

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ADVANCED MICRO DEVICES, INC. AND PENSANDO SYSTEMS, INC.,

Petitioners,

v.

CONCURRENT VENTURES, LLC AND XTREAMEDGE, INC.,

Patent Owners.

Case No. IPR2025-00223
U.S. Patent No. 10,985,943

**PATENT OWNERS' PRELIMINARY RESPONSE
TO PETITION FOR *INTER PARTES* REVIEW**

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Concurrent Ventures, LLC (“CV”) and XstreamEdge, Inc. (“XE”) (collectively “CV/XE” or “Patent Owners”) respectfully submit this Preliminary Response¹ to the petition of Advanced Micro Devices, Inc. (“AMD”) and Pensando Systems, Inc. (“Pensando”) (collectively “AMD/Pensando” or “Petitioners”) seeking *inter partes* review (“IPR”) of U.S. Patent No. 10,985,943 (“the ’943 patent”).

I. INTRODUCTION

The Board should deny AMD/Pensando’s petition against CV/XE’s ’943 patent. None of the petition’s seven obviousness grounds establishes a reasonable likelihood of prevailing against any challenged claim, for multiple reasons.

First, all grounds fail because Petitioners impermissibly mix and match disparate features of the prior art in a manner inconsistent with the claim language of independent Claims 1 and 10. In particular, all challenged claims expressly require (1) a hardware-based or firmware-based router, (2) that the router includes a “port,” with the port in turn comprising a “bridge,” and (3) that the bridge is both “lockable to prevent user access” and “unlockable to enable user access” to

¹ This Preliminary Response addresses only the merits of the petition in accordance with the “Interim Processes for PTAB Workload Management” Memo (<https://www.uspto.gov/sites/default/files/documents/InterimProcesses-PTABWorkloadMgmt-20250326.pdf>) dated March 26, 2025 issued by Acting Under Secretary of Commerce for Intellectual Property and Acting Director for the USPTO, Coke Morgan Stewart. A separate Brief in Support of Patent Owners’ Request for Discretionary Denial of Institution of IPR was submitted in this IPR.

particular “sandboxes” and component circuits. In other words, a *prima facie* showing of unpatentability necessitates not just a showing that the prior art discloses a router, port, and bridge, but a showing that the prior art discloses the specifically claimed “hardware-based or firmware-based” router that includes a port that itself includes a bridge, which is lockable and unlockable. Petitioners’ grounds fall far short of any such showing.

Instead, for Grounds 1 and 2 based on Seshadri, Petitioners rely on Seshadri’s “mailbox” to supply the claimed “bridge.” In attempting to satisfy the lockable/unlockable requirements, however, Petitioners pivot to *other* aspects of the of the reference—wholly unrelated to the mailbox—even the though the claims expressly require that it is the bridge that must be lockable and unlockable. Similarly, for Grounds 3 and 4, Petitioners point to Atsatt-113’s “global resources” as the claimed “router,” and “interconnection resources” as the claimed “port.” Yet Atsatt-113 teaches that these two “resources” are two distinct features—not that the “interconnection resources” are “with” or a part of the “global resources” as would be necessary for the art to read on the claimed “router with a port.” Consequently, because Petitioners have improperly cherry-picked disparate prior art features, no Ground renders obvious the claimed invention.

Second, all grounds fail because, although the petition exclusively pursues a theory that the prior art discloses “hardware-based” routers, no evidence it cites

indicates that the disclosures relied upon are hardware-based. For example, Petitioners identify the shell logic functionality in Seshadri and global resources in Atsatt-113 as the claimed routers, without pointing to any evidence that they are “hardware-based.” Petitioners’ failure to point to any disclosure actually demonstrating a hardware implementation—despite relying on a hardware-based theory—is fatal to the petition.

Taken together, these deficiencies leave Petitioners unable to establish a reasonable likelihood of prevailing on any challenged claim. Accordingly, institution should be denied.

II. BACKGROUND

A. Overview of the ’943 Patent

The inventors of the ’943 patent developed various breakthroughs in dedicated hardware technology that enable faster data processing than software, but also allow the flexibility required to accommodate for rapidly changing data formatting requirements or new data processing applications. EX1001 (’943 Patent) at 1:8-21. For example, video processing is one such data processing application, in which many new different standards are constantly and rapidly introduced, resulting in the need for flexible solutions for data processing. *Id.*

In response to these problems, the inventors of the ’943 patent innovated a novel programmable device for data flow processing in a user-configurable server.

