Trials@uspto.gov
Tel: 571-272-7822

Paper No. 83
Entered: November 26, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORP., CAVIUM, LLC, DELL INC., and
WISTRON COPORATION,
Petitioner,

v.

ALACRITECH, INC.,
Patent Owner.

Case IPR2017-01406[1]
Patent 7,673,072 B2

Before STEPHEN C. SIU, DANIEL N. FISHMAN, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

[1] Cavium, Inc., which filed a petition in Case IPR2017-01707, was joined as a petitioner in this proceeding. Cavium, Inc. has now been converted to Cavium, LLC. Paper 78. Wistron Corporation, which filed a petition in Case IPR2018-00329, and Dell Inc., which filed a petition in Case IPR2018-00375, also have been joined as petitioners in this proceeding.

I. INTRODUCTION

Intel Corporation ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1–21 ("the challenged claims") of U.S. Patent No. 7,673,072 B2 ("the '072 patent," Ex. 1001) under 35 U.S.C. §§ 311–319. Alacritech, Inc. ("Patent Owner") filed a Preliminary Response. Paper 9 ("Prelim. Resp."). Upon consideration of the Petition and Preliminary Response, we instituted an *inter partes* review of all challenged claims. Paper 10 ("Decision on Institution" or "Dec."). Responsive to petitions and requests for joinder filed in IPR2017-01707, IPR2018-00329, and IPR2018-00375, we later joined Cavium, Inc. (now Cavium, LLC), Wistron Corp., and Dell, Inc., respectively, as petitioners in this proceeding. *See* Papers 15, 43, 51, 78. Intel Corporation, Cavium, LLC, Wistron Corp., and Dell, Inc. are identified herein collectively as "Petitioner."

Following institution, Patent Owner filed a Corrected Patent Owner's Response (Paper 34, "Response" or "PO Resp."), and Petitioner filed a Reply (Paper 46, "Pet. Reply"). Patent Owner also filed a Contingent Motion to Amend (Paper 25, "Mot. Amend."), to which Petitioner filed a Response (Paper 40, "Resp. Mot. Amend."). Patent Owner filed a Reply to Petitioner's Response (Paper 47, "Reply Mot. Amend."), and Petitioner filed a Sur-reply (Paper 54, "Sur-reply Mot. Amend.").

Petitioner filed a Motion to Exclude (Paper 59), to which Patent Owner filed an Opposition (Paper 63), and Petitioner filed a Reply to Patent Owner's Opposition (Paper 66).

Patent Owner also filed a Motion to Exclude (Paper 60), to which Petitioner filed an Opposition (Paper 64), and Patent Owner filed a Reply to Patent Owner's Opposition (Paper 67).

Patent Owner filed a Motion to Seal (Paper 32).

Oral argument for this proceeding was held on September 13, 2018, and a transcript has been entered into the record as Paper 79 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). We base our decision on the preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

Having reviewed the arguments of the parties and the supporting evidence, we conclude, for the reasons that follow, that Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable. We also deny in part and dismiss in part Patent Owner's Motion to Exclude, deny Petitioner's Motion to Exclude, deny Patent Owner's Contingent Motion to Amend; and grant Patent Owner's Motion to Seal.

II. BACKGROUND

A. Related Matters

The parties indicate that the '072 patent is asserted in *Alacritech, Inc. v. CenturyLink, Inc.*, 2:16-cv-00693-JRG-RSP (E.D. Tex.); *Alacritech, Inc. v. Wistron Corp.*, 2:16-cv-00692-JRG-RSP (E.D. Tex.); and *Alacritech, Inc. v. Dell Inc.*, 2:16-cv-00695-RWS-RSP (E.D. Tex.). Paper 75, 2; Paper 76, 4.

B. The ’072 Patent

The ’072 patent, titled “Fast-path Apparatus for Transmitting Data Corresponding to a TCP Connection,” describes “a device for processing network communication that greatly increases the speed of that processing and the efficiency of transferring data being communicated.” Ex. 1001, [54], 5:24–27. The processing “includes employing representative control instructions for a given message that allow data from the message to be processed via a fast-path” that “bypasses conventional protocol processing of headers that accompany the data.” *Id.* at 5:38–44.

C. Illustrative Claim

Of the challenged claims, claims 1, 9, and 15 are independent. Independent claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. A method comprising:
>
> establishing, at a host computer, a transport layer connection, including creating a context that includes protocol header information for the connection;
>
> transferring the protocol header information to an interface device;
>
> transferring data from the network host to the interface device, after transferring the protocol header information to the interface device;
>
> dividing, by the interface device, the data into segments;
>
> creating headers for the segments, by the interface device, from a template header containing the protocol header information; and
>
> prepending the headers to the segments to form transmit packets.

Ex. 1001, 97:17–31.

D. Instituted Ground of Unpatentability

We instituted *inter partes* review of claims 1–21 as unpatentable under 35 U.S.C. § 103 over Erickson[2] and Tanenbaum,[3] which was the only proposed challenge stated in the Petition. Pet. 14; Dec. 20.

III. DISCUSSION

A. Claim Construction

In an *inter partes* review instituted on a petition filed prior to November 13, 2018, we construe claim terms in an unexpired patent according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b). Consistent with the broadest reasonable construction, claim terms are presumed to have their ordinary and customary meaning as understood by a person of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

In our Decision on Institution, we determined that it was unnecessary to provide an express construction of any claim term for purposes of institution of *inter partes* review. Dec. 8. The parties do not challenge that determination in their post-institution briefing, and we are not persuaded that any express construction is required for purposes of this Decision. *See Vivid*

[2] U.S. Patent No. 5,768,618, issued June 16, 1998 ("Erickson," Ex. 1005).
[3] Andrew S. Tanenbaum, *Computer Networks* (3d ed. 1996) ("Tanenbaum," Ex. 1006).

Techs., Inc. v. Am. Sci. & Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999) (explaining that only those terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy).

B. Analysis of the Asserted Ground of Unpatentability

1. General Principles

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when presented, objective evidence of nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

2. Level of Skill in the Art

Petitioner contends that a person having ordinary skill in the art ("POSA") with respect to the technology described in the '072 patent as of the October 14, 1997, filing date of the earliest provisional application from which the '072 patent claims priority would be "a person with at least the equivalent of a B.S. degree in computer science, computer engineering or electrical engineering with at least five years of industry experience including experience in computer architecture, network design, network protocols, software development, and hardware development." Pet. 27. Patent Owner proposes a slightly different assessment (i.e., "a person with a

Bachelor's degree in Computer Science, Computer Engineering, or the equivalent, and several years' experience in the fields of computer networking and/or networking protocols"), but argues that "[a]ny differences between this and Petitioners' proposed level of ordinary skill would have no bearing on the analysis presented." PO Resp. 23. To the extent necessary for purposes of this Decision, we have adopted Patent Owner's assessment.

3. Scope and Content of the Prior Art

a. Overview of Erickson

Erickson is directed to a "method of controlling an input/output (I/O) device connected to a computer to facilitate fast I/O data transfers." Ex. 1005, Abstract. Figure 3 of Erickson is reproduced below:

FIG. 3

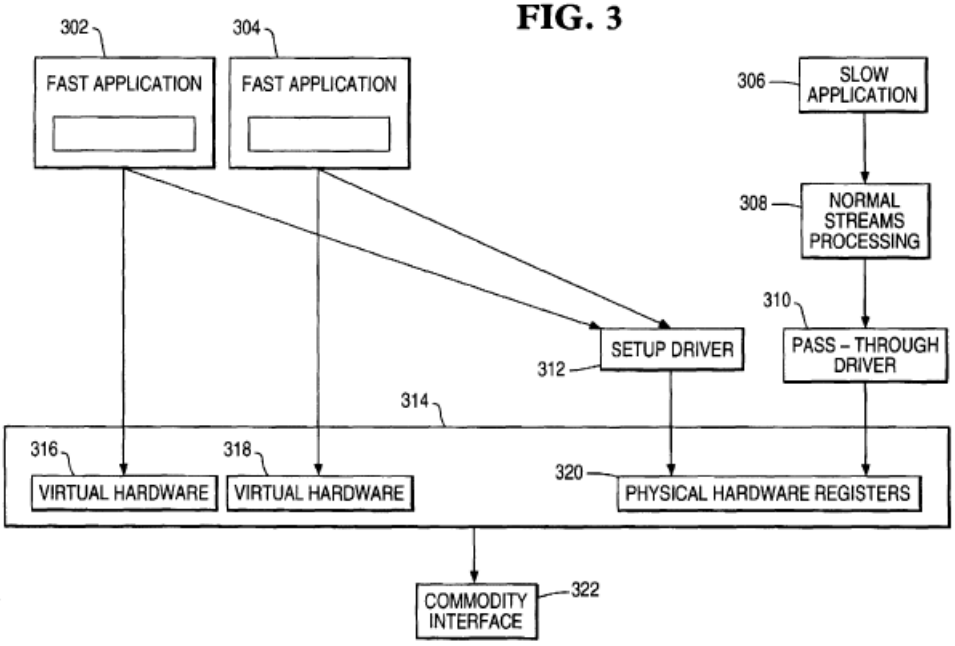

Figure 3 depicts data flow in accordance with Erickson's invention. As shown in Figure 3, slow application 306 uses normal stream processing 308 and pass-through driver 310 to send information to I/O device adapter 314

and then to commodity interface 322. *Id.* at 4:53–61. Alternatively, fast applications 302 and 304 send information directly to I/O adapter 314 via setup driver 312 or "virtual hardware" 316 and 318, avoiding the overhead of the streams processing and pass-through driver. *Id.* at 4:61–5:3.

b. Overview of Tanenbaum

Tanenbaum is a book that describes general principles, as well as detailed aspects, of data transmission in computer networks, including TCP/IP and UDP/IP protocols. *See generally* Ex. 1006.

4. Discussion – Differences Between the Claimed Subject Matter and the Prior Art

Having reviewed the Petition, Response, and Reply, as well as the presented evidence, we determine, for the reasons that follow, that Petitioner has established by a preponderance of the evidence that the challenged claims are unpatentable on the asserted ground.

a. Independent Claim 1

Petitioner contends claims 1–21 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Erickson and Tanenbaum. Pet. 38–76. As set forth in more detail below, Petitioner relies on Erickson as teaching or suggesting all limitations recited in independent claim 1, with the exception of "dividing . . . data into segments" and creating headers "for the segments," which limitations Petitioner contends are disclosed by Erickson in view of Tanenbaum. *Id.* at 38–50. Petitioner relies on the testimony of Dr. Robert Horst to support its contentions regarding how the cited references describe the claim limitations. *Id.* (citing Ex. 1003).

In its Response, Patent Owner raises two principal arguments with respect to Petitioner's contentions: first, that the combination of Erickson

and Tanenbaum does not show or suggest "dividing, *by the interface device*, the data into segments"; and second, that there is no motivation to combine Erickson and Tanenbaum. PO Resp. 24–33, 35–56 (emphases omitted). Patent Owner relies on the testimony of Dr. Kevin Almeroth in support of its arguments. *Id.* (citing Ex. 2026).

We address the parties' contentions with respect to each limitation of claim 1 in turn below.

> *"A method comprising: establishing, at a host computer, a transport layer connection, including creating a context that includes protocol header information for the connection"*

Petitioner persuasively contends Erickson discloses an I/O device adapter 314 is connected to a host computer and that a user process running on the host computer establishes a "transport layer connection." Pet. 38 (citing Ex. 1005, 1:65–67, 6:1–9; Ex. 1003, Appendix A § 1.1). Petitioner further contends the user process creates a "context" by "opening a device driver and specifying the protocol type (e.g., UDP or TCP)." *Id.* at 39–40 (citing Ex. 1005, 6:1–9, 8:2–9). According to Petitioner, the created context "includes protocol header information," as the claim requires, because it is described as "including 'almost everything' concerning a UDP datagram 'except the actual user data.'" *Id.* at 40 (citing Ex. 1005, 6:57–7:4). Furthermore, Petitioner contends, the context is "for the connection," because it discloses TCP scripts which are inherently connection oriented. *Id.* at 41 (citing Ex. 1003, Appendix A § 1.1). We agree.

