

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RPX CORPORATION,
Petitioner,

v.

VERTICAL CONNECTION TECHNOLOGIES,
Patent Owner.

IPR2018-01388
U.S. Patent 7,245,917 B2

Before WILLIAM M. FINK, *Vice Chief Administrative Patent Judge*,
MICHAEL W. KIM and NORMAN H. BEAMER, *Administrative Patent Judges*.

BEAMER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

On July 13, 2018, T-Mobile USA, Inc. and RPX Corporation filed a Petition (Paper 3, “Pet.”) pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 12–25 of U.S. Patent No. 7,245,917 B2 (Ex. 1101, “the ’917 patent”). On October 26, 2018, Vertical Connection Technologies LLC (“VCT”) filed a Preliminary Response (Paper 7, “Prelim. Resp.”). Pursuant to a November 13, 2018 Order (Paper 8), T-Mobile USA, Inc. and RPX Corporation filed a Reply to the Preliminary Response (Paper 10, “Reply”), and on November 30, 2018, VCT filed a Sur-Reply (Paper 11, “Sur-Reply”).

On January 23, 2019, applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we instituted an *inter partes* review of claims 12–25. Paper 14 (“Institution Dec.”). In the Institution Decision, we determined Petitioner demonstrated a reasonable likelihood that it would prevail as to claims 12–25, and we instituted trial on all claims and all grounds in the Petition. Institution Dec. 22.

Following institution, on April 17, 2019, pursuant to a Joint Motion, this proceeding was terminated as to T-Mobile USA, Inc. Paper 18. VCT did not file a Patent Owner Response to the Petition, but did file a May 9, 2019 Motion to Amend (Paper 24, “Mot. Amend”). On August 8, 2019, RPX Corporation (hereafter, “Petitioner”) filed an Opposition to the Motion to Amend (Paper 27, “Oppos. Amend”). No other substantive papers were filed by either party.

An oral hearing took place on October 23, 2019. The Hearing Transcript (“Tr.”) is included in the record as Paper 30. VCT elected to not participate in the hearing. Tr. 1. After considering the parties’ arguments and supporting evidence, we determine that Petitioner (RPX) has proven by a preponderance of the evidence that claims 12–25 of the ’917 patent are unpatentable. 35 U.S.C. § 316(e). We also deny VCT’s Motion to Amend.

II. BACKGROUND AND SUMMARY

A. *The ’917 Patent*

The ’917 patent, titled “System And Method For IP Handoff,” issued July 17, 2007, from an application filed April 1, 2004, and relates to a provisional application filed September 8, 2003. Ex. 1101, (22), (45), (54), (60).

The ’917 patent describes “seamless vertical handoff,” which provides “mobile roaming capabilities” by allowing network applications on a mobile node (*e.g.*, a laptop or smart phone) to continue without disruption as the node moves between wireless networks with different underlying technologies — *e.g.*, moving from a wireless local area network (WLAN) to a wireless wide area network (WWAN). *Id.* at Abstract. A “vertical” handoff in this context refers to a handoff between wireless networks of different technologies, in contrast to a “horizontal” handoff from, for example, one WLAN to another. *Id.* at col. 1, ll. 31–37.

The underlying technology of the ’917 patent is based on the “Mobile IP” standard, which provides for communication between a mobile node (“MN”) and another node, called a “correspondent node” (“CN”) via “home agents” (“HA”) and “foreign agents” (“FA”). Ex. 1104, 5–9; Ex. 1125 ¶ 23; Ex. 1116.

The vertical handoff process described and claimed in the '917 patent is illustrated in Figures 3A and 3B, reproduced below.