Id. at Abstract. For instance, the programmable device includes a programmable logic device that has a first region and a second region, where the first region includes a router with a port enabling communication between the router and the second region and where the second region comprises one or more sandboxes with user-definable electronic circuits. *Id.* at 1:25-49; cl. 1. Moreover, the router includes a bridge that is lockable and unlockable to prevent and enable user access to each of the sandboxes and the user-definable programmable electronic circuits therein, respectively. In that regard, the user-definable electronic circuits in each of the sandboxes can be accessed and configured in different ways to accommodate differing data flow processing architectures, without compromising the overall security of the programmable device. *Id.*

For example, Figure 3 of the '943 patent (reproduced below) illustrates a programmable device for servers that is an FPGA (122) in a pod (104), *e.g.*, mounted to a printed circuit board that is one of one or more printed circuit boards in the pod (104). *Id.* at 4:39-47. The programmable device could also be in a card (106). *Id.* The programmable device has a Module Message Interface (MMI) router (124), a bridge (128),² and sandboxes (132) for configurable modules. The programmable device could be, for example, an FPGA (122) as depicted in Figure 3, a PLD or an

² The specification's reference to "Bridge **128**" refers to what is labelled "Bridge **122**" in the figures.

ASIC, or more than one of these, or some combination of these, or other programmable device that can configure electronic circuitry, in some versions including one or more processors or controllers. *Id.* at 4:27-38.

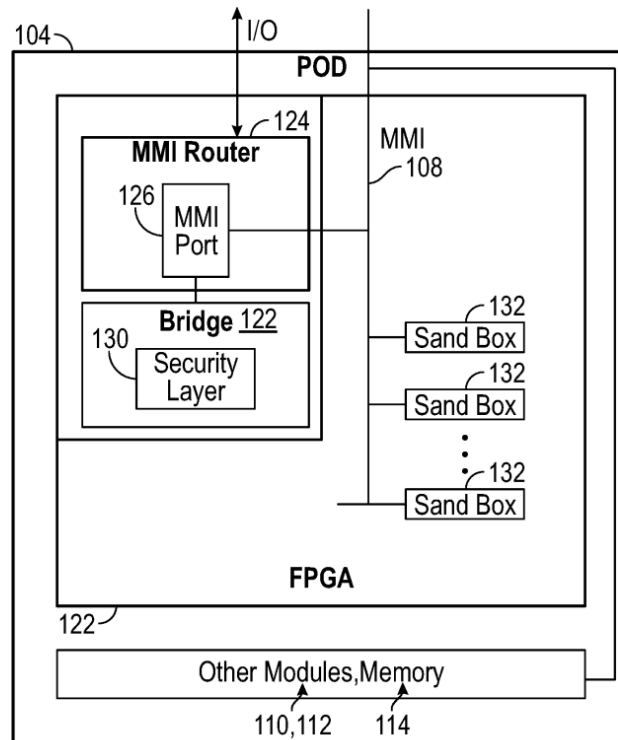


FIG. 3

The FPGA (122) of Figure 3 can have multiple sections, one of which can be a bridge (128) for external communication, *e.g.*, a serial connection to an external network or a parallel connection to an external bus and shown generally as Input/Output (I/O), and internal communication. *Id.* at 4:48-59. Thus, the bridge (128) may be considered a communication bridge between the outside of the server or system, and internal modules and/or memory, and has at least two ports, I/O for external communication and MMI for internal communication, and the bridge may

be a module that sits on a router port, for purposes of crossing the I/O type or protocol. *Id.*

As further shown in Figure 3, the bridge (128) may contain a security layer (130), and in some embodiments, a firewall for MMI message traffic based on static or dynamic policy or rules. *Id.* at 4:60-62. As such, the MMI network connection (108) connects to one or more sandboxes (132) in other sections of the FPGA (122), and can connect to other modules elsewhere in the pod (104). *Id.* at 4:62-65. One of the functions of the security layer (130) could be to protect the circuitry of the bridge, including the router (124) from being reprogrammed. *Id.* at 5:39-49. Another function of the security layer (130) may be authentication of a user or other verification of permission to reconfigure a sandbox (132). *Id.*

Each of the one or more sandboxes (132) is designated for programmable electronic circuits with the intent of providing user-programmable functionality for user customization of one or more pods (104) or cards (106). *Id.* at 5:19-25. For example, a user could define an analog, digital, mixed-signal hardware module (110), or a software module (112) (or more than one of these or some combination of these) in one or more sandboxes (132). *Id.* at 5:25-34. In some embodiments, the bridge (128) is locked to prevent user access in the FPGA (122) so that a user can configure or reconfigure one or more modules in one or more sandboxes (132) but cannot reconfigure the bridge (128). *Id.*

B. The Claims of the '943 Patent

Independent claim 1 of the '943 patent is shown below:

1. A programmable device for data flow processing in a user-configurable server with swappable pods or cards, comprising:

a programmable logic device (PLD) having a first region and a second region;

the first region comprising a hardware-based or firmware-based router with a port enabling communication between the router and the second region; and

the second region comprising one or more sandboxes with user-definable programmable electronic circuits of the PLD,

wherein the port comprises: a bridge being lockable to prevent user access, and unlockable to enable user access, to each of the sandboxes and the user-definable programmable electronic circuits therein.

