

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MARVELL SEMICONDUCTOR, INC.,
Petitioner,

v.

CREDO TECHNOLOGY GROUP LTD.,
Patent Owner.

Case IPR2025-01218
U.S. Patent No. 10,877,233

**PATENT OWNER'S SUR-REPLY
IN SUPPORT OF ITS PATENT OWNER RESPONSE**

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Patent Trial and Appeal Board
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I. INTRODUCTION

Marvell's Reply does not—and cannot—cure the fundamental deficiencies in its Petition. Instead, Marvell doubles down on generic boilerplate disclosures, presents internally inconsistent theories of the prior art, overstates the applicability of references directed to different technologies, and improperly raises new arguments for the first time. Numerous problems persist in the arguments Marvell presented in its Reply.

First, Marvell continues to rely on Lugthart's generic boilerplate about storing “program code” in nonvolatile memory, without ever explaining how this generic disclosure teaches storing FIR filter *coefficient values*—the specific claimed limitation—in nonvolatile memory. Program code and coefficient values are fundamentally different, and Marvell's Reply ignores this critical distinction.

Second, Marvell's Reply asserts without any support that adaptive initialization necessarily requires pre-storage of coefficients in nonvolatile memory. Marvell ignores the various other ways coefficients can be initialized for adaptive equalization, and Lugthart is silent on how any initial coefficient values would be determined, much less where they would be stored.

Third, Marvell vastly overstates the applicability of Gorecki's “backplane” teachings to active cables. Gorecki describes every embodiment in the context of a backplane, and every claim recites a backplane. Ignoring all of this, Marvell cites a

single instance of the word “cable” in Gorecki’s broad statement of the field-of-invention. Marvell’s reliance on this one word is misplaced, as the Federal Circuit has rejected reading so much into a simple statement of the field of the invention in the absence of more fulsome teachings elsewhere in a prior art patent.

Fourth, Marvell still fails to support its half-hearted challenges to the dependent claims. In some cases, the Petition failed to address dependent claims at all, and Marvell’s Reply cannot cure that deficiency.

Finally, Marvell’s attempt to dismiss Credo’s secondary considerations evidence—including six license agreements with major cable manufacturers and extensive industry recognition—lacks merit. For all of these reasons, the Board should confirm the patentability of all twenty claims of U.S. Patent No. 10,877,233.

II. ARGUMENT

A. Marvell’s Reliance on Boilerplate Nonvolatile Memory Disclosures Remains Insufficient

Marvell’s Reply (Paper 29, “Reply”) continues to rely on the same generic boilerplate language in Lugthart about storing “program code” including “instructions” and “data structures” in nonvolatile memory such as EEPROM. *See* Reply at 4-5; Ex-1004, 56:62 – 57:67. Credo’s Patent Owner Response (Paper 13, “POR”) already explained why the passage is insufficient to teach the claimed limitation. *See* POR at 15-17. Marvell’s Reply offers nothing new.

As the POR detailed, there is a critical distinction between *program code* that implements an FIR filter algorithm and the *coefficient values* that the FIR filter uses during operation. See POR at 15-17; Ex-2020, ¶ 63. Program code is static software—the instructions that define *how* a filter operates. Coefficient values, by contrast, are operational parameters that determine *what* the filter does to a signal, determined based on channel conditions. See Ex-2020, ¶ 63. The claims require storing the latter—transmit filter coefficient *values*—in nonvolatile memory. Lugthart’s boilerplate about where program code “may” reside says nothing about where coefficient values are stored.

Marvell’s Reply does not address this distinction. Instead, Marvell dismisses the POR’s arguments as “hand-waving” (see Reply at 5) and asserts that Credo’s expert “admitted” nonvolatile memory was commonly used. Ex-1051, 26:3 – 28:14. But the issue is not whether nonvolatile memory existed as a technology. The issue is whether Lugthart teaches storing FIR filter *coefficients*—not program instructions—in nonvolatile memory. It does not. Marvell points to no passage in Lugthart that discloses, teaches, or suggests storing transmit filter coefficient values in nonvolatile memory. Generic disclosure of where *software* “may” reside cannot supply a specific, claimed limitation about storing particular *data values* in a particular type of memory.