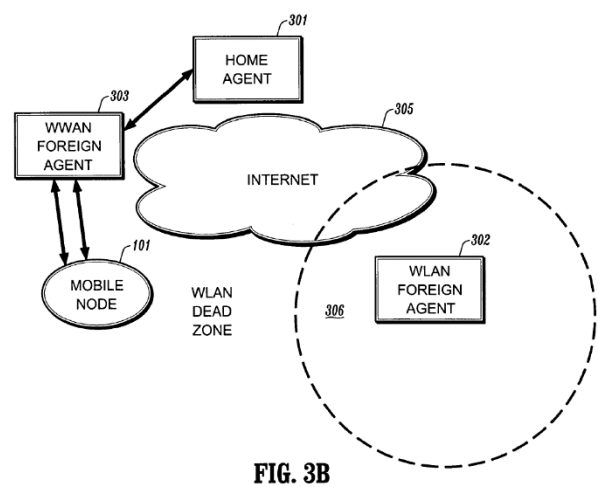
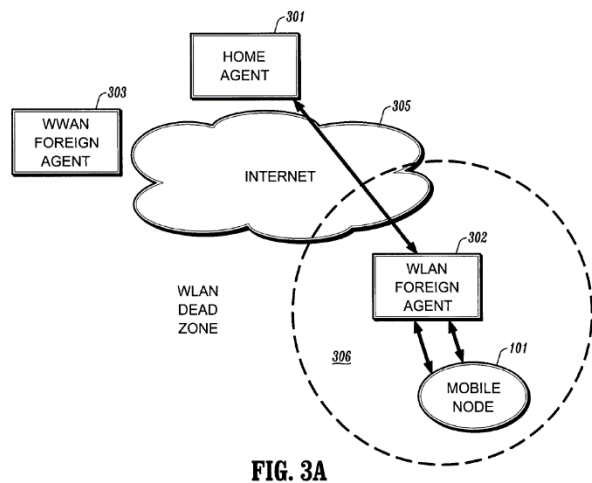


Figure 3A illustrates mobile node 101 connected to home agent 301 via WLAN foreign agent 302 and Internet 305. Ex. 1101, col. 5, ll. 62–67. This figure shows that the mobile node is not in its home location, but is in another WLAN service area 306, in which case it makes connections with correspondent nodes (not shown), via communications passing between the correspondent node and the home agent, which in turn pass between the home agent and the WLAN foreign agent using a “tunneling” process, and finally pass between the foreign agent and the mobile node. *Id.* at col. 6, ll. 8–11.¹

Figure 3B shows that the mobile node has moved into a “WLAN dead zone,” but is in a WWAN service area, thus causing a vertical handoff to

¹ Tunneling was well-known in networking at the time of the '917 application, and involved “encapsulating” data packets in order to transmit their contents undisturbed, so as to hide a mobile node’s home address from intervening routers between its home network and its current location. Rysavy Decl. ¶ 25.

occur, such that the connection to the home agent is via WWAN foreign agent 303, again via a tunneling process. *Id.* at col. 7, ll. 11–25. The handoff process is triggered by the decline in signal strength of the current WLAN network below a defined threshold value. *Id.* at Fig. 4A, col. 9, ll. 52–66. During handoff, transmitted information is “cached” in order to avoid loss of data. *Id.*

B. Illustrative Claim

Challenged independent claim 12 is reproduced below.

12. A method for vertical handoff in a wireless network vertical [sic] comprising:

- monitoring a wireless local area network signal carrying an active network connection;
- initiating vertical handoff to a wireless wide area network signal upon determining that the wireless local area network signal is undesirable;
- tunneling the active network connection over the wireless wide area network signal; and
- caching and replaying information over the wireless wide area network signal.

Ex. 1101, col. 14, l. 61–col. 15, l. 4.

C. Prior Art Relied Upon

Petitioner relies upon the following prior art references (Pet. vi–vii):

- A. Sanmateu, et al., *Seamless mobility across IP networks using Mobile IP*, Computer Networks: Int’l J. Computer Telecomm’ns Networking (Sept. 2002) (“Sanmateu”). Ex. 1110.
- L. Taylor, et al., *The Challenges of Seamless Handover in Future Mobile Multimedia Networks*, IEEE Personal Comm’ns (April 1999) (“Taylor”). Ex. 1127.
- K. Pahlavan, et al., *Handoff in Hybrid Mobile Data Networks*, IEEE Personal Comm’ns (Apr. 2000) (“Pahlavan”). Ex. 1111.