Independent Claim 10 is also directed to a programmable device for data flow processing in a user-configurable server and recites features similar to the features of Independent Claim 1, with an additional limitation directed to an internal communication network.

The remaining challenged claims depend from one of Claims 1 or 10.

C. The Parallel Litigation

Patent Owners, CV/XE, are presently asserting the '943 patent in the following district court action: *Concurrent Ventures, LLC and XstreamEdge, Inc. v.*

Advanced Micro Devices, Inc. and Pensando Systems, Inc., No. 1-24-cv-00335
(W.D. Tex. 2024).

D. The IPR Petition

Petitioners request *inter partes* review on following seven grounds:

Grounds	Claims	Statutory Basis	Prior Art
1	1-5, 10-14	§103	Seshadri
2	1-5, 9-14, 18	§103	Seshadri and Biderman
3	1-5, 10-14	§103	Atsatt-113
4	1-5, 9-14, 18	§103	Atsatt-113 and Biderman
5	6, 15	§103	Grounds 1-4 and Tarafdar
6	7, 16	§103	Grounds 1-4 and Kulkarni
7	8, 17	§103	Grounds 1-4 and Atsatt-923

E. Related IPR Matters

Petitioners have also filed three other petitions for *inter partes* reviews on three other patents asserted in the district court action: IPR2025-00478, IPR2025-00479, and IPR2025-00486.

**III. PETITIONERS HAVE NOT SHOWN A REASONABLE
LIKELIHOOD OF PREVAILING ON ANY CHALLENGED CLAIMS**

**A. Ground 1: Seshadri Does Not Disclose or Render Obvious Any
Challenged Claim.**

Limitation [1b] of the '943 patent requires that “the first region compris[es] a hardware-based or firmware-based *router* with a *port* enabling communication

between the router and the second region.” Limitation [1d] then requires that “the *port comprises: a bridge being lockable ... , and unlockable ... , to each of the sandboxes and the user-definable programmable electronic circuits therein.*” Claim 10 similarly requires a router that includes a combined port and bridge, with the bridge being lockable and unlockable. Independent Claims 1 and 10 thus require (1) a router that is hardware-based or firmware-based and (2) that the router includes a port and bridge, with the bridge being lockable and unlockable. The petition does not demonstrate a reasonable likelihood of success of proving that either requirement is anticipated or rendered obvious. Not only does the petition fail to properly map these distinct claim elements to Seshadri, but even under Petitioners’ own mapping of the reference, Seshadri fails to disclose or suggest these limitations of Claims 1 and 10.

1. Even Under Petitioners’ Mapping, Seshadri Does Not Disclose or Render Obvious That The Alleged “Bridge” Is “Lockable” And “Unlockable.”

The petition fails to even identify an alleged “bridge” in Seshadri that it alleges is lockable and unlockable, as required by Claims 1 and 10. The *only* feature of Seshadri that Petitioners allege satisfies the “bridge” limitation is Seshadri’s “mailbox 588.” Pet., 25, 28, 31-32 (incorporating by reference the petition’s claim 1 argument for claim 10). Specifically, the petition alleges that “the shell logic’s

‘mailbox 588 may be used as a bridge[.]’” Pet., 28. The petition includes no other examples of the claimed “bridge.” *Id.*, 28-31.

Nor could it because Petitioners rely on “mailbox functionality” to supply the “port” limitation (Pet., 25) and claim 1 requires that the “port” comprises the claimed bridge. In other words, the plain language of claim 1 require that the “bridge” must be contained within, or at most coterminous with, the claimed “port.” ’943 patent cl. 1 (“the port **comprises**: a bridge being lockable . . . , and unlockable”).³ Thus, the “bridge” cannot be something outside of the “port”—the fact that the petition identifies the “port” to the “mailbox” is further evidence that the only “bridge” that the petition identifies is also the “mailbox.”