Patent Owner does not raise any counterarguments or point to any contrary evidence with respect to this limitation, and we are persuaded by Petitioner's arguments and cited evidence that the limitation is taught by Erickson.

"transferring the protocol header information to an interface device"

Petitioner persuasively contends Erickson I/O device adapter 314 is the claimed "interface device." Pet. 41. Petitioner also contends that Erickson's datagram template 702 in the I/O device adapter's memory, comprises protocol header information that was transferred to the I/O device adapter from the host computer. *Id.* at 41–42 (citing Ex. 1005, 7:39–41, 5:37–51, 8:2–4).

Patent Owner does not raise any counterarguments or point to any contrary evidence with respect to this limitation, and we are persuaded by Petitioner's arguments and cited evidence that the limitation is taught by Erickson.

"transferring data from the network host to the interface device, after transferring the protocol header information to the interface device"

Petitioner persuasively contends that in Erickson, data is transferred from the host to the interface device, after transferring the protocol header information to the interface device, because template 702 resides in the adapter's memory before the script is executed to store data in the I/O device adapter's memory. *Id.* at 42–43 (quoting Ex. 1005, 7:39–48 ("FIG. 7 is a block diagram illustrating a UDP datagram template 702 (without a user data area) residing in the I/O device adapter's memory. . . . The I/O device adapter stores the user data provided by the user process in the I/O device adapter's memory, and then transmits the completed UDP datagram 702 over the media.").

Patent Owner does not raise any counterarguments or point to any contrary evidence with respect to this limitation, and we are persuaded by

Petitioner's arguments and cited evidence that the limitation is taught by Erickson.

"dividing, by the interface device, the data into segments"

Petitioner contends Erickson in combination with Tanenbaum discloses this limitation. Pet. 43. We are persuaded, for the reasons stated below, by Petitioner's contentions. As Petitioner persuasively contends, although Erickson's exemplary context is UDP, it also discloses the use of TCP, refers readers to the 1981 edition of Tanenbaum, and discloses use of TCP/IP scripts. Pet. 34–35 (citing Ex. 1005, 4:38–43); *id.* at 44 (citing Ex. 1005, 5:47–51). Petitioner provides persuasive evidence that a person of ordinary skill in the art would have been motivated to implement "fast path" TCP/IP on Erickson's I/O device adapter in view of the 1996 version of Tanenbaum (i.e., Ex. 1006) with a high expectation of success to take advantage of TCP/IP's popularity for Internet and World Wide Web processing. *Id.* at 35–38 (citing Ex. 1003 ¶¶ 137–148).

Petitioner further contends that Tanenbaum discloses that TCP/IP data is exchanged in segments. Pet. 43 (citing Ex. 1006, 525 ("The sending and receiving TCP entities exchange data in the form of segments."), 522 ("A TCP entity accepts user data streams from local processes, breaks them up into pieces . . . and sends each piece as a separate IP datagram.")).[4] We agree. Petitioner also persuasively contends that the "transport entity, which does the dividing, can be on a network interface card (network interface device)." *Id.* at 43–44 (citing Ex. 1006, 480). According to Petitioner,

[4] We refer to the original page numbering in Tanenbaum, not the exhibit page numbers added by Petitioner.

> A POSA would know how to modify Erickson's UDP script (udpscript at Ex.1005, Erickson at 7:51-64) so that, rather than filling in the UDP Length and Checksum shown in Erickson, the modified script would fill in the TCP Sequence number, Length and Checksum. This script involves minimal changes from the UDP script. Ex.1003, Horst Decl. Appendix A limitation 1.4. The "*dividing, by the interface device, the data into segments*" limitation is met by the foregoing obvious TCP script for Erickson. Erickson's senduserdatagram (Ex.1005, Erickson at 7:23-32) user process triggers the I/O device adapter to send each segment, by "spanking" the GO register. The adapter calculates the TCP checksum, transmits the packet, updates the shared state in Hardware Register 504, and waits for GO to be set again for the next segment. Repeated invocations of the TCP script (by repeatedly spanking the GO register) with pointers to data for consecutive segments result in the interface device dividing the user data stream into TCP segments.

Pet. 44–45. Petitioner contends other TCP scripts would also have been obvious modifications to Erickson. Id. at 45–46 (citing Ex. 1003, Appendix A § 1.4).

Patent Owner advances various arguments as to why the proposed combination does not teach "dividing, by the interface device, the data into segments" or teaches away from such a combination.

First, Patent Owner contends "Tanenbaum and Erickson both perform data division (or segmentation) on the host, and neither one suggests segmentation being performed on the NIC." PO Resp. 24. According to Patent Owner, "Erickson's I/O device adapter receives and operates on single UDP datagrams and has no need to further divide the datagrams into segments." *Id.* at 25. Additionally, Patent Owner contends, "Erickson's pseudocode procedures that prepare a UDP datagram for transmission require the memory address and length of the user data to be provided as two

parameters." *Id.* (citing Ex. 1005 at 7:21–8:2; Ex. 2028 at 120:7–123:7). "As such," Patent Owner asserts, "it is clear that the both the senduserdatagram() and udpscript() procedures in Erickson operate on a single UDP datagram only," and "[t]here is no built-in functionality within Erickson's I/O device adaptor for dividing a large block of user data into multiple segments." *Id.* (citing Ex. 2026 ¶ 91).

Further, Patent Owner contends, whereas Petitioner alleges that the combination of Tanenbaum and Erickson discloses this limitation because Tanenbaum describes a TCP entity that can accept user data streams and break them up into pieces, the traditional TCP functionality described by Tanenbaum occurs completely on the host and not on the network interface device." *Id.* at 25–26 (citing Pet. 43–44; Ex. 2026 ¶ 92). While recognizing that Tanenbaum discloses that the transport entity "can be . . . on the network interface card," Patent Owner contends that statement "refers to transport entities as a generic class, and is not specific to any particular protocol" and "does not necessarily apply to the TCP entity that Petitioner relies on for Tanenbaum's disclosure of dividing data into segments." *Id.* at 26 (citing Ex. 1006, 480, 522). To the contrary, Patent Owner contends, "when discussing the TCP entity, Tanenbaum expressly states that it is 'either a user process or part of the kernel that manages TCP streams and interfaces to the IP layer'—both of which refer to processes on the host, not a separate network interface." *Id.* (citing Ex. 1006, 522). According to Patent Owner, "[t]his makes sense in view of Tanenbaum's later discussion of Fast TPDU processing, in which Tanenbaum explains that offloading transport protocol processing for complex protocols such as TCP/IP is difficult and does not make sense." *Id.* at 26–27 (citing Ex. 1005, 570–71;

Ex. 2026 ¶ 94). Thus, at best, Patent Owner concludes, the combination of Erickson and Tanenbaum "shows traditional segmentation by the host protocol stack and then the prepending of a single header to a single UDP datagram," as "there is not mechanism for dividing data segments in Erickson's I/O device, nor is one disclosed in Tanenbaum that would function on a network interface." *Id.* at 28 (emphases omitted) (citing Ex. 2026 ¶ 96).

Second, Patent Owner contends Petitioner's argument Erickson could have been modified to implement certain scripts that would perform the claimed dividing operation "relies entirely on the conclusory opinions of Petitioner's expert," as "[i]t is undisputed that neither Erickson nor Tanenbaum disclose the scripts that Dr. Horst alleges would have been obvious to those of ordinary skill." *Id.* at 29 (citing Pet. 44–46). According to Patent Owner, Petitioner "cannot rely on the purported knowledge of one of ordinary skill to fill-in the gaps and allege that entire limitations not disclosed the prior art would have been obvious to add." *Id.* at 30. Patent Owner contends such argument "should be procedurally barred under 35 U.S.C. § 311(b), which limits *inter partes* review to 'ground[s] that could be raised under 102 or 103 and ***only on the basis of prior art consisting of patents or printed publications***." *Id.* at 30–31. And "even assuming *arguendo* that Dr. Horst's scripts are not strictly a product of hindsight reconstruction," Patent Owner contends, "a POSA would nevertheless have had no motivation to implement them with Erickson's adapter," because the scripts "would have defeated the stated purpose of Erickson" and "Dr. Horst admitted in his deposition that his scripts would require multiple DMA

transfers requiring repeated access to the I/O bus." *Id.* at 32 (citing Ex. 1001, 41:37–40; Ex. 2029, 99:14–100:2).

Third, Patent Owner contends that, not only does the combination of Erickson and Tanenbaum not disclose an interface device being able to divide data into segments, it teaches away from an interface having such a separate processor. PO Resp. 35–55. While acknowledging Petitioner's arguments regarding similarities between UDP and TCP, as well as Tanenbaum's disclosure of a fast-path procedure for TCP, Erickson's reference to the 1981 version of Tanenbaum, and the growing popularity of TCP/IP in the mid-1990s, Patent Owner contends that a person of ordinary skill in the art "would never have combined these references for a plurality of reasons, none of which are addressed in the Petition." *Id.* at 35.

According to Patent Owner, Tanenbaum "expressly teaches away from the use of a separate device, such as Erickson's I/O adapter, for TCP/IP protocol processing." *Id.* at 35–36. Indeed, Patent Owner contends, Tanenbaum "goes so far as to characterize the notion that processing should be offloaded as a "'***myth***'" and "goes even further, ***expressly teaching*** that faster processing can be achieved by making the protocol simply, and ***having the main CPU do the work***":

> Furthermore, when two general-purpose CPUs communicate, ***race conditions can occur***, so elaborate protocols are needed between the two processors to synchronize them correctly[.] Usually, ***the best approach is to make the protocols simple and have the main CPU do the work.***

PO Resp. 36–37 (quoting Ex. 1006, 570–71). Patent Owner contends, "Tanenbaum cites to the 'race conditions' created by offloading 'elaborate protocols,' but offers no solution to this problem, a fact Petitioner's own

expert agrees with." *Id.* at 37 (citing Ex. 2029, 24:24–25:8, 25:12–14, 26:18–19). "Nor would one of ordinary skill in the art understand how to offload based on Tanenbaum's disclosure," according to Patent Owner, and "Tanenbaum explicitly discloses that ***TCP*** transport entities are implemented in 'a user process or part of the kernel that manages TCP streams and interfaces to the IP Layer'—both of which are ***host*** processes, *i.e.*, both occur on the ***host*** cpu, not a network interface." *Id.* at 38 (citing Ex. 2026 ¶ 110; Ex. 1006, 522). Moreover, Patent Owner contends, "Petitioner provides ***no*** explanation as to how, or indeed, why a POSA would have modified Tanenbaum in such a way." *Id.*

Further, according to Patent Owner, a person of ordinary skill in the art "would never have combined Tanenbaum with Erickson because the references are completely different, and technically incompatible," insofar as "Erickson is directed to a UDP implementation, in contrast to Tanenbaum's TCP/IP implementation." *Id.* at 39. Patent Owner contends the "differences between UDP and TCP would require a POSA 'to fundamentally redesign *Erickson* to include functionality not discussed in either reference.'" *Id.* at 40 (quoting Ex. 2026 ¶ 111). Further, Patent Owner contends, a POSA would not even know how to modify Erickson's I/O device adapter to support TCP. *Id.* at 42 (citing Ex. 2026 ¶ 113).

Still further, Patent Owner contends, Tanenbaum does not include an express motivation to combine the cited references. *Id.* at 42. Specifically, Patent Owner asserts, Erickson cites the 1981 edition of Tanenbaum for a reason unrelated to protocol offload, and "a POSA would not have incentive to pick specific, unrelated parts of Tanenbaum and combine it with Erickson,

particularly in view of Tanenbaum's teaching away from offloading for TCP/IP." *Id.* at 43 (citing Ex. 2026 ¶ 114).