Moreover, the very fact that Lugthart uses permissive “may” language (Ex-1004, 56:62 – 57:67) when describing where program code could reside only underscores that the passage is descriptive background, not a specific teaching of any claim limitation. If the storage location of program code (as opposed to the claimed filter coefficients) is itself optional background, it cannot bear the weight Marvell places on it as the sole basis for the nonvolatile memory limitation in Ground 1.

Nowhere in Lugthart’s detailed descriptions of FIR filter operation, DSP processing, channel negotiation, transceiver architecture, or equalizer configuration does the patent describe retrieving FIR coefficients from nonvolatile memory. *See* POR at 18. Marvell’s Reply identifies no such passage because none exists. Instead, Marvell asks the Board to infer from a generic computer-readable-media disclosure that a POSITA would have understood Lugthart to teach storing specific coefficient values in nonvolatile memory. That inferential leap is precisely the kind of hindsight reconstruction that *KSR* cautions against. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.”).

B. Credo Explained Why the Prior Art Cannot Be Combined as Petitioner Proposes

Marvell's false assertion that Credo relies on an unclaimed feature conflates two distinct concepts. Credo has not added adaptive equalization as an extra claim limitation or required the prior art to satisfy an unclaimed feature. Rather, Credo explained why Marvell's proposed combinations fail on their own terms. Lugthart teaches adaptive equalization, which is incompatible with Marvell's other references, such as Gorecki. The deficiency in the Petition is a typical failure to show motivation-to-combine, and Credo has not injected some hypothetical unclaimed limitation.

Marvell's reliance on *Smith & Nephew, Inc. v. Rea*, 721 F.3d 1371, 1381 (Fed. Cir. 2013), and *Senju Pharm. Co. v. Lupin Ltd.*, 780 F.3d 1337, 1347 (Fed. Cir. 2015), is inapposite. Those cases address situations in which a patent owner argued that a claim was nonobvious because the prior art failed to teach an unclaimed feature. Credo makes no such argument: Credo does not contend that the claims require adaptive equalization. Credo has demonstrated that Lugthart's actual disclosure—which centers on adaptive equalization—does not lend itself to the combinations that Marvell now presents. Credo's discussion of adaptive equalization also explained why Lugthart does not teach or suggest storing the claimed coefficient values in nonvolatile memory. There is a fundamental difference

between injecting a new limitation into the claims and analyzing what the prior art actually teaches and why a person of ordinary skill in the art (“POSITA”) would not have combined those teachings with other references.

C. Marvell’s Argument About Pre-Stored Initialization Values Misses the Point

Marvell’s assertion that Lugthart “adjusts” parameters—implying they must pre-exist—conflates the concepts of *adaptive initialization* and *pre-storage in nonvolatile memory*. See Reply at 10. An adaptive process necessarily begins from some initial state, but that fact alone does not establish that the initial state was stored in nonvolatile memory. This is Marvell’s burden to prove, and it has failed. Adaptive systems may initialize from default values of various sorts, including values set at power-on and loaded into volatile registers, or values determined during an initial handshake with a network host. See Ex-2020, ¶¶ 67-68 (explaining that volatile memory would be the natural choice for adaptively determined coefficients because it is faster and more efficient for frequently changing values). Petitioner points to nothing in Lugthart to suggest that its adaptive equalization begins with values stored in non-volatile memory. Dr. Chen’s declaration, which presents a false dichotomy of only two options, ignores the possibility that Lugthart’s values simply do not exist before initialization. See POR at 19-20; Ex-2020, ¶¶ 75-76. Lugthart does not specify otherwise, and that is the problem with Marvell’s argument.

