

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL TECHNOLOGIES, INC.
Petitioner

v.

SHAMROCK INNOVATIONS, LLC
Patent Owner

Case No. IPR2023-00842
Patent No. 9,535,454

**PETITIONER'S REPLY TO PATENT OWNER'S
RESPONSE TO PETITION**

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I. INTRODUCTION

Vangemert alone discloses every disputed claim element except the connectors. The obviousness rationale for combining Copeland with Vangemert to add the connectors is unchallenged. PO's only substantive challenge to Vangemert is conjecture that the Vangemert buffer credit control word ("BCCW") does not bypass the second buffer (the transmit buffer), as claimed. A plain reading of Vangemert does not support PO's conjecture nor does logic. PO's arguments against combining Copeland with Vangemert are misdirected because PO focuses on whether to combine Copeland and Vangemert as to the flow control signal limitation, whereas the Petition's use of Copeland for that limitation was presented only as an alternative argument. Relating to the Petition's primary argument, PO agrees that Vangemert alone teaches generating a flow control signal based on the fill amount of the receive buffer, so Copeland is not necessary to teach that limitation and PO's arguments about combining Copeland and Vangemert for that limitation are inapposite because Copeland only adds connectors to the combination. PO's suggestion the Vangemert/Copeland combination is cumulative is specious because Vangemert/Copeland plainly teaches claim elements missing in the combination considered during prosecution, *e.g.*, connectors.

In addressing the second ground, PO fails to meaningfully address the Copeland/Dobson combination, which also renders the asserted claims unpatentable.

Additionally, PO expressly asserts that “Claim 1 is representative of the Challenged Claims.” POR at 6. Petitioner agrees that Claim 1 is representative of the Challenged Claims. Therefore, if Claim 1 is found to be invalid, all Challenged Claims are invalid as a matter of law. *See Miles Lab ’ys, Inc. v. Shandon Inc.*, 997 F.2d 870, 879 (Fed. Cir. 1993) (“Where the parties stipulate to ‘representative’ claims, . . . a validity resolution for the representative claims applies to the other claims as well.”); *see also N.V. Akzo v. E.I. Dupont de Nemours*, 810 F.2d 1148, 1152, 1 U.S.P.Q.2d 1704, 1708 (Fed Cir. 1987) (a finding of invalidity of a broad representative claim applied to all the other claims of the patent in suit); *Northpoint Tech., Ltd. v. MDS Am., Inc.*, 413 F.3d 1301, 1312-13 (Fed. Cir. 2005) (same).

Therefore, Petitioner respectfully requests that the Board find each of the Challenged Claims unpatentable.

II. ARGUMENT

A. Vangemert and Copeland Render the Challenged Claims Obvious

1. PO Cannot Challenge What Was Unchallenged In the POR

As explained in the Petition, Vangemert alone satisfies the “wherein the module is operable to generate a flow control signal in response to the amount of data stored in the first buffer equaling or exceeding the fill amount” limitation. Pet. at 28. PO agreed this limitation is satisfied by Vangemert alone. *See* POR at 22 (“[A] POSITA would understand that the [Vangemert] buffer credit manager calculates available space, sends a buffer credit signal if sufficient space is available, and buffer credit control words are then sent to the transmit node.”). PO similarly asserts the Vangemert “buffer credit control words . . . serve as the flow control signals for transport on the serial link.” POR at 36. PO cannot now argue otherwise. *See In re NuVasive*, 842 F.3d 1376, 1380-81 (Fed. Cir. 2016) (holding that if the Patent Owner does not include an argument in its POR that was raised in the Petition, those arguments are waived); *SAP Am., Inc. v. Versata Dev. Grp., Inc.*, CBM2012-00001, Paper 81 at 2-4 (P.T.A.B. Sept. 13, 2013).

The Petition relied on Vangemert to show that all other limitations of claim 1 of the ’454 patent were known, except for the claimed connectors. PO did not challenge combining Copeland with Vangemert to add the connector; instead, PO

only challenged the appropriateness of combining Vangemert with Copeland for flow control and whether the Vangemert flow control signal bypassed the transmit buffer (the claimed second buffer). *See generally* POR at 31-38.

To be clear, PO only challenged Vangemert’s disclosure of bypassing the claimed second buffer with the claimed flow control signal; Vangemert’s disclosure of the remaining limitations are not challenged. *Compare* Pet. Section VII.A.1.a.-l. *with* POR Section VII.B.2.