When it comes to the claim requirement that the “bridge” be lockable and unlockable, however, Petitioners abandon the mailbox functionality relied upon for the port and bridge and instead rely on wholly different features of Seshadri’s “static shell” relating to isolation of configuration access ports, as the relevant portions of the petition below illustrate:

The bridge is lockable/unlockable to prevent or enable user access to each sandbox. For example, the shell logic includes functionality to “isolate a

³ Although the language of claim 10 is slightly different in that it speaks of a router “having a bridge with a port,” the deficiency in Petitioners’ arguments remains because claim 10 still requires an integration between the bridge and port (i.e., that the “bridge” is “with a port”), and Petitioner points to the “mailbox” for both elements. Further, Petitioners have treated the corresponding limitations of claims 1 and 10 as having the same scope. *See* Pet., 31-32, 38.

configuration access port”; this functionality is locked/unlocked to disallow or allow configuration of client-configurable circuits. Ex-1004, 6:11-41, 12:10-31; Ex-1003, ¶88.

When configuration is requested by the user, the shell logic checks “customer account permissions” to reject or accept the request to unlock the reprogramming functionality. Ex-1004, 9:48-10:15 (“...Subsequently...the customer logic can be configured on the client configurable circuits and activated using the reconfigurable shell.”). Seshadri locks/unlocks the bridge to control user access to programming and “increase the security, performance, privacy, and/or availability of the computing resources” in the FPGA. Ex-1004, 3:41-64; Ex-1003, ¶89.

Pet., 29-30 (citations in original).

Never once do Petitioners attempt to link their allegations regarding isolation of configuration access ports to the mailbox—even though that is the only functionality that Petitioners identify as satisfying the “bridge.” Nor could Petitioners have done so, since nothing in Seshadri links isolation of configuration access ports by the shell logic to the mailbox. Nor does anything in Seshadri otherwise suggest that the mailboxes (474, 588) are lockable and unlockable. To the contrary, the mailboxes (474, 588) of Seshadri are used to *enable* communications between client virtual machines (420, 520) and management virtual machine (440, 530) (*see* EX1004 at 17:47-49), not to inhibit them. There is no reason (and certainly the petition points to none) why the mailbox would ever be locked. In other words, locking the mailboxes (which, as Figure 4 demonstrates, is the only communicative channel between the client and management virtual machines), would defeat the

overall goal of the management virtual machine providing effective services to the client virtual machine (*e.g.*, in the capacity as a management hypervisor). EX1004 at 9:19-22. Thus, it would be contrary to Seshadri's teachings to lock and unlock the mailboxes (474, 588), as Seshadri emphasizes the importance of facilitating communication between the management and client virtual machines in cloud computing environments.

In sum, Ground 1 fails on its own terms because Petitioners never argue that the mailbox feature the ground relies on for the "bridge" limitation is lockable and unlockable as the claims require, instead relying on a different functionality that does not pertain to the mailbox. And even if Petitioners had attempted such an argument, it would be unavailing since nothing in Seshadri discloses or suggests that the mailbox is lockable/unlockable as claimed. The petition has thus not demonstrated a reasonable likelihood of success on Ground 1.

2. Seshadri Does Not Disclose or Render Obvious That The Alleged "Router" Is "Hardware-Based."

Ground 1 also fails because Petitioners rely on a theory that the prior art discloses a "hardware-based" router, but fails to support—and indeed directly contradicts—that theory with its citations to the prior art.

Claims 1 and 10 both require “a *hardware-based or firmware-based router*.”⁴ ’943 patent, cls. 1, 10. Petitioners identify specific “functionality” within the “shell logic” as the claimed “router”: “Regarding the router, the shell logic includes *functionality* that ‘perform[s] bridging functions between the local interconnect (e.g., the PCIe interconnect) and the client configurable logic.’ This *functionality* (including but not limited to management functions and the data-path) routes communication between the shell logic and the client-configurable circuit in order to convey messages to/from the host device.” Pet., 24 (internal citations omitted). As relevant here, Petitioners argue that this “router” (functionality in the shell logic) is “hardware-based” and offers no argument that these limitations are met under a firmware-based theory. Pet., 27 (“The router in the shell logic is hardware-based because it is implemented in the hardware programmable fabric of the FPGA.”); Pet. 31-32 (relying on corresponding claim 1 contentions for claim 10). Thus, the petition must show that the alleged “router” is hardware-based.⁵

⁴ All emphasis supplied unless otherwise noted.