Marvell takes Dr. Williams' statements out of context, but even these statements identify only possibilities, not specific teachings in Lugthart. Ex-1051, 43:2-10 (initial starting values "can be" loaded from a register when a cable is plugged in, and coefficients "can be" adjusted during the adaptive process). Dr. Williams' statements of mere possibilities cannot carry Marvell's burden—"can be" does not establish that a POSITA would have understood Lugthart to specifically teach storing initial values in *nonvolatile* memory. A mere possibility cannot satisfy Petitioner's burden to establish that the combination would have been obvious.

Finally, Marvell's waiver argument (Reply at 9)—that the POR did not address the "initial values" point—is misplaced and should be rejected. The POR addressed Lugthart's adaptive system comprehensively (*see* POR at 17-21), including Dr. Chen's false dichotomy of manual re-entry versus nonvolatile storage (Ex-2020, ¶¶ 75-76). The POR's argument that Lugthart teaches a *third option*—adaptive determination of coefficients *at runtime*—necessarily encompasses and refutes the initial values argument. The only specific option Lugthart described for selecting initial coefficients is to compute them during channel negotiation and load them directly into processing elements; there is no teaching of a separate storage step in nonvolatile memory. Moreover, storing Lugthart's adaptive equalization values, which are constantly changing, in nonvolatile memory would be inefficient and

impractical—volatile memory is faster and better suited for frequently updated values. Ex-2020, ¶¶ 67-68.

D. Marvell Vastly Overstates Gorecki’s Applicability to Active Cables

Marvell’s Reply (at 12-16) relies on a single instance of the word “cable” in Gorecki’s broad statement of the field-of-invention (Ex-1005, 1:11-17) to argue that Gorecki’s teachings apply to active cables. This one word cannot bear the weight Marvell places upon it.

Gorecki’s single mention of “cable” appears only once in the background section, with no teaching as to how a POSITA would actually implement such a cable:

This invention relates to a system and method for providing high-speed digital communications through a communications channel, and more particularly to an equalizer for communications systems implemented in wired type environments, for example microstrip, stripline, printed circuit board (e.g., a backplane) and cable.

Ex-1005, 1:11-17.

Outside of this background statement, Gorecki focuses solely on backplanes. *Every* independent claim in Gorecki recites “a communications channel, wherein the communications channel includes a backplane.” Ex-1005, Claims 1, 11, 22. *Every* embodiment in Gorecki is described in the context of a backplane, not a cable. The single mention of “cable” in the field-of-invention paragraph is a generic,

introductory characterization of the general field, not a specific technical teaching that Gorecki's pre-stored coefficient approach is applicable to active cables.

The Federal Circuit has recognized that broad field-of-invention characterizations are insufficient to extend a reference's specific teachings to different technological contexts. *See Securus Techs., Inc. v. Glob. Tel*Link Corp.*, 701 F. App'x 971, 977 (Fed. Cir. 2017); *Markforged Inc. v. Continuous Composites, Inc.*, No. IPR2022-00679, 2023 WL 6534357, at *10 (P.T.A.B. Sept. 26, 2023); *c.f. D Three Enters., LLC v. SunModo Corp.*, 890 F.3d 1042, 1051 (Fed. Cir. 2018) (finding "boilerplate language [in the] specification is not sufficient to show adequate disclosure" in context of a written description analysis); *Knowles Elecs. LLC v. Cirrus Logic, Inc.*, 883 F.3d 1358, 1367-68 (Fed. Cir. 2018) (finding lack of adequate written description where only general soldering was disclosed in a specification, but claims disclosed a specific means of soldering). That Gorecki generically references "cable" in describing the field of high-speed digital communications does not establish that its specific pre-stored coefficient approach was intended for, or would function in, the active cable context.