2. Vangemert Teaches All Elements of Claim 1 Other Than the Claimed Connectors Taught by Copeland

- a. *“wherein the module is operable to generate a flow control signal in response to the amount of data stored in the first buffer equaling or exceeding the fill amount”*

Petitioner consistently explained Vangemert alone taught the above element of Claim 1. Pet. at 28 (“Vangemert teaches generating a flow control signal in the form of a buffer credit signal when the buffer has sufficient space for a new data frame.”); *see also* Ex. 1003, ¶ 69 (“Vangemert discloses generating ‘a flow control signal in response to the amount of data stored in the first buffer equaling or exceeding the fill amount,’ as claimed.”). In an abundance of caution, Petitioner explained, “[t]o the extent Vangemert is deficient, Copeland teaches overflow control by activating a signal upon the buffer capacity reaching a predetermined

threshold.” Pet. at 28. But the reliance on Copeland *in the alternative* for this limitation does not take away from the fact that Vangemert is not deficient in teaching this limitation.

Indeed, PO does not dispute Vangemert teaches this limitation. PO’s expert, Mr. Lee, stated “[a] POSITA would understand *without doubt that the buffer credit control words provide the **flow control signal for transport on the link.***” Ex. 2002, ¶ 107 (emphasis added). PO admits the BCCW of Vangemert are generated after assessing the amount of data in the claimed first buffer. *See* POR at 9.

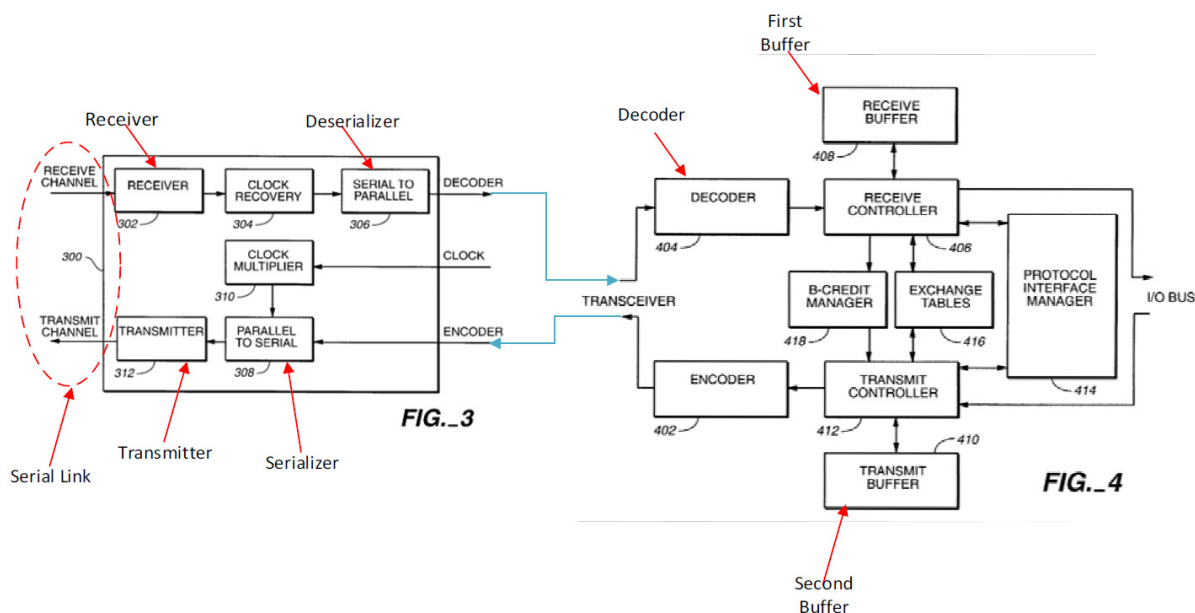
Thus, PO confirms Vangemert teaches this limitation. Rather than challenging the sufficiency of Vangemert’s disclosure for this limitation, PO spends pages challenging the propriety of the combination of Vangemert and Copeland’s¹ flow control methods. *See* POR at 18-25. While, as noted below, the combination of flow control methods is appropriate when addressing the Petition’s *alternative argument* that Copeland teaches this limitation (*see* Section II.A.3.a.,

¹ Copeland teaches an alternate method for satisfying the limitation—sending a flow control signal when the buffer reaches or exceeds a fill threshold (e.g., 40% full). *See* Ex. 1003, ¶ 70. Not knowing what PO might argue, Copeland was provided as a backstop to Vangemert—a secondary argument—to show this limitation was known if PO challenged the sufficiency of Vangemert.

infra), the Board does not need to reach that alternative argument because Vangemert alone discloses the claimed flow control features and PO's arguments about the combination of Vangemert and Copeland are inapposite to the Petition's arguments relying on Copeland only for the connectors limitation.

- b. *“wherein the module is further configured to transmit the flow control signal through the serial link”*

This limitation is taught by Vangemert because, as noted immediately above, PO admits the Vangemert flow control signal (the BCCW) is transmitted through the serial link. The combined schematic from Vangemert is reproduced below.



Vangemert Modified Combined FIGs. 3 and 4 (Annotated)

As stated in the Petition, “Vangemert teaches the transmit controller 412 transmits buffer credit control words [BCCW] received directly from the buffer credit manager 418 and passes them directly to the encoder, 402 which sends them to transmitter 312.” Pet. at 30. PO’s expert agreed that the BCCW embodies the claimed “flow control signal” transmitted through the serial link. Ex. 2002, ¶ 107 (“A POSITA would understand *without doubt that the buffer credit control words provide the **flow control signals for transport on the link.***”) (emphasis added).