- T. La Porta et al., *Mobile IP and Wide Area Wireless Data*, IEEE Wireless Comm'ns and Networking (Sept. 1999) ("La Porta"). Ex. 1128.
- S. Aust, et al., *Design Issues of Mobile IP Handoffs between General Packet Radio Service (GPRS) Networks and Wireless LAN (WLAN) Systems*, IEEE WPMC 2002 (Oct. 2002) ("Aust"). Ex. 1113.
- Dahlman et al., U.S. Patent No. 6,907,005 B1 ("'005 patent"). Ex. 1129
- M. Ye, et al., *The Mobile IP Handoff Between Hybrid Networks*, IEEE PIMRC 2002 (Sept. 2002) ("Ye"). Ex. 1114.

Petitioner also relies on Declarations of Peter Rysavy. Ex. 1125 ("Rysavy Decl."); Ex. 1152 ("Rysavy 2nd Decl.").

D. Asserted Grounds of Unpatentability

Petitioner challenges claims 12–25 on the following grounds of unpatentability (Pet. 4):

Claim(s)	References	Basis
12–15, 18–21, 23, 25	Sanmateu, Taylor	§ 103(a)
16, 17	Sanmateu, Taylor, Pahlavan	§ 103(a)
22	Sanmateu, Taylor, La Porta	§ 103(a)
24	Sanmateu, Taylor, Aust	§ 103(a)
12–15, 18–22, 25	Ye, '005 patent	§ 103(a)
16, 17	Ye, '005 patent, Pahlavan	§ 103(a)
23	Ye, '005 patent, Sanmateu	§ 103(a)
24	Ye, '005 patent, Aust	§ 103(a)

E. Real Parties in Interest

RPX is the remaining real party in interest for Petitioner. Pet. x; Paper 18.

VCT identifies "Vertical Connection Technologies LLC, exclusive licensee of [the '917 patent], and The Research Foundation of the State

University of New York (“Research Foundation”), owner of the ‘917 patent,” as the real party in interest. Paper 21, 2.

F. Related Matters

The parties are contemporaneously involved in IPR2018-01387, which concern claims 1–11 of the ‘917 patent. Pet. x. Additional petitions for *inter partes* review of the ‘917 patent were *AT&T Corporation et al. v. Vertical Connection Technologies LLC*, IPR2018-01750 and IPR2018-01753, which proceedings were terminated on April 1, 2019. *E.g.*, IPR2018-01750, Paper 15.

The ‘917 patent was asserted in *Vertical Connection Technologies LLC v. T-Mobile US, Inc. et al.*, 2:17-cv-04992-JMA-AKT, (E.D.N.Y.) and *Vertical Connection Technologies LLC v. AT&T Corporation et al.*, 2:17-cv-04990-JMA-GRB, (E.D.N.Y.), which actions have been dismissed. Paper 21, 2.

III. ANALYSIS — PETITIONER’S ORIGINAL GROUNDS

A. Legal Standards — Obviousness

A 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) where in evidence, so-called secondary considerations, including commercial success, long-felt but

unsolved needs, failure of others, and unexpected results (“the *Graham* factors”).² *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

If the claimed subject matter cannot be fairly characterized as involving the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement, a holding of obviousness can be based on a showing that “there was an apparent reason to combine the known elements in the fashion claimed.” *KSR*, 550 U.S. at 418. Such a showing requires “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.* (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

In general, obviousness entails an inquiry that is “expansive and flexible” and takes into account “the inferences and creative steps that a person of ordinary skill in the art would employ” when presented with the teachings of the prior art. *KSR*, 550 U.S. at 415–18. Under this flexible approach, it can be important to identify “a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements” in the way claimed. *Takeda Chem. Ind., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1356–57 (Fed. Cir. 2007). Such reason may be found “explicitly or implicitly in market forces; design incentives; the interrelated teachings of multiple patents; any need or problem known in the field of endeavor at the time of invention and addressed by the patent; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (internal quotations and citations omitted); *see also KSR*, 550 U.S. at 419–20. Moreover, “if a technique has been used to improve one device, and a

² VCT does not rely on any secondary considerations.

person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.’” *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1003 (Fed. Cir. 2016) (quoting *KSR*, 550 U.S. at 417).