Patent Owner additionally contends that a person of ordinary skill in the art would not have had a reasonable expectation of success in combining Tanenbaum with Erickson (*id.* at 43–44); that Petitioner "mischaracterize[s] the purported similarities between Erickson and Tanenbaum" (*id.* at 45); that the complexities of the technology weigh against combining Erickson and Tanenbaum (*id.* at 46–49); that marketplace demands discouraged offloading TCP/IP protocol processing (*id.* at 49–51); and that combining Erickson with Tanenbaum would have the increased complexity of Erickson's I/O adapter, including by increasing I/O bus access and requiring additional logic (*id.* at 51–55).

In its Reply, Petitioner responds that Erickson explicitly states its invention can be used with TCP/IP and describes Tanenbaum as a source of information about TCP/IP, and that both TCP and UDP were designed to be alternative transport protocols for the Internet Protocol." Pet. Reply 1–2. According to Petitioner, TCP and UDP were the "two main protocols" designed to operate over IP; were known alternatives; both were cited by Erickson; and Tanenbaum discussed both protocols at length. *Id.* at 1–3 (citing Ex. 1005, 8:4–6 ("There are different scripts for different types of datagrams 702 (e.g., UDP or TCP)."); Ex. 1006, 521; Ex. 1003 ¶ 109; Ex. 1223 ¶¶ 24–25, 30). Petitioner contends that Patent Owner's arguments that differences between UDP and TCP would require a "fundamental[] redesign" contradict Erickson's express disclosure that it supports TCP by means of a TCP script. *Id.* at 3. Petitioner argues that Tanenbaum does not teach away from the invention and that Patent Owner's argument is based on

the false premise that Tanenbaum is the base reference for the combination, whereas Petitioner's combination is the use of Tanenbaum's TCP fast-path processing to implement TCP processing for Erickson's adapter. *Id.* at 5–6 (citing PO Resp. 38; Pet. 38–76).

Addressing the portion of Tanenbaum cited by Patent Owner as teaching away, Petitioner contends, "[a]t most, Tanenbaum[] suggests that offloading using two different processors may not work well if the second processor is cheaper and slower than the main CPU unless the protocol is very simple," but "does not suggest that a 'plug-in board with a second CPU and its own program' will not work well if the second CPU is fast enough, regardless of the complexity of the offloaded protocol." *Id.* at 6–7 (citing Ex. 1006, 570–71). Further, Petitioner asserts, Tanenbaum "states that while 'in the ESTABLISHED state' TCP processing is 'straightforward,' not complex." *Id.* at 7 (quoting Ex. 1006, 565–66).

With respect to Patent Owner's arguments regarding the "dividing" limitation, Petitioner argues those fail as a matter of law and also are wrong on the facts. Pet. Reply 14–15. First, Petitioner contends, Patent Owner attacks the prior art references individually and in isolation, rather than addressing the combination identified by Petitioner. *Id.* (citing PO Resp. 24–33; *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986)). Further, Petitioner contends, contrary to Patent Owner's argument, "the Federal Circuit has been clear that it is appropriate to rely on expert testimony about ordinary skill in the art in determining obviousness." *Id.* at 18 (citing *Genzyme Therapeutic Prods. LP v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1372 (Fed. Cir. 2016)). Second, Petitioner contends, Patent Owner's arguments are factually incorrect because "dividing . . . into

segments" is required by TCP, as a connection-oriented protocol that accepts an arbitrarily long stream of data and transports it in packets (i.e., "TCP segments") of a fixed maximum length. *Id.* at 15 (citing Pet. 43). Petitioner points out that "Patent Owner . . . does not argue that, if a POSA were to implement Tanenbaum[]'s TCP/IP processing on Erickson's adapter, this limitation would not be met," and "[t]here is . . . no dispute that if Tanenbaum[]'s fast TCP/IP protocol processing were performed by Erickson's network interface device, the combination would meet the limitation of 'dividing, by the interface device, the data into segments,'" as argued in the Petition. *Id.* (citing Pet. 43–46; Ex. 1003, Appendix A § 1.4).

Indeed, Petitioner argues, "Erickson explicitly teaches that TCP/IP could be implemented on Erickson's adapter," and a "POSA would certainly have had more than a reasonable expectation of success in implementing Erickson's TCP/IP scripts based on Tanenbaum[] (e.g., using freely available TCP segmentation source code, which would result in Erickson's adapter 'dividing, by the network interface device, the data into segments' as claimed." *Id.* (citing Ex. Pet. 18, 43–46; Ex. 1003 ¶ 140, Appendix A § 1.4). Regarding Patent Owner's argument that the proposed scripts would "require repetition, creating undesirable I/O bus access that would slow down Erickson's system" (PO Resp. 32), Petitioner contends Patent Owner is incorrect because "no extra data movement across the I/O bus is required" for "both the UDP script and the exemplar TCP scripts." Pet. Reply 17 (citing Ex. 1223 ¶ 46). Furthermore, Petitioner contends, Dr. Almeroth conceded on cross-examination that it would be within the abilities of a POSA to put a loop around the "*senduserdatagram*" code in Erickson, which "would have resulted in the GO bit being repeatedly spanked," contrary to

Patent Owner's argument. *Id.* at 17–18 (citing Ex. 1224, 85:23–87:6; Ex. 1003, Appendix A § 1.4).

After full consideration of the parties' respective arguments and evidence, we are persuaded, for the reasons stated by Petitioner and discussed above, that Petitioner has established by a preponderance of the evidence that Erickson in view of Tanenbaum teaches or suggests "dividing, by the interface device, the data into segments," as recited in claim 1. *See* Pet. 43–46 (and evidence cited therein). We are also persuaded, for the reasons stated by Petitioner and discussed above, that Petitioner has sufficiently established that a person of ordinary skill in the art would have been motivated to combine the teachings of Erickson and Tanenbaum and would have had a reasonable expectation of success in adapting Erickson to utilize TCP. *Id.* at 34–38, 44–46.

Patent Owner's arguments to the contrary are not persuasive to rebut Petitioner's showing. First, we do not find that Tanenbaum teaches away from combination with Erickson. *Cf.* PO Resp. 35–37. A reference can be said to teach away "when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013). However, "[a] reference that 'merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into' the claimed invention does not teach away." *Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017) (quoting *Galderma*, 737 F.3d at 738). The latter is the case here. Although Tanenbaum states, for example, that "elaborate protocols"

may be needed "between . . . processors to synchronize them correctly" and that "[u]sually, the best approach is to make the protocols simple and have the main CPU do the work" (Ex. 1006, 571), we find that those statements merely express a preference and would not discourage what Erickson already teaches, namely, fast-path processing. We understand Petitioner to rely on Tanenbaum for greater detail regarding TCP, given that Erickson explicitly cites an earlier version of Tanenbaum for that specific purpose. *See, e.g.*, Pet. 34–37; Pet. Reply 1–5, 8–13.

Moreover, the portion of Tanenbaum cited by Patent Owner (PO Resp. 26–27, 36–37) discloses that if an effort is made to "avoid having the network coprocessor be as expensive as the main CPU, it is often a slower chip," which results in the "(fast) CPU [being] idle waiting for the second (slow) CPU to do the critical work." Ex. 1006, 570–71. Hence, contrary to Patent Owner's contentions that Tanenbaum teaches away from the use of a separate device, such as Erickson's I/O adapter, for TCP/IP protocol processing (*see, e.g.*, PO Resp. 35–36), Tanenbaum actually discloses only that the system may not be optimal if a less "expensive" CPU is selected and the "slow CPU" "do[es] the critical work." Indeed, rather than teaching away, we understand that passage instead to suggest the use of a commensurately fast chip as a network coprocessor for purposes of offload.

Still further, Patent Owner's arguments essentially imply that it would not have been obvious to one of ordinary skill in the art to have bodily incorporated the teachings of Erickson into Tanenbaum (or vice versa). *See, e.g.*, PO Resp. 38. We are not persuaded by Patent Owner's argument at least because "[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the

primary reference. . . . Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

Finally, regarding the specific step of "dividing, by the interface device, the data into segments," we agree with Petitioner that it is necessary to look at what the combined teachings of the references would have suggested to those of ordinary skill in the art, rather than focusing solely on what the individual references suggest independently. Pet. Reply 15–16; *MCM Portfolio LLC v. Hewlett-Packard Co.*, 812 F.2d 1284, 1294 (Fed. Cir. 2015). In that regard, we credit the testimony of Dr. Horst and agree with Petitioner that a person of ordinary skill in the art would have had a reasonable expectation of success in implementing Erickson's TCP/IP scripts based on Tanenbaum (*see* Pet. 43–46; Ex. 1003 ¶ 140, Appendix A § 1.4), and we are not persuaded by Patent Owner's argument (*see* PO Resp. 24) that the combination of Erickson and Tanenbaum cannot teach dividing by the NIC because neither reference individually so teaches.

We likewise agree with Petitioner that it is appropriate to rely on expert testimony regarding what the combined teachings of the references would have suggested to a person of ordinary skill in the art at the time of the invention and whether such a person would have had a reasonable expectation of success. *See* Pet. Reply 18; *Genzyme Therapeutic*, 825 F.3d at 1372–73. We are persuaded, moreover, that it would have been within the ability of a person of ordinary skill in the adapt Erickson's UDP scripts to support TCP, as proposed by Dr. Horst, particularly in view of Erickson's explicit disclosure. *See* Pet. 44–45; Ex. 1003, Appendix A § 1.4; *see also KSR*, 550 U.S. at 421 ("A person of ordinary skill is also a person of

ordinary creativity, not an automaton."). Dr. Almeroth's testimony to the contrary, which merely copies verbatim portions of Patent Owner's arguments (*compare* Ex. 2026 ¶¶ 91–100, *with* PO Resp. 25–32), does not persuade us otherwise. *See* 37 C.F.R. § 42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.)."

"*creating headers for the segments, by the interface device, from a template header containing the protocol header information*"

Petitioner persuasively contends Erickson in combination with Tanenbaum discloses this limitation. Pet. 47. Specifically, Petitioner relies on Erickson's description of a UDP script running on the I/O device adapter "creating UDP/IP/MAC headers for datagrams by filling in protocol template header 702 shown in Fig. 7," and its disclosure of other protocol scripts including TCP/IP. *Id.* (citing Ex. 1005, 5:47–51). Similar to its contentions discussed above, Petitioner persuasively contends it would have been obvious to a person of ordinary skill in the art to create a TCP version of the script described in Erickson that exchanges data in the form of segments based on Tanenbaum's TCP prototype header. *Id.* at 47–48. Figure 6-50 of Tanenbaum is reproduced below:

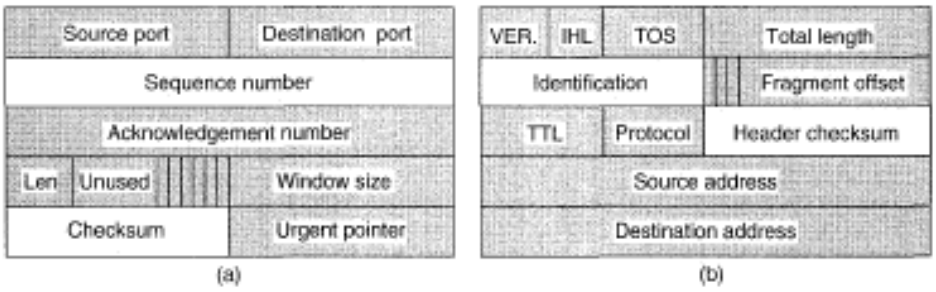

Fig. 6-50. (a) TCP header. (b) IP header. In both cases, the shaded fields are taken from the prototype without change.

Figure 6-50 of Tanenbaum depicts a TCP and IP header with shaded areas indicating no changes during one-way data transmission.

Ex. 1006, 566. Petitioner contends that in the proposed combination, "the modified script would fill in the TCP Sequence number, Length and Checksum." Pet. 48; Ex. 1003 ¶ 40, Appendix A § 1.4. We again agree.