PO argues the buffer credit signal generated by the buffer credit manager 418 is not transmitted over the serial link. See POR at 25-36. PO’s position is off-point. The buffer credit signal triggers creation of the BCCW, and Petitioner agrees with PO’s characterization above—the BCCW is the claimed flow control signal transported over the link.

- c. “*transmit the flow control signal through the serial link and the connector without passing the flow control signal through the second buffer*”
- i. Vangemert does not teach passing the BCCW through the second buffer and is properly read to bypass the second buffer when sending a BCCW

PO’s only argument suggesting the Petition failed to show a limitation was disclosed in Vangemert is conjecture that because Vangemert indicates some control words may touch the transmit buffer, all control words necessarily pass

through the buffer. Contrary to PO's contention, there is no suggestion of any step or action that would send the BCCW to transmit buffer 410 between receipt of the credit signal and transmission of the BCCW by the transmit controller 412.

Vangemert does *not* teach the BCCW flow control signal passes through the transmit buffer 410 (the claimed second buffer). Pet. at 30-31; Ex. 1003, ¶ 77. The Vangemert disclosure describing BCCW creation and transmission states “the transmit controller 412 *begins* transmitting buffer credit control words in response to a credit signal from the credit manager 418.” Ex. 1005 at 4:14-16. Vangemert also teaches “[t]he *transmit controller* is *configured* to send buffer credits to the remote node in response to a credit signal from the buffer credit manager.” Ex. 1005 at Abstract; 2:12-15; *see also* claims 1, 8. “Configured” conveys the idea that the transmit controller is “set up or arranged . . . in such a way that it is ready for operation for a particular purpose.” American Heritage Dictionary 5th ed. More specifically, “configured” suggests the controller is “arrange[d] . . . to make it able to do a particular task or work in a particular way.” Cambridge Computing dictionary (“to arrange the way in which something, such as a computer system or software, is organized, so that it can be used for a particular task”). Vangemert does not suggest any other component or grouping of components is “configured”

to send a BCCW in response to a signal from the buffer credit manager. Ex. 1003, ¶ 77.

Moreover, PO's interpretation that Vangemert sends the BCCW through the transmit buffer 410 before transmission of the BCCW by transmit controller 412 is inconsistent with Vangemert's other teachings. *See* Ex. 1003, ¶¶ 77-82. Vangemert stresses the importance of a fast, low latency system and configuring the transmit controller to achieve that end simply and quickly. *See* Ex. 1005 at Abstract, 1:8-10, 1:54-55, 1:62-63, 1:66-2:1, 4:16-23, 5:2-4. The simplest and quickest way to send the BCCW to the transmitter 312 is to have the transmit controller 412 configured to send it directly to the encoder 402 without adding a step of passing it through the transmit buffer 410. *See* Ex. 1013, ¶ 22.

- ii. PO's conflation of BCCWs with data frame control words is illogical and unsupported

Vangemert does not teach passing the BCCW through the transmit buffer. PO hypothesizes that, because Vangemert indicates control words are created in the transmit buffer 410 when discussing data transmission, the BCCW must pass through or be stored in the transmit buffer. *See* POR at 34. Nothing in Vangemert suggests the BCCW is treated the same as other, more general "control words" associated with data frames. *See* Ex. 1005 at 3:41-60. It makes sense that control

words associated with data frames would be stored in the transmit buffer because these control words are used to facilitate the transmission of associated data frames from one node to the other. Ex. 1013, ¶ 23. This understanding of data frame control words, however, does not support the logical leap that *control words critical to flow control must be treated the same as* control words associated with data frames. *Id.* Indeed, a PHOSITA would not read Vangemert to teach passing the BCCW through the transmit buffer.

Passing the BCCW through the transmit buffer would be illogical and is not supported by the plain language of Vangemert. As noted above, Vangemert taught a system to reduce latency. *See* Section II.A.2.c.i., *supra*. Creating the BCCW in the transmit controller and then passing the BCCW through the transmit buffer adds unnecessary steps and increases latency over a system in which “the transmit controller 412 *begins* transmitting buffer credit control words in response to a credit signal from the credit manager 418.” Ex. 1005 at 4:14-16 (emphasis added); *see also* Ex. 1013, ¶ 24. Immediately transmitting the BCCW upon receipt of a credit signal is faster than taking the additional step of passing the BCCW through the transmit buffer before transmitting the BCCW. PO’s contention would increase latency, contrary to Vangemert’s stated intent of reducing latency.