“[A] combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 416. “[I]n many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle. . . . A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *Id.* at 420–421.

“The 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). “Combining the *teachings* of references does not involve an ability to combine their specific structures.” *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973).

B. Level of Ordinary Skill in the Art

Petitioner’s expert opines:

[A]s of April 2004 (the filing date of the application that issued as the ’917 patent), it is my opinion that a person of ordinary skill in the art (“POSITA”) would have had a bachelor’s degree in electrical engineering or computer science, plus two years experience designing and implementing heterogeneous network systems. From this experience, the POSITA would have had working familiarity with Mobile IP; with TCP/IP and other similar protocols, e.g., UDP; GPRS, GSM, and similar WWAN

networks often used in Mobile IP implementations; and IEEE 802.11 and similar wireless local area networks (WLANs).

Rysavy Decl. ¶ 32. VCT does not provide an alternative or dispute this description, and after review of the record we agree with and adopt it as our own.

C. Claim Construction

The Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b) (2018); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard).³ The broadest reasonable construction is an interpretation that corresponds with how the inventor describes his invention in the specification, *i.e.*, an interpretation that is “consistent with the specification.” *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997) (citation and internal quotation marks omitted); *see also In re Suitco Surface Inc.*, 603 F.3d 1255, 1259–60 (Fed. Cir. 2010). An inventor may provide a meaning for a term that is different from its ordinary meaning by defining the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Otherwise, terms are given their ordinary and customary meaning, as would have been

³ We acknowledge that for petitions filed on or after November 13, 2018, the *Phillips* standard will be applied. Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018).) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018) (codified at 37 C.F.R. § 42.100(b) (2019)). The recent amendment to the claim construction standard does not apply in this proceeding because the Petition was filed before November 13, 2018.

understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007.) We need only construe terms “that are in controversy, and only to the extent necessary to resolve the controversy.” *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Petitioner submits the following proposed constructions, based on the above-discussed Mobile IP standard:

“home agent” should be construed as comprising an MIP home agent, which RFC-2002 defines as: “A router on a mobile node’s home network which tunnels datagrams for delivery to the mobile node when it is away from home, and maintains current location information for the mobile node.”

“foreign agent” should be construed as comprising an MIP foreign agent, which RFC-2002 defines as: “A router on a mobile node’s visited network which provides routing services to the mobile node while registered. The foreign agent detunnels and delivers datagrams to the mobile node that were tunneled by the mobile node’s home agent. For datagrams sent by a mobile node, the foreign agent may serve as a default router for registered mobile nodes.”

Pet. 11; Rysavy 2nd Decl. ¶ 10. VCT does not propose any claim constructions in connection with Petitioner’s original unpatentability grounds, and in the Motion to Amend submits “that the language in the additional limitations in the proposed substitute claims is well-understood and does not require explicit construction.” Mot. Amend 3. Based on our review of Petitioner’s unrebutted expert declaration explaining the basis for these definitions, we agree with and adopt these claim constructions.

Rysavy Decl. ¶¶ 37–39; Rysavy 2nd Decl. ¶ 10.

D. Ground 1: Obviousness of Claims 12–15, 18–21, 23, and 25 Over Sanmateu and Taylor

For the first ground challenging the '917 patent, Petitioner argues claims 12–15, 18–21, 23, and 25 are obvious over Sanmateu and Taylor. Pet. 12–31.⁴ Based on our review of the record as a whole, we determine that Petitioner has proven by a preponderance of the evidence supporting the first four asserted grounds that claims 12–25 of the '917 patent are unpatentable. With that understanding, we summarize our analysis below, based on the arguments made in the Petition, which are supported by the submitted prior art and Petitioner's expert's testimony.