Patent Owner does not raise any counterarguments or point to any contrary evidence with respect to this limitation, and we are persuaded by Petitioner's arguments and cited evidence that the limitation is taught by the combination of Erickson and Tanenbaum.

"and prepending the headers to the segments to form transmit packets."

Petitioner persuasively contends Erickson in combination with Tanenbaum discloses this limitation. Pet. 49–50. In particular, Petitioner relies on Erickson's description of UDP datagram template 702 without user data residing in the I/O device adapter's memory. *Id.* (citing Ex. 1005, 7:39–47). Petitioner contends a person of ordinary skill in the art would have recognized that one of two obvious ways to concatenate the user data and the header (such as the described UDP header or TCP header in Tanenbaum) would have been to prepend the header to the segmented user

data in the system of Erickson as modified by Tanenbaum. *Id.* at 50; Ex. 1003 ¶¶ 36–37, Appendix A § 1.6. We agree.

Patent Owner does not raise any counterarguments or point to any contrary evidence with respect to this limitation, and we are persuaded by Petitioner's arguments and cited evidence that the limitation is taught by the combination of Erickson and Tanenbaum.

* * *

Accordingly, after full consideration of the parties' respective arguments and evidence, we are persuaded, for the reasons stated by Petitioner and discussed above, that Petitioner has established by a preponderance of the evidence that Erickson in view of Tanenbaum taught or suggest each of the limitations of claim 1.

b. Independent Claims 9 and 15

Independent claim 9 differs from claim 1 principally by omitting claim 1's recitation of "establish[ment of] . . . a transport later connection"; adding that "status information" is created and transferred along with the recited protocol information; and adding a step of "transmitting the packets on a network." *See* Ex. 1001, 97:57–98:6. Independent claim 15 differs from 1 in that it specifically recites establishing "a Transmission Control Protocol (TCP) connection" and specifies that the "context" includes "status information and Internet Protocol (IP) addresses and TCP ports for the connection," rather than merely "protocol header information." *Id.* at 98:29–42. Petitioner relies on the combination of Erickson and Tanenbaum as teaching or suggesting each of these additional elements. Pet. 62–66.

Patent Owner relies on the same arguments for claims 9 and 15 as for claim 1 and does not present any additional arguments with respect to

claims 9 and 15 specifically. We are persuaded by Petitioner's arguments and cited evidence, for the reasons stated by Petitioner and as set forth in our discussion of claim 1, that the subject matter of claims 9 and 15 is taught by the combination of Erickson and Tanenbaum.

c. Claim 2

Claim 2 depends from claim 1 and further recites the step of "transferring status information for the context to the interface device during the same operation as transferring protocol header information to the interface device." Ex. 1001, 97:32–35.

Petitioner persuasively contends that although the '072 patent does not define "status information" as recited in claim 2, challenged claim 3 indicates that status information may include information found in the template header. Pet. 51. Petitioner points out that Tanenbaum's Figure 6-50 (reproduced above) describes a prototype TCP header including Acknowledgement and Sequence numbers, and also that datagram template 702 in Figure 7 of Erickson, reproduced below, includes protocol header information. *Id.* at 51–52 (citing Ex. 1005, Fig. 7; Ex. 1006, 566 (Fig. 6-50)).

FIG. 7

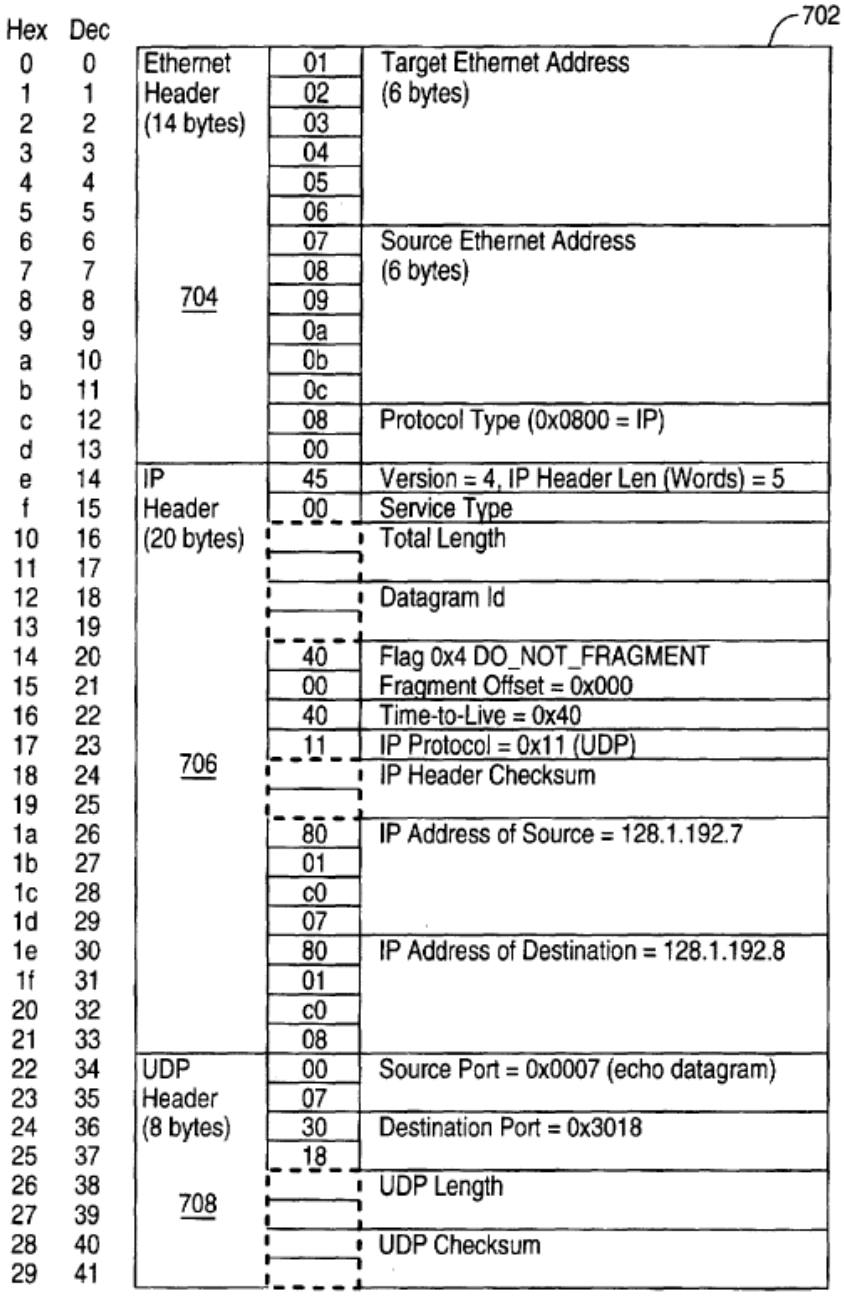

Figure 7 of Erickson is a block diagram illustrating a UDP datagram template 702 (without a user data area) residing in the I/O device adapter's memory.

Ex. 1005, 7:39–41. Petitioner further contends datagram template 702, including protocol header information, is transferred to the interface device when the protocol script on the adapter is called. Pet. 52–53 (citing

Ex. 1005, 5:37–51, 8:2–4). With reference to the fields illustrated in Figure 6-50 of Tanenbaum, Petitioner points specifically to the TCP Acknowledgement number as satisfying the requirement for "transferring status information for the context to the interface device" recited in claim 2. *Id.* at 54. Petitioner further contends Erickson in view of Tanenbaum "also discloses that *transferring status information* [occurs] . . . *during the same operation as transferring protocol header* because a POSA would understand that at least the TCP Acknowledgement number is a part of the prototype header that is transferred to the I/O device adapter." *Id.* (alteration in original). Specifically, Petitioner contends, "Erickson does not disclose multiple phases of header template transfer and a POSA would understand it to be a single operation or would find it obvious to perform the entire transfer as a single operation such as a single DMA transfer." *Id.* (citing Ex. 1003, Appendix A § 2). Finally, Petitioner contends, "Erickson also discloses transferring data from the host to the I/O device adapter's memory." *Id.* at 55 (citing Ex. 1005, 8:30–34). Thus, Petitioner contends,

> it would have been obvious to a POSA to modify the Erickson UDP teachings to support TCP by transferring the TCP prototype header shown in Tanenbaum[] including protocol header information (TCP, IP and Ethernet headers) and status information (e.g. TCP Sequence and Acknowledgement numbers) in a single DMA operation from host memory to adapter memory, thereby "*transferring status information for the context to the interface device during the same operation as transferring protocol header information to the interface device*."

Id.

Patent Owner responds that "[n]either Erickson nor Tanenbaum disclose that both status information for the context and protocol header

information are transferred to the interface device 'during the same operation' as required under claim 2." PO Resp. 33. Rather, Patent Owner contends,

> Erickson discloses that the transfer of a UDP datagram template to the I/O device adapter (which, according to Petitioner, constitutes the claimed transferring protocol header information to the interface device—see Petition at 52-53) is performed in a separate operation from the transfer of the user datagram and any status information associated with the user datagram to the I/O device (which Petitioner appears to agree is performed in a separate operation—see Petition at 55).

Id. (citing Ex. 1005, 7:19–33, 7:47–8:4; Ex. 2026 ¶ 102). Additionally, Patent Owner asserts,

> Erickson updates certain fields in the UDP datagram template (Ex. 1005[], 7:3–4), but this too is done in a separate operation as the operation that provides the datagram template to the I/O adapter in the first place. (Ex. 2026, ¶ 103.) Tanenbaum contains no disclosure of transferring anything other than completed IP datagrams to the network interface, (Ex. 2026, ¶ 104.) and, as such, also contains no disclosure of transferring status information and protocol header information during the same operation.

Id. at 33–34.

We are persuaded by Petitioner's arguments and evidence that the combination of Erickson and Tanenbaum teaches or suggests "transferring status information for the context to the interface device" and that it would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Erickson and Tanenbaum for such transfer to occur "during the same operation as transferring protocol header information to the interface device," as recited in claim 2. In particular, we agree with Petitioner (*see* Pet. 54) that the TCP Acknowledgement number, disclosed

by Tanenbaum, would be a part of the prototype header that would be transferred to the I/O device adapter in the asserted combination with Erickson. Patent Owner's arguments to the contrary are not persuasive to rebut Petitioner's showing. As Petitioner argues in its Reply, Patent Owner appears to be focusing improperly on the prior art references in isolation rather than on what would have been suggested to a person of ordinary skill in the art in view of the combination of Erickson and Tanenbaum. *See* Pet. Reply 18.

d. Claims 7, 14, and 21

Claim 7 depends from claim 1 and further recites the step of "receiving, by the interface device, receive packets that correspond to the context, and updating the context by the interface device to account for the receive packets." Ex. 1001, 97:51–54. Claim 14, which depends from claim 9, and claim 21, which depends from claim 15, similarly recite "receiving, by the interface device, receive packets that correspond to the *protocol information*, and updating the *status information* by the interface device to account for the receive packets" and "receiving, by the interface device, receive packets that correspond to the context, and updating the *status information* by the interface device to account for the receive packets," respectively. *Id.* at 98:25–28, 98:62–65 (emphases added). Petitioner persuasively contends these additional limitations are disclosed by Erickson in view of Tanenbaum. Pet. 61–62, 70–71, 76. In particular, Petitioner cites Tanenbaum as disclosing fast path TCP receiving of packets corresponding to connection records (i.e., contexts, in the parlance of the claims) and updating the connection records to account for the received packets or the sequence number (i.e., status information) thereof. *Id.* at 61–

62, 70–71 (citing Ex. 1006, 568–67). Further relying on Tanenbaum's disclosure that the transport entity may be on the network interface card, Petitioner contends it would have been obvious to implement Erickson's fast path TCP protocol processing for the I/O device adapter to perform the recited steps. *Id.* at 62, 71 (citing Ex. 1006, 480), 76.