One of skill would have understood the Vangemert transmit buffer is a FIFO buffer. Ex. 1013, ¶ 25. Because most communication protocols do not limit the size of transfer buffers, the time required for a flow control signal to pass through the buffer is unknown—e.g., it would take longer for a flow control signal to pass through a large buffer than it would take to get through a small buffer. *Id.* Having unbounded times for control signals to get delivered is not a sound protocol design and makes the protocol exceedingly challenging to validate. *Id.* This would also have led one of skill to have thought it illogical to interpret Vangemert to require the BCCW to pass through the transmit buffer. *Id.*

Finally, contrary to PO's conjecture, one of skill would have understood the Vangemert BCCW had to bypass the transmit buffer to avoid the occurrence of a deadlock condition. Vangemert discloses a module that both receives and sends data. Ex. 1005 at 2:58-3:3. In other words, a node is sometimes a transmitter and sometimes a receiver. The following example illustrates a deadlock condition between two serial devices:

1. Side A is out of transfer credits from Side B but has a frame of data already queued up in the transfer buffer (which you would expect if it has been waiting to get a flow control credit).
2. Side B is completing a transfer to Side A that exhausts Side B's transfer credits. Side B also has a subsequent pending frame to transmit in its transfer buffer after the current one finishes (which is expected since

efficient implementations will strive to have the next frame ready to go as soon as previous one is done).

3. *If Side A inserts its flow control signal granting Side B a credit into the transfer buffer (which has a frame of data already pending), then that signal will not be transmitted because it is stuck behind the data frame which cannot be transmitted due to lack of credits.*
4. Similarly, Side B cannot send Side A a credit to allow it to empty the data frame that is stuck ahead of the flow control credit because it is also unable to transmit the data frame that is ahead of its flow control signal.

Ex. 1013, ¶ 29. Thus, one of skill would not have interpreted Vangemert to teach passing the BCCW through the transmit buffer because PO's hypothetical would lead to an undesirable deadlock condition. *Id.*, ¶ 30.

- iii. PO incorrectly assumes one of skill would understand Vangemert taught passing the BCCW through the transmit buffer

PO introduced a 1996 article entitled "An Introduction to Fibre Channel" as Exhibit 2012. Page 5 of Exhibit 2012 references "Article 12" of the Hewlett-Packard Journal, which was published in the same October 1996 HP Journal, but was not cited by PO. "Article 12" in the Journal is entitled "Tachyon: A Gigabit Fibre Channel Protocol Chip" (the "Tachyon article"), and the two articles share a

common author in addition to being published concurrently.² Compare Ex. 2012 at 5 with Ex. 1014 at 96.

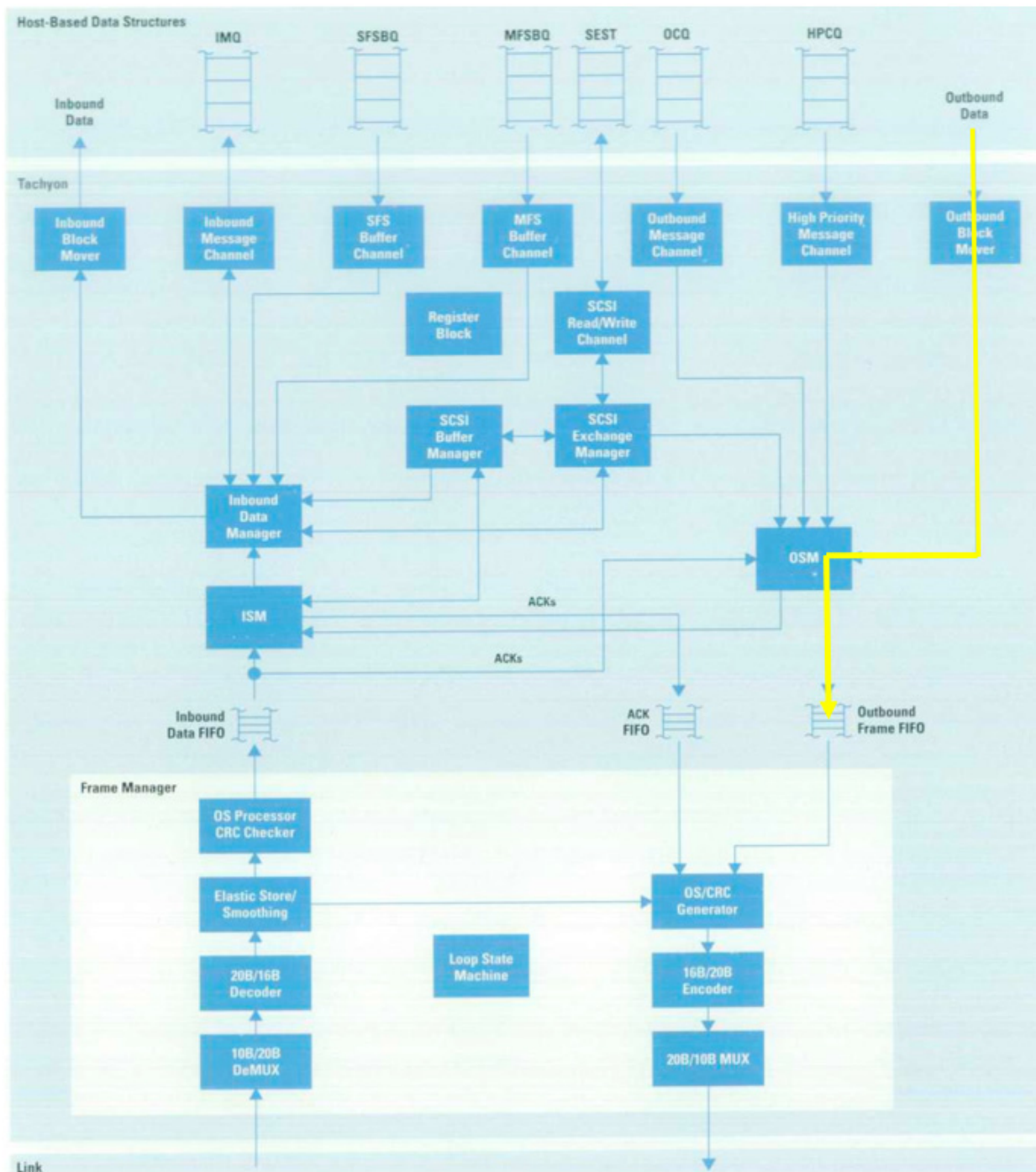
Exhibit 2012 and the Tachyon article rebut PO's argument that the BCCW is transmitted "via the transmit buffer" (*see* POR at 34 & n.4) and instead support the Petition in showing that a PHOSITA would understand Vangemert to teach the BCCW does not pass through the claimed second buffer.