1. Sanmateu and Taylor

Sanmateu describes a research project evaluating the use of Mobile IP operating across various access network technologies including WLAN and GPRS (General Packet Radio System), which is a type of WWAN, including the use of Mobile IP to enable inter-access technology handoffs — *i.e.*, vertical handoffs. Ex. 1110, Abstract, § 5.

Figure 3 of Sanmateu is reproduced below.

⁴ For economy of presentation, for this and the remaining grounds relied on by Petitioner, we note that VCT does not provide any counterarguments — it has not submitted a Patent Owner Response or appeared at the oral hearing.

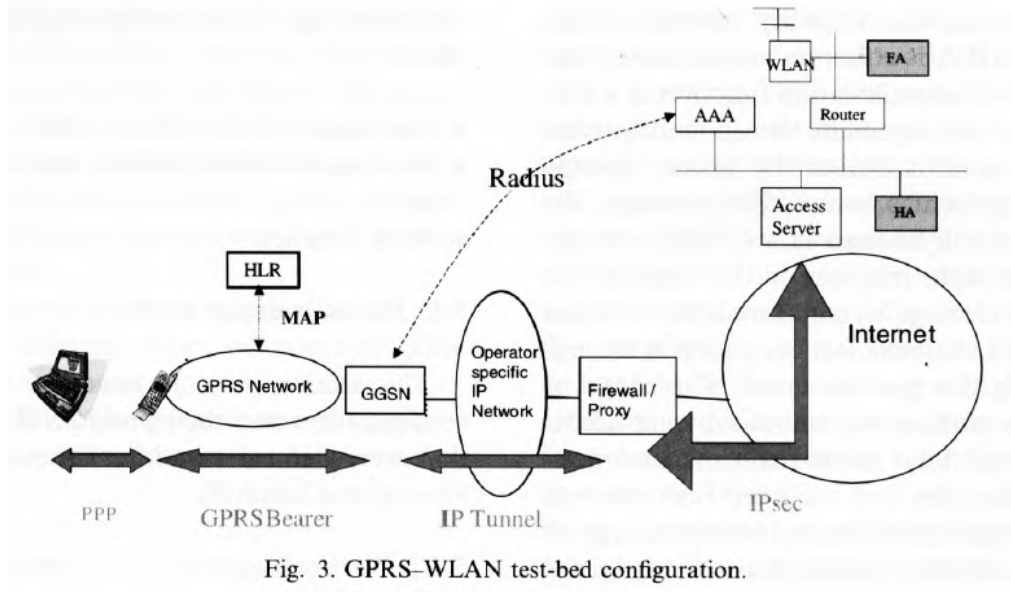


Figure 3 depicts a test-bed configuration to provide vertical handoffs between a WLAN and a GPRS network. Rysavy Decl. ¶ 53.

Taylor discusses seamless handoffs between different network domains, including issues related to the TCP/IP (Transport Control Protocol/Internet Protocol) over wireless links.⁵ Ex. 1127, Abstract.

2. Independent Claims 12 and 25

For the preamble of claim 12 (“a method for vertical handoff in a wireless network”), the record establishes that Sanmateu performs vertical handoffs. Specifically, we find that the above described handoffs in

⁵ As stated in the Stevens reference:

TCP provides a reliable flow of data between two hosts. It is concerned with things such as dividing the data passed to it from the application into appropriately sized chunks for the network layer below, acknowledging received packets, setting timeouts to make certain the other end acknowledges packets that are sent, and so on.

Ex. 1108, 13.

Sanmateu between WLAN and GPRS are handoffs across different wireless technologies. Pet. 14.