⁵ Petitioners cannot later allege that their identified router meets teaches this claim element because it is “firmware-based” because the petition never mentions a firmware-based router, much less advances a theory that Seshadri discloses a firmware-based router. It is well-settled that Petitioners are limited to the unpatentability theories set forth in the petition. *See SK Hynix Inc. v. Netlist, Inc.*, IPR2017-00649, Paper 9 at 7 (PTAB Dec. 4, 2017) (holding that Petitioner was limited to the arguments it made in its petition); *see also Samsung Elecs. Co., Ltd. v. Netlist, Inc.*, IPR2023-00847, Paper 13 at 13 (PTAB Dec. 12, 2023) (Board was

Despite exclusively relying on a hardware-based theory, however, Petitioners never actually show that Seshadri discloses a hardware-based router. The petition’s *only* argument that the alleged “router” in Seshadri is hardware-based is that “it is implemented in the hardware programmable fabric of the FPGA.” Pet., 27. But the mere fact that something is “implemented” in hardware does not make it “hardware-based.” Indeed, everything is “implemented” in hardware at some level—Petitioners’ assertion does not show that the claim requirement is met.

Petitioners’ argument is further undermined by the claim language, which specifies that the router can be “hardware-“ or “firmware-based.” Firmware is always “implemented” on hardware at some level. Under Petitioners’ argument anything that is “firmware-based” would also by definition be “hardware-based” because even a firmware-based router necessarily is “implemented” in some type of hardware (e.g., a chip, circuit board, or other hardware). Therefore, Petitioners’ argument that something being “implemented” in hardware is sufficient for it to be “hardware-based” effectively eliminates the distinction between hardware and firmware-based routers—improperly rendering the “firmware-based” claim language superfluous. *See Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364,

limited to the arguments presented in petition citing and quoting *Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018) (“It would ... not be proper for the Board to deviate from the grounds in the petition....”).

1372 (Fed. Cir. 2005) (“A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so.”); *Power Mosfet Techs., L.L.C. v. Siemens AG*, 378 F.3d 1396, 1410 (Fed. Cir. 2004) (“[I]nterpretations that render some portion of the claim language superfluous are disfavored.”).

At base, the flaw in the petition is that it points to router **functionality**, but does not identify any structure (*i.e.*, the claimed “hardware-based” “router”) that performs that functionality. Pet at 24 (“Regarding the router, the shell logic includes **functionality** that ‘perform[s] bridging **functions** between the local interconnect (e.g., the PCIe interconnect) and the client configurable logic.’ Ex-1004 at 6:11-41. This **functionality** (including but not limited to management **functions** and the data-path) routes communication between the shell logic and the client-configurable circuit in order to convey messages to/from the host device. Ex-1004 at 8:37-61.”), *id.* at 24-25 (“Inbound communication from the host device [of Seshadri] is received over the peripheral interface, and **functionality** in the shell logic ‘route[s] commands to functional modules or blocks of peripheral device 210 based on an address.’ Ex-1004 at 7:56-8:8, 14:37-53, Fig. 4.”). Petitioners even summarize their “router” and “port” contentions by again expressly relying on functionality, not hardware-based structure:

In summary, Seshadri teaches a port that comprises the **functionality** in the shell logic for enabling communication with client configurable circuits. The port also comprises a bridge, explained for [1d]. Seshadri teaches a router that

comprises the shell logic port and *other functionality* in the shell logic for bridging and routing communications. Ex-1003, ¶77.

Pet., 26.

But fatally, the petition does not show what specific shell logic component is responsible for the identified “functionality,” and never ties any of the functionalities discussed to any particular piece of hardware. Petitioners’ failure to identify any hardware that performs the identified “functionality” demonstrates that Seshadri at most discloses router functionality, but does not disclose a hardware-based router, as required by the claims.

Nor does Petitioners’ cited support show that its claimed “router” is “hardware-based.” Petitioners first cite to two portions of the specification, which show that the “shell logic” is “programmed” on a “client configurable circuit.”⁶ Pet., 24 (citing Ex-1004, 2:2-5, 3:24-27). If anything, this evidence undermines Petitioners’ argument—the shell logic functionality is simply “programmed” on the hardware, which does not necessarily show that it is hardware-based. As discussed above, firmware is also “programmed” on hardware.

Finally, Petitioners cite a single paragraph from their expert, Dr. Alpert, but that again does nothing to show the shell logic “functionality” is hardware-based. *Id.*

⁶ Petitioners assert that the “‘client configurable circuit’ refers to the programmable fabric of an FPGA.” Pet., 24, n. 7. Patent Owners do not contest that factual assertion for the limited purposed of this Preliminary Response.