As the POR explained, backplanes and cables present *fundamentally different* engineering challenges. *See* POR at 22-25. Backplanes are fixed, semi-permanent installations with known, consistent channel characteristics that remain substantially constant over the equipment's life. Ex-2020, ¶¶ 80-83. Active cables, by contrast,

are pluggable, portable devices designed to be repeatedly connected to and disconnected from different host devices—each presenting different signal characteristics, trace lengths, and connector properties. *Id.* These are not trivial differences. They go to the core design assumptions underlying Gorecki’s pre-stored coefficient approach: Gorecki’s approach makes engineering sense *precisely because* backplane channels are fixed and known, so coefficients determined at manufacture remain valid throughout the equipment’s life. *See* POR at 23; Ex-2020, ¶ 81. For a pluggable cable encountering a different host at each connection, pre-stored coefficients may be immediately invalid, and it therefore would not have been obvious to apply Gorecki’s teachings to cables. *See* POR at 24; Ex-2020, ¶ 82.

Again, Marvell cites Dr. Williams’s out-of-context testimony that his personal wireless experience is applicable to “adaptive systems, equalization, and clock and data recovery circuits.” *See* Reply at 13-14; Ex-1051, 44:15 – 45:1. The fact that some general equalization principles may translate across domains does not establish that a POSITA would have found it obvious to apply Gorecki’s *specific* pre-stored coefficient approach to active cables with variable channels. This is precisely the type of impermissible hindsight reasoning the Federal Circuit routinely cautions to avoid. *See, e.g., Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F.3d 1358, 1367 (Fed. Cir. 2017) (“[W]e cannot allow hindsight bias to be the thread that stitches together prior art patches into something that is the claimed invention.”). Moreover, the POR

explained that combining Gorecki’s pre-stored coefficients with Lugthart’s adaptive system would create an internal conflict: Gorecki’s approach assumes coefficients are static, determined in advance and loaded from nonvolatile memory at power-up, while Lugthart’s coefficients are adaptively acquired during channel negotiation—rendering any pre-stored values “immediately overwritten or rendered superfluous.” POR at 26; Ex-2020, ¶ 87. Marvell’s Reply does not address this incompatibility.

E. Marvell’s Secondary Considerations Analysis Is Deficient

Marvell dismisses Credo’s secondary considerations evidence by arguing a lack of nexus, but this argument is misplaced. *See* Reply at 27-28. The licenses at issue specifically cover Credo’s AEC technology, and evidence of such licensing carries strong probative value. *See Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F.3d 1337, 1347 (Fed. Cir. 2013) (explaining that licensing the subject patent provides “strong probative value” supporting non-obviousness).

Credo presented evidence of six license agreements with major active cable manufacturers—3M (Ex-2024), Amphenol (Ex-2023), Molex (Ex-2025), Siemon (Ex-2027), TE Connectivity (Ex-2026), and Volex (Ex-2022)—each specifically covering Credo’s AEC technology. Credo also presented evidence of industry recognition in the form of the 2019 Gold Award from Cabling Installation & Maintenance Innovators (Ex-2007), equity research analyst coverage highlighting Credo’s AEC technology (Ex-2029), and Forbes coverage describing Credo’s AECs

as “indispensable in the AI infrastructure buildout” (Ex-2031). The first Credo AECs were released in September 2019 (Ex-2028) and within months won the industry’s top recognition—evidence of a long-felt, unmet need that Credo’s patented technology addressed.

The evidence here shows that major manufacturers sought licenses to Credo’s specific AEC patents, which demonstrates that the industry recognizes the value of the claimed technology. The Board should weigh these secondary considerations as further evidence of non-obviousness, particularly where Marvell’s obviousness case rests on hindsight combination of references from different technological domains.