The first element of claim 12 requires, “monitoring a wireless local area network signal carrying an active network connection.” Ex. 1101, col. 14, ll. 63–64. Sanmateu states that “[w]hen the WLAN signal level becomes lower than a pre-defined threshold, the controller starts switching network interfaces,” which is a reference to vertical handoff from WLAN to GPRS. Ex. 1110, 12. The record establishes that this disclosure would have taught or suggested that the wireless signal is monitored. Pet. 14–15 (citing Rysavy Decl. ¶¶ 138–139).

The second element of claim 12 requires, “initiating vertical handoff to a wireless wide area network signal upon determining that the wireless local area network signal is undesirable.” Ex. 1101, col. 14, ll. 65–67. The ’917 patent describes that a signal becomes “undesirable” when it falls below a threshold, thus triggering handoff. *Id.* at Fig. 4, step 402. The record establishes that the above-described disclosure in Sanmateu, of switching network interfaces when the signal falls below a threshold, satisfies this claim requirement. Pet. 15–16 (citing Ex. 1110, 186, 188; Rysavy Decl. ¶ 138).

The third element of claim 12 requires, “tunneling the active network connection over the wireless wide area network signal.” Ex. 1101, col. 15, ll. 1–2. Sanmateu describes this tunneling process, as follows:

Datagrams sent by a correspondent node to the mobile node’s home address are intercepted by the mobile node’s HA [Home Agent] and *tunnelled to the current mobile node’s CoA. The tunnel endpoint is either the FA [Foreign Agent] or the MN [Mobile Node] itself. . . .*

Reverse tunnelling, i.e., the tunnel from the MN to the HA, solves the [security] issue, as the source address of the uplink packets is the co-located address allocated by the local domain.

Pet. 16–18 (citing Ex. 1110, 183; Rysavy Decl. ¶¶ 142–143).

The fourth element of claim 12 requires, “caching and replaying information over the wireless wide area network signal.” Ex. 1101, col. 15, ll. 3–4. The record establishes that the networks discussed in Sanmateu function in accord with TCP, which operates to cache and replay information over the networks. Pet. 18–19 (citing Ex. 1110, 187–188; Rysavy Decl. ¶¶ 147, 155–159). Petitioner also relies on Taylor’s description of caching and replaying approaches used “to improve the performance of TCP over wireless links.” Pet. 20–21 (citing Ex. 1127, 36; Rysavy Decl. ¶¶ 160–164). Based on Petitioner’s un rebutted expert testimony, we determine that a person of ordinary skill would have been motivated to use the Taylor retransmission schemes in order to minimize data loss in the Sanmateu system, in accord with this claim requirement. Pet. 20–21 (citing Rysavy Decl. ¶ 166).

Independent claim 25 recites “[a] program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for vertical handoff in a wireless network, the method steps comprising” steps identical to those recited in claim 12. Ex. 1101, col. 16, ll. 21–33. We agree with Petitioner that the teachings discussed above for claim 12 also apply to the limitations of claim 25. Pet. 30–31.

Accordingly, we determine that Petitioner has proven by a preponderance of the evidence that independent claims 12 and 25 of the '917 patent would have been obvious in light of Sanmateu and Taylor.

3. Dependent Claims 13–15, 18–21, and 23

Claim 13 depends from claim 12, and adds the requirement, “initiating the vertical handoff comprises establishing a wireless wide area network connection to a mobile node.” Ex. 1101, col. 15, ll. 5–7. The record establishes that Sanmateu discloses establishing a connection to the mobile node on the GPRS WWAN as part of vertical handoff. Pet. 21–24 (citing Ex. 1110, 186; Rysavy Decl. ¶ 168).

Claim 14 depends from claim 12, and adds the requirement, “initiating the vertical handoff comprises caching information received by a mobile node over the wireless local area network signal,” and claim 15 depends from claim 14 and adds the requirement, “the caching of information received over the wireless local area network is performed before a wireless wide area network connection is established.” Ex. 1101, col. 15, ll. 8–14. As discussed above for claim 12, caching is part of the TCP protocol referenced in Sanmateu. Based on Petitioner’s un rebutted expert testimony, we determine that a person of ordinary skill would have known that the caching operation of Sanmateu would have performed in accord with these claim requirements. Pet. 24–26 (citing Rysavy Decl. ¶ 179).