In the Response, Patent Owner contends that the combination of Erickson and Tanenbaum does not show or suggest "*receiving, by the interface device*, receive packets that correspond to the [context / protocol information], and updating the [context / status information] *by the interface device* to account for the receive packets." PO Resp. 34. More specifically, Patent Owner argues:

> Erickson is directed to the ***transmit*** path and does not appear to contain any relevant disclosure of packet reception, nor has Petitioner cited Erickson for these claims. (Petition at 61–62, 70–71, 76; Ex. 2026, ¶ 105.) Accordingly, Erickson does not disclose receiving packets and updating the corresponding context or status information by the interface device. Tanenbaum discloses conventional packet processing including packet reception that, as described above in [discussion of the "dividing" step], is performed entirely on the host. (Ex. 1006[, 568–71]; Ex. 2026, ¶ 106.) Thus, at least the limitation of updating the context or status information by the interface device is not disclosed in either Erickson or Tanenbaum.

Id. at 34–35.

We are persuaded by Petitioner's arguments and evidence that the combination of Erickson and Tanenbaum teaches or suggests the "receiving" limitations recited in claims 7, 14, and 21. As Petitioner points out in its Reply, "Erickson discloses *receiving* packets via a Direct Application Interface." Pet. Reply 19 (emphasis added) (citing Ex. 1005, 4:61–5:5,

5:53–67; Ex. 1003, Appendix A § 7). We also agree with Petitioner's contention, supported by Dr. Horst's testimony, that "Erickson discloses that the I/O adapter runs protocol scripts to process outgoing *and incoming* data packets" and that "creating these scripts would have been within the ordinary skill of one in the art" *Id.* (emphasis added) (citing Ex. 1003, Appendix A §§ 1.4, 7). Again, Patent Owner's arguments to the contrary are not persuasive to rebut Petitioner's showing.

e. Claims 3–6, 8, 10–13, and 16–20

In support of its contention that claims 3–6, 8, 10–13, and 16–20 are unpatentable, Petitioner persuasively maps Erickson's and Tanenbaum's teachings to each recited limitation. Pet. 56–62, 66–70, 74–76 (citing Ex. 1005, 6:19–9, 6:57–7:4, 7:39–47, 8:10–12, Figs. 5, 7; Ex. 1006, 568; Ex. 1003 ¶¶ 28, 29, 91, Appendix A §§ 1.1, 3, 4). Patent Owner does not provide any separate argument with respect to claims 3–6, 8, 10–13, and 16–20 in the Patent Owner Response. We have considered the evidence cited in the Petition and are persuaded, for the reasons presented by Petitioner, that Petitioner has carried its burden to demonstrate by a preponderance of the evidence that the combination of Erickson and Tanenbaum teaches or suggests each of the limitations recited in claims 3–6, 8, 10–13, and 16–20.

5. Secondary Considerations

Patent Owner argues that "strong evidence of secondary considerations weighs against obviousness" of the challenged subject matter. PO Resp. 56 (emphasis omitted). In particular, Patent Owner contends that the claimed invention addresses a long-felt yet unresolved need in the art for accelerated network communications, that the claimed inventions were commercially successful, that the claimed invention received praise in the

industry, that many others tried and failed to develop the claimed technology, and that experts were skeptical of the claimed invention and taught away from it. *Id.* at 56–63. Petitioner responds that Patent Owner has failed to show any nexus between the alleged objective evidence and the features of the challenged claims, as neither Patent Owner nor its expert ties any of Patent Owner's products or the alleged "claimed network acceleration technologies" to any limitation of any claim. Pet. Reply 19. We address these arguments in turn.

a. Long-felt, yet unsatisfied need

Patent Owner alleges that there was significant demand, beginning at least in the early 1990s and recognized in academic papers and prior art publications, "to enhance the efficiency of network protocol processing and network traffic management" and that "[t]he nexus between the long-felt need and the claimed invention is clear and direct" insofar as the accelerated network processing technologies recited in the challenged claims solved recognized "bottlenecks" in data communications caused, for example, by the processing of protocols. PO Resp. 56–58 (citing Ex. 2026 ¶¶ 125–126; Exs. 2031–2034). Petitioner responds that "Patent Owner provides no evidence that the 'accelerated network processing technologies recited in the challenged claims' actually relate to the 'challenged claims,'" and that Patent Owner's "only support is its expert declaration, which is identical to the Response and likewise has no support." Pet. Reply 21.

We agree with Petitioner that Patent Owner's arguments are insufficient to establish a nexus between the alleged "long-felt, yet unresolved need" and the challenged claims. Although Patent Owner provides citations to four references that afford evidence of networking

bottlenecks (Exs. 2031–2034), we agree with Petitioner that Patent Owner has not persuasively established any connection between resolution of those bottlenecks and the patented invention. To be accorded substantial weight, evidence of secondary considerations must be shown to have a nexus with the claimed invention. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). Nexus is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining nonobviousness. *Demaco Corp. v. F. von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988). The burden of showing that there is a nexus lies with the Patent Owner. *See In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir 1994). In the absence of an established nexus with the claimed invention, secondary consideration factors are not entitled to much, if any, weight and generally have no bearing on the legal issue of obviousness. *See In re Vamco Mach. & Tool, Inc.*, 752 F.2d 1564, 1577 (Fed. Cir. 1985). Moreover, here, to the extent that offloading protocol processing could be regarded as solving any long-felt need, we note that Erickson previously disclosed offloading protocol processing. The "long-felt need" must not have been satisfied by another before the patentee. *Newell Co. v. Kenney Mfg. Co.*, 864 F.2d 757, 768 (Fed. Cir. 1988).

b. Commercial success and licensing

Patent Owner argues that "[t]he features described in the challenged claims also enjoyed great commercial success for over a decade" and that "the offloading and other network acceleration technology described in the challenged claims became 'the *de facto* standard' in network acceleration techniques shortly after its introduction and is still the standard today." PO

Resp. 58 (citing Ex. 2026 ¶ 127). Patent Owner further contends that its "patent portfolio covering network acceleration techniques was the subject of several successful commercial licenses to many large network and storage players in the industry" and that "[t]his remarkable commercial success was attributed to Patent Owner's network acceleration technology." *Id.* at 58–59 (citing Ex. 2026 ¶ 128).

Petitioner responds that Patent Owner provides no support for its assertions other than paragraphs in its expert declaration that are identical to the paragraphs in its response and are likewise entirely unsupported. Pet. Reply 21. Petitioner also argues Patent Owner does not demonstrate sufficiently that the alleged licenses were the result of the claimed invention and, therefore, fails to establish a nexus between the claimed invention and the alleged licenses. *Id.* at 22–23. Rather, Petitioner contends, Patent Owner does not attempt to tie the '072 patent to these licenses, the '072 patent is not mentioned in any of the licenses, and the licenses "resulted from a lawsuit . . . asserting that Microsoft's software and Broadcom's hardware were infringed by different patents on [TCP Offload Engine ("TOE")] technology," as a result of which lawsuits Microsoft and Broadcom took a license and a handful of other manufacturers also took licenses so they could utilize certain Microsoft software that supported the TOE technology. *Id.* at 23 (citing Ex. 1227; Ex. 2038).

We are not persuaded by Patent Owner's argument for at least the reasons set forth by Petitioner. *Id.* at 21–23. We agree with Petitioner that Patent Owner does not provide sufficient information or evidence to establish that the claimed invention, in fact, experienced "commercial success." In fact, as Petitioner argues, evidence of record indicates that the

claimed invention "never went anywhere" and was ultimately "deprecated." Pet. Reply 21–22 (citing Exs. 1224, 1227, 1228, 1230). Further, Patent Owner fails to show that its licensing program was successful because of the merits of claims 1–21 of the '072 patent, as opposed to, for example, other of the patents in Patent Owner's licensed portfolio, business decisions to avoid litigation, prior business relationships, or for other economic reasons. Although "there is a presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product and that product 'is the invention disclosed and claimed in the patent'" (*WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1339 (Fed. Cir. 2016) (quoting *J.T. Eaton & Co. v. Atl. Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997)), Patent Owner carries the burden of demonstrating that the "thing . . . that is commercially successful is the invention disclosed and claimed in the patent" (*Demaco*, 851 F.2d at 1392). Moreover, "[w]hen the thing that is commercially successful is not coextensive with the patented invention . . . the patentee must show prima facie a legally sufficient relationship between that which is patented and that which is sold." *Demaco*, 851 F.2d at 1392. Patent Owner has not made such a showing in this case. Additionally, we note that Patent Owner relies on the essentially the same evidence and arguments when asserting secondary considerations for at least eight other patents. *See* Cases IPR2017-01391 (concerning U.S. Patent No. 7,237,036 B2); IPR2017-01392 (concerning U.S. Patent No. 7,337,241 B2); IPR2017-01393 (concerning U.S. Patent No. 9,055,104 B2); IPR2017-01405 (concerning U.S. Patent No. 7,124,205 B2); IPR2017-01409 and IPR2017-01410 (both concerning U.S. Patent No. 8,131,880 B2); IPR2018-00226 (concerning U.S. Patent No. 7,124,205 B2); IPR2018-00234

(concerning U.S. Patent No. 8,805,948 B2); and IPR2018-00401 (concerning U.S. Patent No. 7,945,699 B2). This casts further doubt on the existence of a legal sufficient relationship between the alleged commercial success and the claimed subject matter in *this* case. Still further, even assuming that the claimed invention experienced "commercial success" or "successful commercial licens[ing]" as Patent Owner alleges, we find that offloading protocol processing, at least, was previously disclosed by Erickson. *See* discussion above. Thus, to the extent Patent Owner's alleged commercial success or licensing resulted from that feature, that success stems from what was known in the prior art so that there can be no nexus. *Tokai Corp. v. Easton Enters., Inc.*, 632 F.3d 1358, 1369 (Fed. Cir. 2011).

c. Industry praise

Patent Owner alleges that "[t]he industry universally praised commercial embodiments of the features described in the challenged claims." PO Resp. 59. In particular, Patent Owner contends that HP found that Patent Owner's NIC was "able to sustain network bandwidth comparable to that of Native NT for large messages, which is close to wire-speed" and "achiev[e] lower processor utilization than native NT's TCP/IP protocol stack for transmission of large enough messages" and that the test performance of Patent Owner's iNIC was "definitely better than [HP's] offload." *Id.* at 59–60 (citing Ex. 2026 ¶ 130; Ex. 2039 ¶ 4). Patent Owner also cites a technology analyst as opining in 2011 that a particular Alacritech product was "an evolutionary advancement of Alacritech's long standing leadership in protocol acceleration" and that "Alacritech is setting the stage for a next generation of solutions that will accelerate storage from outside the storage array." *Id.* at 60 (quoting Ex. 2040). Patent Owner further

contends that the analyst "call[ed] the patented technology 'game-changing.'" *Id.* (citing Ex. 2040, 3; Ex. 2026 ¶ 131). Petitioner responds that Patent Owner "has provided no evidence that its products practice the challenged claims." Pet. Reply 23.