(citing Ex-1003, ¶78). In particular, the only non-repeated statement in the cited portion of Dr. Alpert's report is that "[b]ecause the shell logic is implemented using electronic circuits configured in the hardware of an IC, it is hardware-based." Ex-1003, ¶78. But, to the extent Dr. Alpert's statement provides anything beyond Petitioners' contention, it is conclusory. If Dr. Alpert simply means that the shell logic is implemented in hardware (that it is ultimately "implemented" in "electronic circuits"), that does not show that it is "hardware-based," as discussed above. And if Dr. Alpert intends to make some additional argument as to why the shell logic is hardware-based, his contention is unsupported and conclusory. Dr. Alpert does not cite *any support* for his statement—and the only evidence he cites in the entire paragraph is to the same two portions of the specification the petition cites. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15-17 (PTAB Aug. 24, 2022) (designated precedential) (according "little weight" to declaration testimony that contains a verbatim restatement of a petition's conclusory assertions without additional supporting evidence or reasoning). As explained above, those do not show the shell logic functionality is "hardware-based." In sum, the petition at most points to evidence that the identified "router" (the shell logic functionality) is implemented in hardware—not that it is hardware-based.

In sum, Ground 1 fails because Petitioners never identify a “hardware-based” “router.” The petition has thus not demonstrated a reasonable likelihood of success on Ground 1.

* * *

For at least the foregoing reasons, Seshadri fails to disclose or suggest, *inter alia*, “the first region comprising *a hardware-based* or firmware-based *router*” and “*a bridge* being *lockable* ..., and *unlockable* ..., to each of the sandboxes and the user-definable programmable electronic circuits therein,” as recited in independent claim 1, or the similar limitations in claim 10. Ground 1 thus fails to establish a reasonable a reasonable likelihood of prevailing against Claims 1 and 10.

Claims 2-5 depend directly from Claim 1 and claims 11-14 depend directly from Claim 10. Because AMD/Pensando failed to establish a reasonable likelihood of prevailing against Independent Claims 1 and 10, they also failed to establish a reasonable likelihood against each of the dependent claims. *In re Fine*, 837. F.2d 1071, 1076 (Fed. Cir. 1988).

B. Ground 2: The Combination of Seshadri and Biederman Does Not Disclose or Render Obvious Any Challenged Claim.

Biederman does not fix—or even address—the flaws in Ground 1. Petitioners cite Biederman to address the “second region comprising a plurality of sandboxes...” limitation of Claim 10. Pet., 32-35. But Petitioners do not point to the disclosures or

teachings of Biderman⁷, alone or together with Seshadri, as overcoming the deficiencies of Seshadri, as described above in **Sections III.A**, with respect to Claims 1 and 10. Accordingly, Ground 2 fails to establish a reasonable likelihood of prevailing against Claims 1 and 10.

Claims 2-5 and 9 depend directly from Claim 1. Claims 11-14 and 18 depend directly from Claim 10. Because Petitioners failed to establish a reasonable likelihood of prevailing against Independent Claims 1 and 10, they also failed to establish a reasonable likelihood against each of the dependent claims. *In re Fine*, 837. F.2d at 1076.

C. Grounds 3: Atsatt-113 Does Not Disclose or Render Obvious Any Challenged Claim.

As set forth above in **Section III.A**, independent claims 1 and 10 require (1) a router that is hardware-based or firmware-based and (2) that the router includes a port and a bridge. The Petition does not demonstrate a reasonable likelihood of success of proving that either requirement is anticipated or rendered obvious. Indeed, not only does the petition fail to properly map these distinct claim elements to Atsatt-

⁷ Patent Owners do not agree that a POSITA would not have been motivated to combine Seshadri with Biederman, but do not address that issue in this Preliminary Response.

113, but even under Petitioners' own mapping of the reference, Atsatt-113 fails to disclose or suggest at least these limitations of Claims 1 and 10.⁸

1. Even Under Petitioners' Mapping, Atsatt-113 Does Not Disclose or Render Obvious That The Alleged "Router" Is "With A Port" "Wherein The Port Comprises: A Bridge."

As is the case with Ground 1, Ground 3 fails because of Petitioners' internally inconsistent mapping of the prior art. Specifically, Petitioners identify only Atsatt-113's "global resources" as allegedly supplying the claimed router. Pet., 58-61, 67 (incorporating by reference the petition's claim 1 argument for claim 10).⁹ When it comes to the claimed "port," however, Petitioners shift to Atsatt-113's "interconnection resources." Atsatt-113, however, neither teaches nor suggests that the "interconnection resources" are within the "global resources"—as they must be in order for Petitioners' claim mapping to be coherent. Instead, Atsatt-113 describes the "interconnection resources" separately from the global resources and then states "[t]he programmable fabric 100 *also includes* global resources 112, 114, 116, and

⁸ Claim 1 recites features similar to the features of Claim 10, and thus, the remarks and arguments set forth with respect to Claim 1 also apply to Claim 10.