Claim 18 depends from claim 13, and adds the requirement, “initiating vertical handoff from the wireless wide area network signal to the wireless local area network signal upon determining that the wireless local area network signal is desirable.” Ex. 1101, col. 15, ll. 21–24. Sanmateu discloses that, after WLAN to GPRS handoff has occurred, a vertical

handoff from GPRS back to WLAN occurs when the WLAN signal becomes desirable, i.e., above a certain threshold:

The threshold to go back to WLAN is then increased by a certain margin to limit ping-pong effects, i.e., to prevent successive WLAN-GPRS switching in borderline cases. Switching back to WLAN is done in a similar way, except that Mobile IP registration is done via the WLAN interface.

Pet. 26–27 (citing Ex. 1110, 186; Rysavy Decl. ¶¶ 181, 190).

Claim 19 depends from claim 13, and adds the requirement, “desirability corresponds to a threshold for measuring strength of a wireless signal.” Ex. 1101, col. 15, ll. 25–27. As discussed above for the second element of claim 12, and of claim 18, Sanmateu discloses that the desirability or undesirability of a signal relates to defined thresholds of signal strength. Pet. 27 (citing Ex. 1110, 186; Rysavy Decl. ¶ 192).

Claims 20, 21, and 23 each depend from claim 13, and add requirements that tunneling comprise, respectively: “redirecting a signal of a client side mobile internet protocol implementation from the wireless local area network signal to the wireless wide area network signal”; “providing a communication agent using a protocol to talk to home agent and mobile node”; and “tunneling packets from a home agent directly to a mobile node.” Ex. 1101, col. 15, ll. 28–34, col. 16, ll. 10–12. Based on Petitioner’s un rebutted expert testimony, we determine that a person of ordinary skill would have known that these aspects of tunneling are present in the Mobile IP standard, as applied to the Sanmateu disclosure. Pet. 27–30 (citing Rysavy Decl. ¶¶ 142–143, 193–195, 198).

Accordingly, we determine that Petitioner has proven by a preponderance of the evidence that dependent claims 13–15, 18–21, and 23 of the ’917 patent would have been obvious in light of Sanmateu and Taylor.

E. Grounds 2–4: Obviousness of Claims 16 and 17 Over Sanmateu, Taylor, and Pahlavan, of Claim 22 Over Sanmateu, Taylor, and La Porta, and of Claim 24 Over Sanmateu, Taylor, and Aust

Claim 16 depends from claim 13, and adds the requirement, “determining whether a second wireless local area network signal is desirable prior to initiating the vertical handoff,” and claim 17 depends from claim 16, and adds the requirement, “initiating a horizontal handoff upon determining that the second wireless local area network signal is desirable.” Ex. 1101, col. 15, ll. 15–20. These claims relate to horizontal handoffs, and Petitioner relies on Pahlavan, in combination with Sanmateu and Taylor, as teaching or suggesting these limitations. Pet. 31–35. Pahlavan Figure 6 is set forth below.