F. Marvell Does Not Meaningfully Address its Deficiencies with Respect to the Dependent Claims

1. Claims 6 and 13

As the POR explained, Ground 1 of the Petition failed to provide *any* analysis of claims 6 and 13. *See* POR at 21. These claims depend through intermediate claims (claim 6 depends from claims 3 and 4, and claim 13 depends from claims 10 and 11) that the Petition did not address at all. Marvell’s Reply does not cure this omission—it merely suggests these claims fall with the independent claims. *See* Reply at 22. Marvell bears the burden here, and it was incumbent on Marvell to meet that burden *in the Petition*. *See* POR at 21; *see generally*, Pet. Marvell and its Petition failed entirely to meet that burden. Furthermore, it is textbook law that

dependent claims necessarily include additional limitations beyond those recited in the independent claims, and thus, by definition, the dependent claims cannot simply rise and fall with independent claims. *See, e.g., Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (“the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.”). Marvell bore the burden of establishing unpatentability of each challenged claim, and the Petition’s silence on claims 6 and 13 is dispositive.

2. Claims 2, 9, and 16 (Controller)

Marvell’s Reply improperly—and incorrectly—makes a new assertion that Lugthart’s monolithic device is “merely one possible embodiment” and that the transceiver “may instead comprise ‘multiple integrated circuits.’” *See* Reply at 22. Marvell made no such argument in the Petition. *See* Pet. at 41-42. But even accepting Marvell’s untimely argument that Lugthart purportedly contemplates multi-chip implementations, Marvell does not explain how or why a POSITA would have added a separate controller to Lugthart’s self-contained transceiver architecture specifically to retrieve coefficient values from nonvolatile memory. As the POR explained, Lugthart’s cable connectors are limited in both space and power, and adding a controller would require entirely new hardware at each end of the cable. *See* POR at 27-28; Ex-2020, ¶ 98. Marvell fails to address these practical constraints

or explain how Gorecki's backplane controller would interact with Lugthart's existing adaptive startup process.

3. Claims 7, 14, and 20 (No Pre-Equalization)

Marvell argues that configuring pre-equalization filter taps to produce no net equalization effect (by setting taps to zero or “turning off” leading/trailing taps) satisfies the claim limitation requiring that DRR devices “do not perform pre-equalization.” Reply at 27-28. This conflates two structurally and functionally different implementations.

A system with an active FIR filter whose taps are set to zero *still processes the signal through the equalization circuitry*—the equalization is structurally present, powered, and operating. The signal passes through the filter; the filter simply applies unity gain. See Ex-2021, 37:17-21. By contrast, a system that “does not perform pre-equalization” does not subject the signal to equalization processing *at all*. Ex-2020, ¶ 110. As the POR explained, a POSITA would understand the difference between a pre-equalizing filter configured to have *no effect* as opposed to a device that *entirely lacks* pre-equalization filtering. See POR at 31-32. Marvell's argument improperly reads the “do not perform” limitation out of the claims. *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 801, 810 (Fed. Cir. 2021) (“It is highly disfavored to construe terms in a way that renders them void, meaningless, or superfluous.” (quoting *Wasica Finance GmbH v. Continental Automotive Systems, Inc.*, 853 F.3d

1272, 1288 n.10 (Fed. Cir. 2017)). Furthermore, Marvell’s reading of Gorecki is itself flawed: the passage upon which Marvell relies (Ex-1005, 18:15–18) does not even describe disabling pre-equalization. It describes *swapping* one tap path for another—turning one off *while turning another on*. This cannot satisfy the claimed limitation of disabling pre-equalization entirely. *See* POR at 31-32.

III. CONCLUSION

For the foregoing reasons and those discussed in its Patent Owner Response, Patent Owner Credo Technology Group Ltd. respectfully requests that the Board find that Petitioner has not demonstrated by a preponderance of the evidence that claims 1-20 of U.S. Patent No. 10,877,233 are unpatentable and confirm the patentability of all twenty claims.

IPR2025-01218
U.S. Patent No. 10,877,233

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Respectfully submitted,

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**CERTIFICATE OF COMPLIANCE WITH
TYPE-VOLUME LIMITATIONS**

I, the undersigned, do hereby certify that the foregoing Patent Owner Sur-
Reply in Support of Its Patent Owner Response, including footnotes, contains 3,113
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/Charles M. McMahon/

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e)(4), I hereby certify that on September 4, 2026,
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