⁹ While the petition uses "e.g." when identifying the "global resources" as a "router," it does not identify any other examples. Pet., 58-62. And elsewhere, the petition is clear the "global resources" is the only identified "router." Similarly, while the petition states that the "interconnection resources" is an "example" of a bridge, it does not provide any other examples. *Id.*, 58-62, 64-67. And the petition also identifies the "interconnection resources" as the only example of the claimed "port." *Id.*, 61. Since the port "comprises" the "bridge (*i.e.*, the bridge is within the port), the "bridge" cannot be something other than the "interconnection resources."

118.” Ex-1006, ¶¶39. Thus, although Petitioners assert in conclusory fashion that “global resources...includes interconnection resources” (Pet., 59), the petition includes no evidence stating or suggesting that this is true.

2. Atsatt-113 Does Not Disclose or Render Obvious That The Alleged “Router” Is “Hardware-Based.”

Ground 3, like Ground 1, suffers from a similar failure of proof regarding the “hardware-based” limitation. Just as was the case in Ground 1, Petitioners’ Ground 3 contentions focus on abstract functionality and identify no actual hardware or structure. For example, Petitioners allege: “Atsatt-113 teaches the first region (e.g., control area) comprising a router with a port. For example, the control area comprises (e.g., in global resources, including interconnection resources and the device controller) to “route” data signals through the FPGA using interconnection resources (Ex-1006, ¶30), where the ‘signals may be transmitted as communication packets.’” Pet., 58. Petitioners further assert that the “global resources” of Atsatt-113 includes the “interconnection resources” and that the global resources also include device controller 60 that routes communications from outside the FPGA to the destination sector, for example, external communication to and from the HSSI interface are routed over pathways provided by the interconnection resources. *See* Pet., 59. Petitioners conclude by alleging: “[t]herefore, Atsatt-113 includes router *functionality* in the global sources to route communications to the second region,

which further includes port functionality to enable communication between the global resources and the second region.” Pet., 61. Despite this focus on functionality, however, as with Ground 1 Petitioners exclusively rely on a theory that Atsatt-113’s alleged “router functionality is *hardware-based*.” Pet at 62.

Yet nothing in Petitioners’ arguments above suggests, much less establishes, that the functionality of the global resources or the interconnection resources is hardware-based. Indeed, Petitioners never even describe what, for example, the “global” or “interconnection resources” are or what they comprise, much less any hardware on which they are implemented. The signals of Atsatt-113—of course—can be transmitted as packets, but the petition is completely silent on *what structure* performs the routing functionality or *how* it is implemented. Petitioners have thus failed to make even a threshold showing that the functionality relied upon is hardware-based.

Similar to Ground 1, Petitioners’ only argument that Atsatt-113’s alleged router is in fact hardware-based is that “the above-described teachings [pertaining to Atsatt-113’s “global resources”] are implemented on the hardware-programmable fabric of the FPGA.” Pet., 62; *see also* Ex. 1003 ¶ 186 (Dr. Alpert parroting petition almost verbatim). As discussed above with reference to Ground 1, however, this argument is unavailing because even a firmware-based router still necessarily is implemented on some type of hardware. Petitioners’ interpretation of “hardware-

based” thus improperly obliterates the distinction between hardware-based and firmware-based routers by effectively making all routers hardware-based.

For at least the foregoing reasons, Ground 3 fails to establish a reasonable a reasonable likelihood of prevailing against Claims 1 and 10. Claims 2-5 depend directly from Claim 1 and claims 11-14 depend directly from Claim 10. Because Petitioners failed to establish a reasonable likelihood of prevailing against Independent Claims 1 and 10, they also failed to establish a reasonable likelihood against each of the dependent claims. *In re Fine*, 837. F.2d 1071, 1076 (Fed. Cir. 1988).

D. Ground 4: The Combination of Atsatt-113 and Biederman Does Not Disclose or Render Obvious Any Challenged Claim.

Biederman does not fix—or even address—the flaws in Ground 3. Petitioners cite Biderman to address the “second region comprising a plurality of sandboxes...” and “an internal communication network, coupling the port of the bridge of the router and the one or more sandboxes for the data flow processing” limitations of Claim 10. Pet., 67-72. But Petitioners do not point to the disclosures or teachings of Biderman¹⁰, alone or together with Atsatt-113, as overcoming the deficiencies of

¹⁰ A POSITA would not have been motivated to combine Atsatt-113 with Biederman, as Biderman is directed to partitioning an FPGA for increasing throughput, not sandboxing the partitions for security purposes.

Atsatt-113, as described above in **Sections III.C**, with respect to Claims 1 and 10. Accordingly, Ground 4 fails to establish a reasonable likelihood of prevailing against Claims 1 and 10.