Notwithstanding Patent Owner's arguments and reliance on Exhibits 2039 and 2040, we again agree with Petitioner (Pet. Reply 19–20, 23) that Patent Owner has not established a nexus between the challenged claims and the alleged objective evidence. Whereas Patent Owner argues, for example, that sources stated that Patent Owner's network interface card "is able to sustain network bandwidth," "achiev[es] lower processor utilization," and "is an evolutionary advancement of [Patent Owner's] . . . protocol acceleration" (PO Resp. 59–60 (citing Ex. 2039 ¶ 4; Ex. 2040; Ex. 2026 ¶¶ 130–131)), Patent Owner does not demonstrate sufficiently that any of these alleged statements, assuming that any of these statements would have been considered to be "praise" at all, pertain to the claimed invention and, if so, in what way. Likewise, whereas Patent Owner contends an analyst "call[ed] the patented technology 'game changing'" (*id.* at 60), the evidence indicates only that the analyst reported that he had "talked to early-stage customers using the product"—referring in context to one specific product, to which Patent Owner has not persuasively established any connection with the challenged claims—"and they believe it's game-changing" (Ex. 2040, 3). And again, we note that Patent Owner relies on the same evidence and arguments when asserting secondary considerations for other patents in Cases IPR2017-01391, IPR2017-01392, IPR2017-01393, IPR2017-01405, IPR2017-01409, IPR2017-01410, IPR2018-00226, IPR2018-00234, and IPR2018-00401, casting further doubt on any alleged

nexus between the alleged "praise" and the specific subject matter of the challenged claims in this case.

d. Failure of others

Patent Owner argues that "prior attempts at 'TCP offload [have] repeatedly failed'" as a "result of the 'complexities of deploying TCP offload in practice.'" PO Resp. 60 (alteration in original) (citing Ex. 2041, 1–13). Patent Owner alleges that "[t]he TCP offload described above is a form of network processing offload that is described by the challenged claims, and this failure of others therefore has a direct nexus to the claimed inventions." *Id.* (citing Ex. 2026 ¶ 132). Petitioner responds that "Patent Owner provides no evidence of nexus between the single article it cites and the features of the ['072 Patent." Pet. Reply 24. We again agree with Petitioner. Even if TCP offload is a form of network processing offload, Patent Owner provides no evidence linking the failure of others to any limitations of the challenged claims.

e. Skepticism

Patent Owner argues that "experts and industry were skeptical of offloading processing of complex protocols such as TCP/IP, and expressly taught away from offloading." PO Resp. 61. Patent Owner points specifically to the same portion of Tanenbaum that it relied upon previously as teaching away from the claimed invention, as well as to a paper published by Dr. Horst that Patent Owner alleges "expressed a high level of skepticism that offloading would result in any beneficial results." *Id.* at 61–62 (citing Ex. 1006, 570–571; Ex. 2300, 194). Petitioner responds that, while Tanenbaum "states a preference for an alternative because of expense and complexity, it never suggests a 'plug-in board with a second CPU and its

own program' will not work with a fast-enough processor, regardless of the offload protocol," and furthermore, "Dr. Horst's article in fact confirms the 'conventional wisdom' was that special purpose NICs were used for TCP/IP." Pet. Reply 24. Accordingly, Petitioner contends, Patent Owner's reliance on Tanenbaum and Dr. Horst's article is misplaced. *Id.*

We are not persuaded by Patent Owner's argument for at least the reasons set forth by Petitioner. Further, as previously discussed, Erickson, for example, discloses offloading processing of complex protocols. There can be no nexus if the feature relied upon was previously known in the prior art. *Tokai Corp.*, 632 F.3d at 1369. Nor would one of ordinary skill in the art have been "skeptical" of procedures (e.g., offloading) that a person of ordinary skill in the art would have recognized to have already been disclosed in the prior art (e.g., Erickson).

6. Conclusion of Obviousness

Patent Owner's proffered evidence of alleged secondary considerations does not overcome Petitioner's strong evidence regarding the teachings of Erickson and Tanenbaum with respect to the subject matter of claims 1–21. Accordingly, for the foregoing reasons, we conclude that Petitioner has shown by a preponderance of the evidence that the subject matter of claims 1–21 would have been obvious to a person of ordinary skill in the art at the time of the invention over Erickson and Tanenbaum.

C. Patent Owner's Motion to Exclude

In *inter partes* review proceedings, documents are admitted into evidence subject to an opposing party asserting objections to the evidence and moving to exclude the evidence. 37 C.F.R. § 42.64.

Patent Owner moves to exclude Tanenbaum as "irrelevant, as Petitioner has failed to establish that [it] is prior art." Paper 60, 2–6. Patent Owner also moves to exclude Exhibit 1011, the Declaration of Rice Majors regarding Tanenbaum ("Majors Declaration"), contending that "it is inadmissible hearsay and inadmissible layman opinion." *Id.* at 2, 6–9

Petitioner responds that Patent Owner's arguments are directed at the sufficiency of Petitioner's evidence, not the admissibility of Tanenbaum. Paper 64, 3. Moreover, Petitioner contends, Patent Owner never objected to the relevance of Tanenbaum and, accordingly, waived the opportunity to move to exclude it. *Id.* at 4 (citing Paper 14 (Patent Owner's Objections to Evidence)).

Federal Rule of Evidence 401 provides that evidence is relevant if "it has any tendency to make a fact more or less probable than it would be without the evidence" and "the fact is of consequence in determining the action." Both the Federal Circuit and the Board have recognized that there is a "low threshold for relevancy." *See, e.g., OddzOn Prods., Inc. v. Just Toys, Inc.*, 122 F.3d 1396, 1407 (Fed. Cir. 1997); *Laird Techs., Inc. v. GrafTech Int'l Holdings, Inc.*, Case IPR2014-00025, slip op. at 44 (PTAB Mar. 25, 2015) (Paper 45) ("*Laird Techs.*"). There is no question that Tanenbaum is relevant to the patentability of the challenged claims in this case. Tanenbaum is a widely recognized and readily accessible reference explaining network protocols including UDP, TCP, and IP. Further, as Petitioner points out, the record does not show that Patent Owner timely objected to Tanenbaum on the basis of relevance, and Patent Owner, accordingly, waived that objection. *See* Paper 14, 3 (raising objections to

Tanenbaum under FRE 901 (authentication) and 801 (hearsay), but not under FRE 401 (relevance)).

Accordingly, we deny Patent Owner's Motion to Exclude as it relates to Tanenbaum.

We also dismiss as moot Patent Owner's Motion to Exclude as it relates to the Majors Declaration because we do not rely on that declaration in rendering this Decision.

D. Petitioner's Motion to Exclude

Petitioner moves to exclude portions of Dr. Almeroth's declaration (Exhibit 2026) because, according to Petitioner, portions thereof "are identical to the arguments in" Patent Owner's Corrected Response to the Petition and, "[when] counsel for Petitioner asked [Patent Owner's expert, Dr. Almeroth] why portions of the Patent Owner's oppositions were identical to the expert's purported declaration . . . Counsel for Patent Owner instructed Dr. Almeroth not to answer on the basis of privilege." Paper 59, 2–4.

Although we agree with Petitioner that significant portions of Dr. Almeroth's declaration indeed are identical to arguments Patent Owner's Response and lack disclosure of underlying facts or data on which they are based, we nonetheless agree with Patent Owner that "Petitioner's complaints go to the weight of Dr. Almeroth's opinions and not their admissibility." Paper 63, 4. As explained in *Laird Techs.*, "[a] motion to exclude . . . is not an appropriate mechanism for challenging the sufficiency of evidence or the proper weight that should be afforded an argument." Case IPR2014-00025, slip op. at 42 (Paper 45). Moreover, "[o]ur general approach for considering challenges to the admissibility of evidence was outlined in *Corning Inc. v.*

DSM IP Assets B.V., Case IPR2013-00053, slip op. at 19 (PTAB May 1, 2014) [(Paper 66)]," which stated that, "similar to a district court in a bench trial, the Board, sitting as a non-jury tribunal with administrative expertise, is well-positioned to determine and assign appropriate weight to evidence presented." *Id.* (citing *Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) ("One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received . . . .")). Accordingly, we deny Petitioner's motion to exclude.

E. Patent Owner's Contingent Motion to Amend

Patent Owner filed a contingent motion to substitute independent claims 1, 9, and 15 with proposed claims 22, 30, and 36 and dependent claims 2–8, 10–14, and 16–21 with proposed claims 23–29, 31–35, and 37–42, respectively, if the original claims are found unpatentable. Mot. Amend.

Before considering the patentability of any substitute claims, we first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. A motion to amend may "cancel any challenged patent claim" or, for each challenged claim, "propose a reasonable number of substitute claims." 35 U.S.C. § 316(d)(1). Our corresponding rule provides that "[t]he presumption is that only one substitute claim would be needed to replace each challenged claim." 37 C.F.R. § 42.121(a)(3). Furthermore, a motion to amend "may not enlarge the scope of the claims of the patent or introduce new matter." 35 U.S.C. § 316(d)(3). Our corresponding rule provides that "[a] motion to amend may be denied where . . . [t]he amendment seeks to

enlarge the scope of the claims of the patent or introduce new subject matter." 37 C.F.R. § 41.121(a)(2)(ii).

In the Federal Circuit's *en banc* decision in *Aqua Products, Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017), the lead plurality opinion explains that "the patent owner must satisfy the Board that the statutory criteria in § 316(d)(1)(a)–(b) and § 316(d)(3) are met and that any reasonable procedural obligations imposed by the Director are satisfied." *Id.* at 1305–06; *see also id.* at 1341 ("There is no disagreement that the patent owner bears a burden of production in accordance [with] 35 U.S.C. § 316(d)." (Reyna, J., writing for a majority)).

On November 21, 2017, the Office provided guidance on motions to amend in view of *Aqua Products*. *See* "Guidance on Motions to Amend in view of *Aqua Products*" (Nov. 21, 2017) (https://www.uspto.gov/sites /default/files/documents/guidance_on_motions_to_amend_11_2017.pdf). In that Guidance, the Office explained:

> In light of the *Aqua Products* decision, the Board will not place the burden of persuasion on a patent owner with respect to the patentability of substitute claims presented in a motion to amend. . . . Thus, for example, if the entirety of the evidence of record before the Board is in equipoise as to the unpatentability of one or more substitute claims, the Board will grant the motion to amend with respect to such claims, and the Office will issue a certificate incorporating those claims into the patent at issue.
>
> Beyond that change, generally speaking, practice and procedure before the Board will not change. For example, a patent owner still must meet the requirements for a motion to amend under 37 C.F.R. § 42.121 or § 42.221, as applicable. That is, a motion to amend must set forth written description support and support for the benefit of a filing date in relation to

> each substitute claim, and respond to grounds of unpatentability involved in the trial.

Id. at 2.

We, therefore, determine whether Patent Owner has met its burden of production of a threshold of evidence sufficient to establish that its Motion to Amend complies with 35 U.S.C. § 316(d)(1)(a)–(b), § 316(d)(3), and 37 C.F.R. § 42.121.

1. Insufficient Written Description for Substitute Claims

With regard to written description support for the proposed substitute claims, Patent Owner's Motion to Amend merely argues:

> The chart included in **Appendix A** indicates where support can be found for the substitute claims from the original disclosure of the '072 Patent—from U.S. App. No. 11/821,820 ("the '820 Application") (Exhibit 2024).
>
> . . .
>
> The '072 Patent claim[s] priority to U.S. Prov. App. No. 60/061,809, filed on Oct. 14, 1997. "Support in an earlier-filed disclosure" for which "benefit of the filing date of the earlier filed disclosure is sought" is shown in the chart included as **Appendix B**.

Mot. Amend 3–4.