The Tachyon article teaches that an ACK signal increments an end-to-end count, which "determines the number of frames that Tachyon can send to the remote designation without receiving an ACK." Ex. 1014 at 102. Thus, the ACK signal corresponds to the Vangemert BCCW. Ex. 1013, ¶ 36.

Figure 6 from Ex. 1014 is reproduced below. As shown on the right, outbound data is stored in Outbound Frame FIFO, which corresponds to the claimed second buffer and the Vangemert Transmit Buffer. *Id.*, ¶ 36. Directly to the left of the Outbound Frame FIFO is the ACK FIFO. Thus, the ACK signal corresponding to Vangemert's BCCW passes through a buffer different from the

² The Board has even considered Exhibit 2012 and the Tachyon article as a single reference in a past IPR because they were published at the same time in the same journal and share a common author, with the Tachyon article providing a continuation of Exhibit 2012. *See Cisco Sys., Inc. v. Crossroads Sys., Inc.*, IPR2014-01463, Paper No. 49 at 2 n.3 (P.T.A.B. Mar. 16, 2016).

outbound data frame buffer (the claimed second buffer or Vangemert transmit buffer). *Id.* As discussed above in Section II.A.2.c.i., avoiding the data transmit buffer “[a]llows time-critical messages [such as the BCCW] to bypass the normal traffic waiting for various resources via a low-latency, high-priority outbound path.” Ex. 1014 at 102.



Ex. 1014, Fig. 6 (annotated)

The HP Journal cited by PO rebuts PO's theory that one of skill would understand Vangemert's BCCW passed through the transmit buffer. Vangemert makes clear the transmit controller is configured to begin transmitting the BCCW upon receipt of a buffer credit signal (rather than subsequently routing it through the transfer buffer). The HP Journal—especially the Tachyon article—shows Fibre Channel systems' flow control signals bypass all data buffers. Such “[a]llows time-critical messages [such as flow control messages] to bypass the normal traffic waiting for various resources via a low-latency, high-priority outbound path.” Ex. 1014 at 102. Such illustrates that one of skill would have recognized issues relating to latency, system integrity and system failure dictate a design bypassing data buffers, such as the Vangemert transfer buffer. While Vangemert does not expressly show a “low-latency, high-priority path” with a separate BCCW buffer like the Tachyon article ACK buffer, the words used in Vangemert suggest the BCCW is sent promptly without entanglement with the transfer buffer. While the logic blocks in the HP Journal differ from those in Vangemert, the HP Journal confirms Dr. Grimsrud's opinion that one of skill would not interpret Vangemert as suggest by PO—such would simply be inconsistent with how Fibre Channel systems were designed, as evidenced by the Tachyon article.

3. The Combination of Vangemert and Copeland is Proper

PO's attack on the combination of Vangemert and Copeland is that the combination is improper because (1) Vangemert and Copeland are cumulative of the prior art applied during prosecution (POR at 26-28); (2) Vangemert and Copeland teach "divergent" flow control solutions (POR at 18-24); and (3) combining Vangemert and Copeland would have been "illogical" to a PHOSITA (POR at 28-31). As explained below, PO's arguments are incorrect.

