given above, Petitioner requests institution of PGR for claims 1-20 of the '553 patent, and a finding that the claims are unpatentable based on the above grounds.

Respectfully submitted,

Dated: March 18, 2019

By:/Naveen Modi/
Naveen Modi (Reg. No. 46,224)
Counsel for Petitioner

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,003,553 contains, as measured by the word processing system used to prepare this paper, 18,545 words. This word count does not include the items excluded by 37 C.F.R. § 42.24 as not counting towards the word limit.

Respectfully submitted,

Dated: March 18, 2019

By:/Naveen Modi/
Naveen Modi (Reg. No. 46,224)
Counsel for Petitioner

CERTIFICATE OF SERVICE

I hereby certify that on March 18, 2019, I caused a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,003,553 and supporting exhibits to be served via express mail on the Patent Owner at the following correspondence address of record as listed on PAIR:

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