Initially, we find Patent Owner's argument in the Motion to Amend itself is insufficient to satisfy Patent Owner's threshold burden of production, because it merely indicates that the required written description support can be found elsewhere, namely, in the claim charts included in Appendixes A and B.[5] *See id.* Even taking into account the information

[5] We note that Patent Owner, with leave from the Board, filed as Paper 62 corrected exhibits to its Motion to Amend on June 15, 2018. References here and below to Appendixes A and B refer to the corrected exhibits.

provided in the cited claim charts, however, the Motion to Amend still fails to produce sufficient evidence of written description support for each substitute claim. For example, the claim chart entry in Appendix A for substitute claim 22 (replacing independent claim 1) is reproduced below:

Claims	Exemplary Support in the '820 Application
Proposed Claim 22	
~~1~~22. A method comprising:	*See* below.
establishing, at a host computer, a transport layer connection, including creating a context that includes a media access control (MAC) layer address, an Internet Protocol (IP) address and Transmission Control Protocol (TCP) state information ~~protocol header information~~ for the connection;	*See, e.g.*, Ex. 2024 at Abstract, Figs. 1-3, 4A-4D, and 5-12, Pages 7-8, 10-17, Cl. 1.
transferring the context ~~protocol header~~ information to an interface device;	*See, e.g.*, Ex. 2024 at Abstract, Figs. 1-3, 4A-4D, and 5-12, Pages 7-8, 10-17, Cl. 1.
transferring data from the network host to the interface device, after transferring the context ~~protocol header~~ information to the interface device;	*See, e.g.*, Ex. 2024 at Abstract, Figs. 1-3, 4A-4D, and 5-12, Pages 7-8, 10-17, Cl. 1.
dividing, by the interface device, the data into segments;	*See, e.g.*, Ex. 2024 at Abstract, Figs. 1-3, 4A-4D, and 5-12, Pages 7-8, 10-17, Cl. 1.
creating headers for the segments, by the interface device, from a template header containing ~~the~~ protocol header information including IP address and TCP state information; and	*See, e.g.*, Ex. 2024 at Abstract, Figs. 1-3, 4A-4D, and 5-12, Pages 7-8, 10-17, Cl. 1.
prepending the headers to the segments to form transmit packets.	*See, e.g.*, Ex. 2024 at Abstract, Figs. 1-3, 4A-4D, and 5-12, Pages 7-8, 10-17, Cl. 1.

Paper 62, Appendix A at i. Patent Owner's Appendix A claim chart for substitute claim 22, reproduced above, provides string citations to figures and paragraphs of Exhibit 2024, but provides no explanation as to how the citations disclose the corresponding claim element. The remainder of the

claim chart in Appendix A provides similar string citations for each element of each substitute claim, devoid of explanation of how the cited portions disclose the corresponding elements. *Id.* at i–xii.

> In its Opposition to the Motion to Amend, Petitioner argues:
>
> Patent Owner has used string citations to broad swaths of pages and figures in the disclosures (in fact, **the exact same pages and figures** in the original disclosure for each limitation of the three independent claims) without any attempt to explain how the substitute claims are supported by those disclosures. It is not Petitioner's or the Board's job to sift through these repetitive string citations to piece together Patent Owner's claim of support.

Resp. Mot. Amend 1; *see also id.* at 3–5.

In its Reply, Patent Owner explains how the string citations in the claim chart of Appendix A allegedly disclose the elements of claims 22–42. PO Reply 6–13. Patent Owner further argues that Petitioner's reliance on *Respironics*[6] is inapposite because "it is premised upon precedent that has been overturned" by *Aqua Products*. *Id.* at 6. Patent Owner contends *Aqua Products* held that the Petitioner has the burden of persuasion to prove unpatentability and the Patent Owner "need only satisfy its burden of production," which Patent Owner contends it has done. *Id.*

Patent Owner correctly characterizes the holding of *Aqua Products* that it need only meet the burden of production. However, we disagree with Patent Owner that *Aqua Products* in any manner overturned the Board's decision in *Respironics*. As the Board found in *Respironics*, mere string

[6] *Respironics, Inc. v. Zoll Med. Corp.*, Case No. IPR2013-00322, 2014 WL 4715644, at *13 (PTAB Sept. 17, 2014), *vacated and remanded on other grounds*, 656 F. App'x 531 (Fed. Cir. 2016).

citations without explanation are insufficient to meet even this lower threshold burden of production. 2014 WL 4715644, at *13; *see also B.E. Tech., L.L.C. v. Google, Inc.*, 2016 WL 6803057, at *7 (Fed. Cir. 2016) (agreeing with Board that a patent owner did not meet its burden to show written description support for proposed substitute limitations in motion to amend where the patent owner provided only a string citation without explaining how the cited material supported each of the proposed substitute limitations); *Greene's Energy Grp., LLC v. Oil States Energy Servs., LLC*, No. IPR2014–00216, 2015 WL 2089371, at *14 (PTAB May 1, 2015) ("A string citation does not explain how the original disclosure of the application relied upon reasonably conveys to a person the features intended to be encompassed by the proposed substitute claims."), *aff'd*, 639 F. App'x 639 (Fed. Cir. 2016), *aff'd sub nom. Oil States Energy Servs., LLC v. Greene's Energy Grp., LLC*, 138 S.Ct. 1365 (2018). It is unclear, for example, whether such citations are to be understood as a combination of disclosures that, taken together, disclose the corresponding element, or whether Patent Owner contends that each citation of the string citations is sufficient to disclose the corresponding element. In that regard, Patent Owner provides the same string citations for all of the elements of substitute claims 22, 30, and 36. It is not the responsibility of the Board to search through the string citations to find sufficient written description support for each element and we decline Patent Owner's invitation to do so. *See Respironics*, 2014 WL 4715644, at *13 ("Zoll's string citations amount to little more than an invitation to us (and to Respironics, and to the public) to peruse the cited

evidence and piece together a coherent argument for them. This we will not do; it is the province of advocacy.").[7]

For these reasons, Patent Owner has failed to meet its burden of production, *in its Motion or in the claim charts* in its corrected exhibits, to identify written description support for each substitute claim, and we, accordingly, have grounds to deny the Motion to Amend on this basis. Nevertheless, we additionally address below both whether the proposed substitute claims improperly enlarge the scope of the claims and whether the proposed substitute claims overcome the prior art challenges.

2. Proposed Substitute Claim 22 Improperly Broadens Claim 1

Proposed substitute claim 22 would amend original claim 1 by (1) specifying that the recited "context" includes "a media access control (MAC) layer address, an Internet Protocol (IP) address and Transmission Control Protocol (TCP) state information," rather than "protocol header information," for the recited connection; (2) requiring that "the context information," rather than "the protocol information," be transferred to the recited interface device; and (3) specifying that the recited headers be created from a template header containing "protocol header information including IP address and TCP state information" rather than from a template header containing "the protocol header information" that was previously recited. Mot. Amend 2; Paper 62 (Patent Owner's Corrected Exhibits of Contingent Motion to Amend), Appendix A at i.

[7] *See also Stampa v. Jackson*, 78 USPQ2d 1567, 1571 (BPAI 2005) (quoting *Ernst Haas Studio, Inc. v. Palm Press, Inc.*, 164 F.3d 110, 111–12 (2d Cir. 1999) ("Appellant's Brief is at best an invitation to the court to scour the record, research any legal theory that comes to mind, and serve generally as an advocate for appellant. We decline the invitation.")).

Petitioner argues in its Response to the Motion to Amend that proposed substitute independent claim 22 broadens the scope of claim 1 and that substitute dependent claims 23–29 broaden the scope of claims 2–8, respectively. Mot. Amend 5–8. In particular, Petitioner argues:

> Original claim 1 requires "creating a context that includes protocol header information for the connection" and then later "creating headers for the segments from a template header containing the protocol header information." Motion at xiii (emphasis added). Only methods where the "template header" contains the same "protocol header information" as the "context" infringe claim 1.
>
> In contrast, substitute claim 22 removed the requirement that the context "includes protocol header information." As a result, the amended claim is no longer limited to methods where the "context" and the "template header" both contain the same "protocol header information." Motion at xiii (emphasis added).

Id. at 6. Petitioner further explains:

> For instance, if a method uses a processor on an interface device (i.e., the "second processor") to create protocol header information for the segments (perhaps for an unrelated connection or protocol) instead of using protocol header information included in the context, that method would infringe substitute claim 22 but not the original claim 1, thereby making the new claim broader.

Id. at 6–7.

In its Reply to Petitioner's Response, Patent Owner contends that "substitute claim 22 narrows original claim 1 by limiting the 'context' to 'include[]' three specific types of 'protocol header information,' . . . as opposed to the original claim's broad inclusion of potentially any type of 'protocol header information.'" Reply Mot. Amend. 2. Patent Owner further contends that Petitioner is incorrect in its assertion that substitute

claim 22 removes the requirement in original claim 1 that the context 'includes protocol header information" and is no longer limited to methods where the "context" and the "template header" both contain the same "protocol header information." *Id.* at 3–4 (citing Resp. Mot. Amend 6). In particular, Patent Owner argues, "the amended language continues to define a 'context'; it is merely narrowed to requiring three specific types of information within the context, *i.e.*, 'media access control (MAC) layer address, an Internet Protocol (IP) address and Transmission Control (TCP) state information,'" and "[t]he template header is then expressly required to contain the IP address and TCP state information—two specific types of protocol header information within the claimed context." *Id.* at 4 (citing Ex. 2305 (Declaration of Dr. Almeroth in Support of Patent Owner's Reply in Support of Motion to Amend) ¶ 101).

We agree with Petitioner that substitute claims 22–29 improperly broaden the claims they are proposed to replace. As Petitioner points out, although proposed substitute claim 22 would add certain limitations relative to original claim 1 (e.g., requiring the context to include specific information), "this does not change the fact that substitute claim 22 has been broadened to include methods where the 'template header' does not contain the same 'protocol header information' as the 'context.'" *Id.* at 7. Because "such a method would not have infringed original claim 1," entry of proposed substitute claim 22 and its dependent claims 23–29 would improperly broaden claims 1–8. *Id.* at 7–8 (citing *In re Bennett*, 766 F.2d 524, 526 (Fed. Cir. 1985) (en banc) ("[A] claim is broadened if it is broader in any respect than the original claim, even though it may be narrowed in other respects.")); *see also In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268,

1283 (Fed. Cir. 2015) ("[A] claim is broader in scope than the original claims if it contains within its scope any conceivable apparatus or process which would not have infringed the original patent." (quotations omitted)).

Patent Owner's reply arguments do not persuade us otherwise. Claim 1 expressly recites creating headers from a template header containing "*the* protocol header information"—i.e., the same protocol header information that finds its antecedent earlier in the claim. Ex. 1001, 97:19–20 (emphasis added). In contrast, although claim 22 would still require the template header to contain *some* "protocol header information" that includes *some* "IP address and TCP state information," the template header recited in claim 22 is *not* "expressly required to contain *the* IP address and TCP state information," as Patent Owner asserts. Reply Mot. Amend 4 (emphasis added). The omission of the definite article "the" before "IP address and TCP state information" leaves that phrase untethered to any antecedent, resulting in an improper broadening of claim scope.

Accordingly, in addition to Patent Owner's failure to meet its burden to identify written description support for each substitute claim (*see supra* Section III.E.1), Patent Owner's enlargement of the scope of the claims provides an independent basis for denial of Patent Owner's Motion to Amend.

3. Amendments Do Not Overcome Erickson and Tanenbaum

Assuming, *arguendo*, that Patent Owner's Motion to Amend complied with the statutory and regulatory requirements to meet its burden of production, the proposed substitute claims still would not overcome the prior art challenges.

With regard to the Motion to Amend, the parties repeat many of the arguments presented in the Petition and the Patent Owner's Response. To the extent arguments are repeated, we incorporate our earlier discussion addressing those arguments, and, accordingly, we remain persuaded by Petitioner's repeated arguments and find Patent Owner's repeated responses unpersuasive. We focus the discussion below on arguments directed specifically to the claims as amended.

a. Obviousness of proposed substitute independent claims

As mentioned above, proposed substitute claim 22 would amend original claim 1 by (1) specifying that the recited "context" includes "a media access control (MAC) layer address, an Internet Protocol (IP) address and Transmission Control Protocol (TCP) state information," rather than "protocol header information," for the recited connection; (2) requiring that "the context information," rather than "the protocol information," be transferred to the recited interface device; and (3) specifying that the recited headers be created from a template header containing "protocol header information including IP address and TCP state information" rather than from a template header containing "the protocol header information" that was previously recited. Mot. Amend 2; Paper 62, Appendix A at i. Proposed substitute claims 30 and 36 would amend original claims 9 and 15, respectively, by requiring that the recited "protocol information" "includ[es] a media access control (MAC) layer address, an Internet Protocol (IP) address and Transmission Control Protocol (TCP) state information," in addition to providing a template header for the network connection. Mot. Amend 2; Paper 62, Appendix A at iii, v.