- a. *Copeland is Only Combined with Vangemert to Provide Connectors in Petitioner's Simplest Combination Because Vangemert Alone Teaches All Remaining Claim Limitations*

The Petition explained that Vangemert discloses all elements of the Challenged Claims, with the possible exception of connectors. PO did not challenge Petitioner's claim that adding Copeland's connectors to Vangemert would be obvious. *See* Pet. at 15-20; Ex. 1003, ¶ 46. To the contrary, PO confirmed the addition of connectors to Vangemert was obvious: PO's Exhibit 2012 expressly states it was known to use connectors with Fibre Channel systems. Ex. 2012 at 1 ("Another example of the Fibre Channel is that it uses small connectors."). Vangemert is expressly addressed to Fibre Channel buffer credit flow control. Ex. 1005 at 1:47-63. PO's submission of Exhibit 2012 removes all

doubt that Petitioner is correct—a PHOSITA would have understood that adding connectors to Vangemert was obvious. *See* Ex. 1003, ¶ 46.

Vangemert alone satisfies the “wherein the module is operable to generate a flow control signal in response to the amount of data stored in the first buffer equaling or exceeding the fill amount” limitation. Pet. at 28.³ PO agrees. *See* POR at 22 (“[A] POSITA would understand that the [Vangemert] buffer credit manager calculates available space, sends a buffer credit signal if sufficient space is available, and buffer credit control words are then sent to the transmit node.”). PO similarly asserts the Vangemert “buffer credit control words . . . serve as the flow control signals for transport on the serial link.” POR at 36. PO cannot now argue otherwise.

³ Copeland teaches an alternate method for satisfying this limitation—sending a flow control signal when the buffer reaches or exceeds a fill threshold (e.g., 40% full). *See* Ex. 1003, ¶ 70. Not knowing what PO might argue, Copeland is a backstop to Vangemert—a secondary reference—to show this limitation was known *if* PO challenged the sufficiency of Vangemert’s disclosure. The supplemental nature of the combination is evidenced by the Petition’s transition to the discussion of Copeland—“If Vangemert is deficient . . .” Pet. at 28. That Copeland is relevant only if Vangemert is deemed deficient is confirmed in Dr. Caloyannides’s declaration. Dr. Caloyannides stated, “Vangemert discloses generating ‘a flow control signal in response to the amount of data stored in the first buffer equaling or exceeding the fill amount,’ as claimed” followed by “Copeland additionally teaches . . .” in the paragraph introducing Copeland. Ex. 1003, ¶¶ 69-70.

The Petition also plainly states Vangemert discloses the final clause of Claim 1. Pet. at 30; *see also* Ex. 1003, ¶ 77 (“Vangemert discloses this element of claim 1.”).

PO’s belabored arguments about the reasons Copeland and Vangemert should not be combined fade to irrelevance when Petitioner’s unchallenged assertion that Vangemert alone discloses the last clauses of Claim 1 and Copeland is combined to provide only the connector not expressly found in Vangemert. PO’s misdirection should be seen for what it is, an attempt to avoid consideration of the simplest obviousness combination by steering the Board to unnecessary arguments about the combination of Vangemert’s and Copeland’s flow control features.

In view of the above, PO’s arguments regarding motivations to combine Vangemert with Copeland are easily dismissed as Copeland is only needed to provide a teaching of connectors and PO does not challenge the obviousness of the combination for that purpose.

b. *Vangemert and Copeland are Not Cumulative References*

PO argues the Vangemert-Copeland combination is cumulative to the Szatkowski-Daines combination underlying an Examiner’s rejection overcome by the Applicant and that Petitioner “failed to demonstrate how the Examiner erred in evaluating the combination . . . (which is *cumulative* of the references relied on in

these proceedings).”⁴ POR at 26-28 (emphasis added). However, PO’s arguments fail to recognize that Applicant argued the claims should be allowed because the Szatkowski-Daines combination did not teach or suggest the claimed connector. Ex. 1002 at 23-31 (June 23, 2016, Response to Final OA) (“Szatkowski in view of Daines fails to teach or suggest the claimed limitations of ‘a connector configured to be connectable to a serial link’ The rejection has failed to establish *prima facie* obviousness, as not all recited elements, e.g., a ‘connector’ as recited, are present in the relied-on art.”). Here, Copeland specifically discloses a connector, and the Petition combines the connector from Copeland with the teachings of Vangemert. Ex. 1006 at 15-16. Vangemert-Copeland therefore *cannot be* cumulative to Szatkowski-Daines. *See Gardner Denver v. Utex Indus., Inc.*, IPR2020-00333, Paper 12 at 13-14 (P.T.A.B. Aug. 5, 2020) (a reference is “cumulative” when the art’s relevant teachings provide nothing more than what was taught by previously presented prior art); *see also* MPEP § 609.04(a) (A reference is not cumulative if “it contained a more complete combination of the

⁴ No Reasons for Allowance were provided by the Examiner during prosecution of the ’454 Patent.

claimed elements than any other reference before the examiner.”) (citing 37 CFR 1.98(c)).