Claims 2-5 and 9 depend directly from Claim 1. Claims 11-14 and 18 depend directly from Claim 10. Because AMD/Pensando failed to establish a reasonable likelihood of prevailing against Independent Claims 1 and 10, they also failed to establish a reasonable likelihood against each of the dependent claims. *In re Fine*, 837. F.2d at 1076.

E. Ground 5: Tarafdar Is Not Even Addressed To Claims 1 Or 10 and Thus Does Not Overcome the Deficiencies in Grounds 1 to 4.

Ground 5 relies on Tarafdar to address Claims 6 and 15, and does not address independent claims 1 and 10 at all. Because AMD/Pensando have failed to establish a reasonable likelihood of prevailing on any of the Grounds 1 to 4 for independent claims 1 and 10, they also failed to establish a reasonable likelihood of prevailing on Ground 5.¹¹

¹¹ Given the lack of particularity with respect to Ground 5 (which is described in detail in Patent Owners' Brief In Support of Patent Owners' Request for Discretionary Denial of Institution of IPR Review (Paper 6)), it is impossible to decipher what combination Petitioners are actually relying on for Ground 5. Regardless, since none of Grounds 1-4 anticipate any Challenged Claim, there is no likelihood of success on Ground 5.

For at least the foregoing reasons, Petitioners cannot establish a reasonable likelihood of succeeding on Ground 5.

F. Ground 6: Kulkarni Does Not Overcome the Deficiencies of Grounds 1 to 4.

Ground 6 relies on Kulkarni to address Claims 7 and 16, and does not address independent claims 1 and 10 at all. Because AMD/Pensando have failed to establish a reasonable likelihood of prevailing on any of the Grounds 1 to 4 for independent claims 1 and 10, they also failed to establish a reasonable likelihood of prevailing on Ground 6.¹²

For at least the foregoing reasons, Petitioners cannot establish a reasonable likelihood of succeeding on Ground 6.

G. Ground 7: Atsatt-923 Does Not Overcome the Deficiencies of Grounds 1 to 4.

Ground 5 relies on Atsatt-923 to address Claims 8 and 17, and does not address independent claims 1 and 10 at all. Because AMD/Pensando have failed to establish a reasonable likelihood of prevailing on any of the Grounds 1 to 4 for

¹² Given the lack of particularity with respect to Ground 6 (which is described in detail in Patent Owners' Brief In Support of Patent Owners' Request for Discretionary Denial of Institution of IPR Review (Paper 6)), it is impossible to decipher what combination Petitioners are actually relying on for Ground 6. Regardless, since none of Grounds 1-4 anticipate any Challenged Claim, there is no likelihood of success on Ground 6.

independent claims 1 and 10, they also failed to establish a reasonable likelihood of prevailing on Ground 7.¹³

For at least the foregoing reasons, Petitioners cannot establish a reasonable likelihood of succeeding on Ground 7.

* * *

IV. CONCLUSION

For each of the foregoing reasons, the Board should deny AMD/Pensando's petition against CV/XE's '943 patent. None of the petition's seven obviousness grounds establishes a reasonable likelihood of prevailing against any challenged claim.

Patent Owners have not included all of its arguments for patentability in this optional preliminary response. Patent Owners reserve the right to present additional patentability arguments, including claim construction arguments, should the Board institute trial.

¹³ Given the lack of particularity with respect to Ground 7 (which is described in detail in Patent Owners' Brief In Support of Patent Owners' Request for Discretionary Denial of Institution of IPR Review (Paper 6)), it is impossible to decipher what combination Petitioners are actually relying on for Ground 7. Regardless, since none of Grounds 1-4 anticipate any Challenged Claim, there is no likelihood of success on Ground 7.

Dated: April 15, 2025

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CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that Patent Owners' Preliminary Response (the "POPR") consists of 5,838 words, excluding the table of contents, table of authorities, certificate of service, and this certificate of compliance. The POPR complies with the type-volume limitation of 14,000 words as mandated in 37 C.F.R. § 42.24. In preparing this certificate, counsel has relied on the word count of the word processing system used to prepare this paper (Microsoft Word).

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that pursuant to 37 C.F.R. §42.6(e)(1), a copy of the foregoing **PATENT OWNERS' PRELIMINARY RESPONSE TO PETITION FOR *INTER PARTES* REVIEW** was served on April 15, 2025 by filing this document through the Patent Trial and Appeal Board's P-TACTS System as well as delivering a copy via electronic mail upon the following attorneys of record for the AMD/Pensando:

Dated: April 15, 2025

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