Patent Owner argues that "*Erickson* and *Tanenbaum*, alone or in combination, fail to disclose that context information including a media access control (MAC) layer address, an Internet Protocol (IP) address and Transmission Control Protocol (TCP) state information is transferred to an interface device being used to create headers for segments." Mot. Amend 3–4. More particularly, according to Patent Owner, "*Erickson* does not disclose or suggest that any Transmission Control Protocol (TCP) state information is transferred to the adapter," and "[s]imilarly, in both fast path instances in *Tanenbaum* (transmit and receive), there is no separate processor on the network interface card that receives a media access control (MAC) layer address, an Internet Protocol (IP) address and Transmission Control Protocol (TCP) state information and create headers based on them." *Id.* at 4. As in its arguments regarding claim 1, discussed above, Patent Owner further contends that "[i]ndeed, *Tanenbaum* teaches away from performing any TCP/IP protocol processing by anything other than the host CPU." *Id.* (citing Ex. 1006, 570–71).

In opposition, Petitioner cites Erickson as disclosing that Ethernet Header 604 illustrated in Erickson's Figure 6 includes a Target Ethernet Address and a Source Ethernet Address, as well as that IP Header 606 in Figure 6 includes an IP address. Resp. Mot. Amend. 12 (citing Ex. 1005, 6:58–7:3 ("[T]he user process and the device driver has pre-negotiated the following fields from FIG.6: (1) Ethernet Header 604 (Target Ethernet Address, Source Ethernet Address, . . .) . . . (2) IP Header 606 (. . . IP Address of Source, and IP Address of Destination) . . . .")). Citing the testimony of Dr. Horst, Petitioner contends "Ethernet addresses are MAC addresses," "IP Header 606 includes an IP address," and a person of

ordinary skill in the art "would understand how to modify Erickson's UDP datagram that is shown in Figure 6 of Erickson to include TCP header information, including TCP state information disclosed in Tanenbaum[]." *Id.* (citing Ex. 1003 ¶¶ 28–30; Ex. 1006, 568, Fig. 6-50; Ex. 1210 (Declaration of Dr. Horst in Support of Opposition to Motion to Amend), Appendix A § 22.1). Therefore, according to Petitioner, "Erickson in view of Tanenbaum[] discloses creating a context that includes a media access control (MAC) layer address, an Internet Protocol (IP) address and Transmission Control Protocol (TCP) state information for the connection," as recited in proposed claim 22, "because it refers to a connection and discloses TCP scripts and TCP . . . is inherently connection oriented." *Id.* at 12–13. Petitioner raises substantially the same arguments with respect to proposed substitute independent claims 30 and 36. *Id.* at 18–20, 22–23.

In its Reply to Petitioner's Response, Patent Owner essentially repeats its arguments, presented with respect to the original claims and discussed in Sections III.B.4 and III.B.5 above, that Tanenbaum teaches away from combination with Erickson, that secondary considerations weigh against the combination, that Erickson's disclosure is limited to UDP, Tanenbaum does not teach modification of UDP, and that Tanenbaum does not disclose a second processor but instead utilizes software on the host or first processor. *Compare* Reply Mot. Amend 16–21 (citing Ex. 2305 ¶¶ 58–74), *with* PO Resp. 35–39, 56–63. Patent Owner further contends that "Erickson does not disclose a specific order of transferring data, much less after transfer of context information." Reply Mot. Amend. 19.

We are persuaded by Petitioner's arguments and evidence, for the reasons stated by Petitioner, that the additional limitations recited in

proposed substitute independent claims 22, 30, and 36 do not patentably distinguish those claims over the combination of Erickson and Tanenbaum. Initially, as discussed above (*see, e.g.*, Section III.B.4.a), we are not persuaded by Patent Owner's repeated arguments that Tanenbaum teaches away from the claimed features or the proposed combination. Although Erickson discloses UDP as an exemplary context, it also expressly discloses that the form and structure of TCP sockets and packets were well-known in the art, discloses TCP/IP scripts, and directs the reader to the 1981 version of Tanenbaum for more information. Ex. 1005, 4:38–43, 5:47–51, 8:5–6. Further, although Tanenbaum might suggest that offload to a less expensive, slower processor may not be optimal, we do not understand such expression of preference to teach away from combination with Erickson.

Moreover, we return to the fundamental conclusion that the *combination* of references would have taught or suggested the substitute claim features to the ordinarily skilled artisan. In this regard, we are persuaded by Petitioner's arguments and evidence that a person of ordinary skill in the art would have understood the combination of Erickson and Tanenbaum to teach or suggest a "context" that includes MAC address, IP address, and TCP state information, as well as that such context would be transferred to the interface device from the host during pre-negotiation, prior to the transfer of data. Resp. Mot. Amend 11–12, 14 (citing Ex. 1005, 6:58–7:3; Ex. 1210 ¶¶ 28–30, Appendix A §§ 22.1–22.3); Sur-reply Mot. Amend. 12.

Accordingly, we are persuaded that the combination of Erickson and Tanenbaum would have taught or suggested to the ordinarily skilled artisan the amended "context" and "protocol information" limitations, as well as

transfer of data after transfer of context information, as recited in proposed substitute independent claims 22, 30, and 36.

b. Obviousness of proposed substitute dependent claims

Proposed substitute claims 23–29, 31–35, and 37–42 are identical to original dependent claims 2–8, 10–14, and 16–21, respectively, apart from their dependency from the proposed amended independent claims. Mot. Amend 2; Paper 62, Appendix A at i–ii, iv–vi.

Patent Owner argues the proposed substitute dependent claims overcome the art for the same reasons as their respective base claims. Mot. Amend 5.

Petitioner responds that each proposed substitute dependent claim is unpatentable for the same reasons as its corresponding original challenged claim (i.e., claims 2–8, 10–14, and 16–21, respectively). Opp. 16–17, 20–21, 24–25.

For the reasons discussed in Sections III.B.4.c–e, above, concerning the original dependent claims, we are persuaded by Petitioner's arguments.

c. Conclusion Regarding Patentability of Substitute Claims

For the foregoing reasons (*see supra* Sections III.E.3.a–b), we are persuaded by a preponderance of the evidence that the proposed substitute claims are unpatentable as obvious over the combination of Erickson and Tanenbaum, providing a further basis for denial of Patent Owner's Motion to Amend.

F. Real Parties in Interest

Intel Corporation identified itself as a real party in interest in this proceeding and represented that "[n]o other parties exercised or could have

exercised control over this petition; no other parties funded or directed this Petition." Pet. 2. Patent Owner argues that "[t]he Board should terminate this IPR proceeding because the Petition fails to identify all real parties-in-interest as required by 35 U.S.C. § 312(a)(2) and 37 CFR § 42.8(b)(1)." PO Resp. 63. Patent Owner contends, for example, that "Dell is . . . Intel's . . .customer and indemnitee," that "Dell, Cavium, and Intel have closely intertwined financial interests and business relationships; express indemnification agreements; shared experts; and common litigation strategy with respect to their defense" and that "the fact that Cavium, Intel, Dell, and Wistron all filed almost verbatim petitions and share the same expert is compelling evidence that they were in privy and cooperating in the drafting of each other's petitions." *Id.* at 63–64.

We note that we previously addressed Patent Owner's arguments in this regard both in our Decision on Institution and in an Order denying Patent Owner's request for additional discovery and associated supplemental briefing with respect to real parties in interest in light of the intervening decision of the U.S. Court of Appeals for the Federal Circuit in *Applications in Internet Time v. RPX Corp.*, 897 F.3d 1336 (Fed. Cir. 2018). *See* Dec. 3–6; Paper 69, 2–3. We additionally note that Cavium, Dell, and Wistron are all acknowledged real parties in interest in this proceeding by virtue of their having joined as parties to this proceeding. Accordingly, we are therefore not persuaded by Patent Owner's argument.

G. Patent Owner's Motion to Seal

On March 15, 2018, the parties filed a Joint Motion to Enter a Stipulated Protective Order (Paper 38), which was granted on March 27, 2018 (Paper 39).

Patent Owner requests that we seal Exhibit 2038 due to the inclusion of certain licensing terms that Patent Owner regards as confidential. Paper 32. There is a strong public policy in favor of making information filed in an *inter partes* review open to the public, especially because the proceeding determines the patentability of claims in an issued patent and, therefore, affects the rights of the public. *See Garmin Int'l, Inc. v. Cuozzo Speed Techs., LLC*, Case IPR2012-00001 (PTAB Mar. 14, 2013) (Paper 34). Under 35 U.S.C. § 316(a)(1) and 37 C.F.R. § 42.14, the default rule is that all papers filed in an *inter partes* review are open and available for access by the public; a party, however, may file a concurrent motion to seal and the information at issue is sealed pending the outcome of the motion. It is, however, only "confidential information" that is protected from disclosure. 35 U.S.C. § 316(a)(7); *see* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,760 (Aug. 14, 2012). The standard for granting a motion to seal is "for good cause." 37 C.F.R. § 42.54(a). The party moving to seal bears the burden of proof in showing entitlement to the requested relief, and must explain why the information sought to be sealed constitutes confidential information. 37 C.F.R. § 42.20(c).

In reviewing the Exhibit 2038, we conclude that it may contain confidential information. Accordingly, we are persuaded that good cause exists to have the identified portions remain under seal, and the Motion To Seal is granted.

The Office Patent Trial Practice Guide provides:

> *Expungement of Confidential Information*: Confidential information that is subject to a protective order ordinarily would become public 45 days after denial of a petition to institute a trial or 45 days after final judgment in a trial. There is an expectation

> that information will be made public where the existence of the information is referred to in a decision to grant or deny a request to institute a review or is identified in a final written decision following a trial. A party seeking to maintain the confidentiality of information, however, may file a motion to expunge the information from the record prior to the information becoming public. § 42.56. The rule balances the needs of the parties to submit confidential information with the public interest in maintaining a complete and understandable file history for public notice purposes. The rule encourages parties to redact sensitive information, where possible, rather than seeking to seal entire documents.

77 Fed. Reg. at 48,761.

Consequently, 45 days from entry of this Decision, all information subject to a protective order will be made public by default. In the interim, Patent Owner may file a motion to expunge any such information that is not relied upon in this Decision. *See* 37 C.F.R. § 42.56.

IV. ORDER

Accordingly, for the foregoing reasons, it is

ORDERED that claims 1–21 of U.S. Patent No. 7,673,072 are held unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibit 1006 is denied;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibit 1011 is dismissed;

FURTHER ORDERED that Petitioner's Motion to Exclude Exhibit 2026 is denied;

FURTHER ORDERED that Patent Owner's Contingent Motion to Amend is denied;

FURTHER ORDERED that Patent Owner's Motion To Seal is granted; and

FURTHER ORDERED that because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

For PETITIONER:

Garland Stephens
William S. Ansley
Anne M. Cappella
Justin L. Constant
Melissa L. Hotze
Adrian Percer
WEIL, GOTSHAL & MANGES LLP
garland.stephens@weil.com
sutton.ansley@weil.com
anne.cappella@weil.com
justin.constant@weil.com
melissa.hotze@weil.com
adrian.percer@weil.com

Christopher TL Douglas
Kirk Bradley
ALSTON & BIRD LLP
christopher.douglas@alston.com
kirk.bradley@alston.com

Benjamin E. Weed
Erik J. Halverson
K&L GATES LLP
benjamin.weed.ptab@klgates.com
erik.halverson@klgates.com

David Xue
Karineh Khachatourian
RIMÔN LAW
david.xue@rimonlaw.com
karinehk@rimonlaw.com

For PATENT OWNER:

James M. Glass
Joseph M. Paunovich
Brian E. Mack
QUINN EMANUEL URQUHART & SULLIVAN, LLP
jimglass@quinnemanuel.com
joepaunovich@quinnemanuel.com
brianmack@quinnemanuel.com