Additionally, Vangemert teaches “generating a flow control signal in response to the amount of data stored in the first buffer equaling . . . the fill amount, and where the module is further configured to transmit the flow control signal through the serial link and the connector without passing the flow control signal through the second buffer” as claimed, while Szatkowski does not. As characterized by Applicant,⁵ “Szatkowski teaches waiting on an acknowledgement from a receiver that the receiver has processed a message and is ready to receive another message before sending a subsequent message.” Ex. 1002 at 226. Szatkowski teaches that “[t]he link has a simple protocol. Each node may transmit a packet on its outbound link subject to pacing responses and acknowledgements received from the remote node on its inbound link.” Ex. 2005 at 4:14-17. Unlike Applicant’s arguments about Szatkowski, Vangemert teaches all elements of Claim 1 aside from a connector provided by Copeland.

⁵ Petitioner does not agree with Applicant’s characterizations of Szatkowski made during prosecution but presents them here to demonstrate why they undermine PO’s current arguments about cumulative references.

In sum, Vangemert-Copeland provides “a more complete combination of the claimed elements than any other reference before the examiner” such that the combination cannot be considered cumulative. MPEP § 609.04(a).

c. *The Teachings of Vangemert and Copeland Would Not Lead a PHOSITA Away from the Combination*

PO suggests it would be illogical or improper to combine multiple flow control methodologies into a system. While, as shown above, combining Copeland with Vangemert to disclose the claimed flow control is unnecessary because Vangemert discloses every flow control element, if Vangemert is found deficient in any way, the combination is appropriate. PO argues that because Vangemert teaches a system that uses buffer credits, overflow would be impossible. POR at 19. However, this is incorrect. Copeland also teaches flow control, but using a different methodology (i.e., generating flow control once buffer hits a threshold level). Flow control systems operating properly prevent buffer overflow.

As noted by Dr. Caloyannides, combining the flow control threshold system of Copeland with Vangemert would further bolster the flow control of Vangemert by providing a backup flow control system in the event of miscalculations or timing issues within the buffer credit systems of Vangemert. Ex. 1003, ¶ 73. PO has provided no evidence or arguments to the contrary except to state that

Vangemert would make any possible buffer overflow impossible. POR at 19.

While the system of Vangemert may generally prevent overflow, the assertion that it will be 100% successful is simply conclusory. A PHOSITA would recognize the benefits of providing a failsafe to Vangemert's system. Ex. 1003, ¶ 73.

Accordingly, a PHOSITA would not be led away from combining Vangemert and Copeland.

Further, PO's argument that Copeland's flow control would make overflow possible directly conflicts with PO's other arguments. In contrast to their assertion that Vangemert's flow control makes buffer flow impossible, PO argues that the flow control of Copeland allows for possible overflow. POR at 23-24. Specifically, PO states that "Copeland teaches using a flow control signal to avoid a possible overflow," and "Copeland's system is designed to prevent data overflow in a receive buffer by signaling the transmitter to stop sending data when the receive buffer is getting full." *Id.* At no point does PO explain how Copeland would prevent data overflow itself but then allow for possible buffer overflow when combined with Vangemert. Rather, PO cites multiple portions of Copeland which describe how overflow is prevented via the described flow control methodologies. Thus, the teachings of Vangemert and Copeland would not lead a PHOSITA away from the combination.

d. *The Combination of Vangemert and Copeland Would Not Be Illogical*

PO argues that the combination of Vangemert and Copeland would be “illogical.” POR at 28-31. Again, this position is rendered moot in view of Copeland only being required to teach the “connectors” of Claim 1.

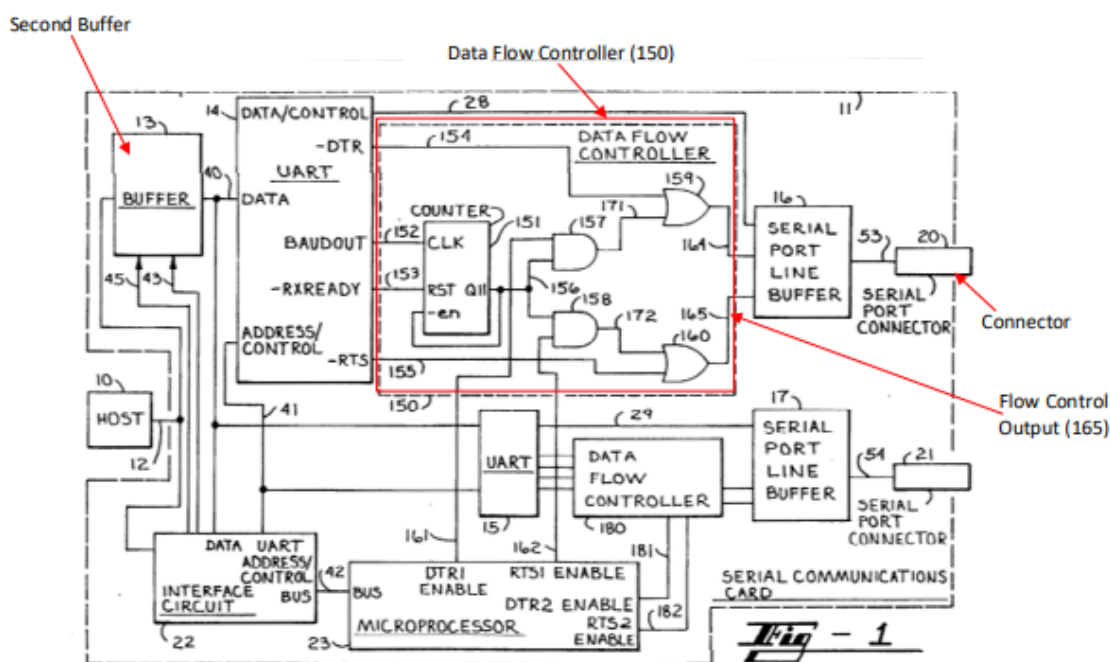
Regardless, PO attempts to read in multiple aspects of Copeland to show that the two systems would not be compatible. For example, PO cites to the technical aspects of how the system of Copeland would transmit a flow control signal, and how the different communication protocols of Vangemert and Copeland would make combining the references illogical. POR at 29-31. However, to the extent Copeland is relied upon to teach generating a flow control signal, it is relied upon for just that—generating a flow control signal. There is no need to determine whether the differing communication protocols would support combining, only that both references teach generating a flow control signal and transmitting it over a serial link. The claims of the ’454 do not require more than that. Thus, the arguments presented by PO are nothing more than a distraction to attempt to obscure the clear teachings of Vangemert and Copeland.

B. The Combination of Dobson and Copeland Teaches All Element of Claim 1

PO argues “Dobson fails to disclose a flow control signal transmitted through the serial link.” POR at 38-41. However, the Petition did not rely on Dobson for this element, instead, the Petition relies on Copeland. Pet. at 65-68. For some unknown reason, PO argues that Dobson’s IRQ signal is not transmitted through the serial link. However, Petitioner never made this argument, nor relied on the IRQ signal of Dobson for anything, let alone the claimed flow control signal, instead relying on Copeland to teach transmitting a flow control signal over a serial link. Pet. at 66-68.

With respect to Copeland, PO argues that Copeland’s flow control signal is “an out-of-band parallel signal” that is transmitted through a “separate signal line” and not through the serial link and the connector. POR at 41. Although it is unclear from PO’s one-sentence argument on this point, it appears PO argues that sending the flow control signal over a wire and not over the data carrying cables is not the same as sending the stop signal over the claimed link. *See id.* However, as shown below in Copeland Figure 1 (annotated), the data flow controller 150 outputs *all* signals directly to the serial port connector 20 via the serial port line buffer. Ex.

1006 at Fig. 1; *see also* Ex. 1003, ¶ 155. Copeland's flow control signal is therefore transmitted through the serial link and the connector.



Finally, with respect to PO's assertion that the Petition's mapping of the "second buffer" is inconsistent (POR at 42-44), PO again either mischaracterizes the arguments in the Petition or completely misinterprets them. The buffer 13 of Copeland was only shown to equate to a "second buffer" to illustrate that the serial port line buffers 16 and 17 could *not* be interpreted to be the second buffer in view of the claim language. *See* above annotated Fig. 1 of Copeland. There was no switching of what was alleged to disclose the second buffer (Tx FIFO buffer 40 of

Dobson), only an illustration to prevent the serial port line buffers from being confused with said second buffer. *See* Pet. at 67.

III. CONCLUSION

For the reasons set forth above and in the Petition and accompanying exhibits, the Board should reject PO's arguments and the Challenged Claims should be found unpatentable.

Respectfully submitted,

Dated: April 3, 2024

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CERTIFICATE OF COMPLIANCE WITH WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), I certify that this Petitioner's Reply to Patent Owner Response to Petition complies with the type-volume limits of 37 C.F.R. § 42.24(c)(1) because it contains 5,145 words, excluding the parts of this Petitioner's Reply to Patent Owner Response to Petition that are exempted by 37 C.F.R. § 42.24(a), according to the word processing system used to prepare this Petitioner's Reply to Patent Owner Response to Petition.

Dated: April 3, 2024

s/ Jon R. Trembath
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CERTIFICATE OF SERVICE

The undersigned certifies that pursuant to 37 CFR § 42.6(e), on April 3, 2024, a copy of the foregoing **PETITIONER’S REPLY TO PATENT OWNER’S RESPONSE TO PETITION** was served via email (as consented to by counsel) on the following attorneys of record:

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