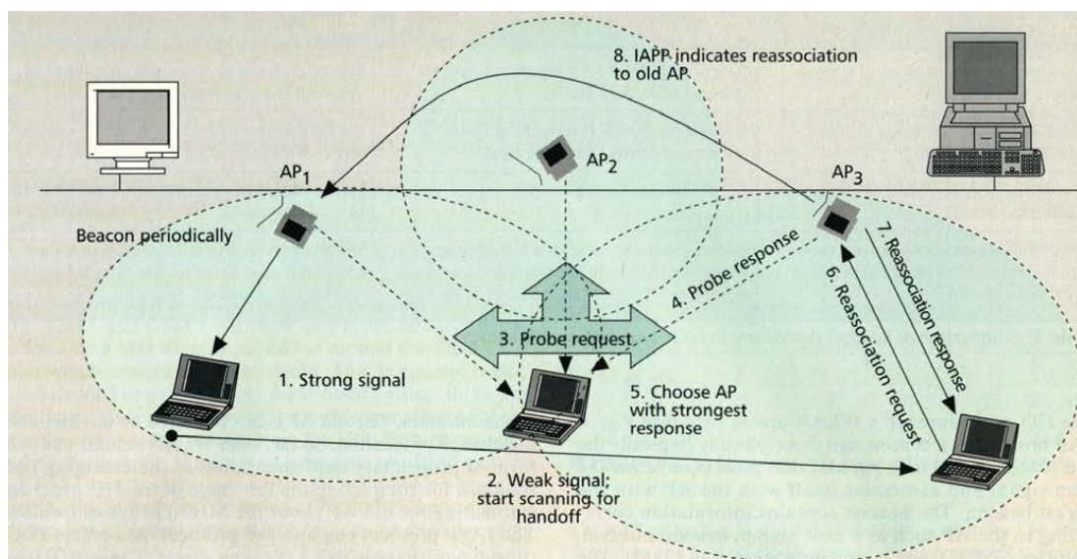


Figure 6 illustrates WLAN horizontal handoff with three WLAN access points (AP₁, AP₂, AP₃) with a MN handoff from AP₁ to AP₃. Ex. 1111, 39. Based on Petitioner’s unrebutted expert testimony, we agree that Pahlavan shows that triggering a horizontal handoff between WLANs, based on monitoring signal strength, was a fundamental and well-known aspect of Mobile IP, and we determine that a person of ordinary skill in the art would

have been motivated to apply the teachings of Pahlavan to the overall teachings of Sanmateu in the indicated manner. Pet. 31–35 (citing Rysavy Decl. ¶¶ 181–189).

Claim 22 depends from claim 13, and adds the requirement, “tunneling comprises: providing a foreign agent for communicating with a mobile node and a home agent; establishing a forwarding tunnel between the home agent and the mobile node; authenticating the mobile node; and updating a routing table of the foreign agent to route packets.” Ex. 1101, col. 16, ll. 1–9. The record establishes that the operation of a foreign agent (FA), with a forwarding tunnel connection and use of a routing table, was a well-known aspect of Mobile IP, as implemented in Sanmateu. Pet. 36–38 (citing Rysavy Decl. ¶¶ 200, 204–207). Petitioner further relies on La Porta, which is a paper describing a Bell Labs-Lucent Technologies implementation of a Mobile IP foreign agent within a GPRS network. Based on Petitioner’s un rebutted expert testimony, and we determine that, in view of La Porta, a person of ordinary skill in the art would have known about these aspects of tunneling, and adopted those techniques in the Sanmateu system for the reasons indicated. Pet. 35–39 (citing Ex. 1128; Rysavy Decl. ¶¶ 201–202).

Claim 24 depends from claim 13, and adds the requirement, “tunneling comprises: intercepting traffic going to a mobile node belonging to an enterprise; and establishing a tunnel between the mobile node and a network address translation gateway, wherein communications between a mobile node and a communicating party is via the network address translation gateway.” Ex. 1101, col. 16, ll. 13–20. Like for claim 22, the record establishes that the claimed tunneling operations were a well-known

aspect of Mobile IP, as implemented in Sanmateu. Pet. 39–40 (citing Rysavy Decl. ¶¶ 211–212). Petitioner further relies on Aust for its teachings relating to network address translation gateways. Pet. 40–43 (citing Ex. 1113, 868; Rysavy Decl. ¶¶ 213–214). Based on Petitioner’s un rebutted expert testimony, and we determine that a person of ordinary skill in the art would have been motivated to turn to Aust for its teachings on NAT gateway tunneling and communications, in order to carry out communications between a mobile node and a communicating party in GPRS networks, as disclosed in Sanmateu. Pet. 43 (citing Rysavy Decl. ¶ 215).

Accordingly, we determine that Petitioner has proven by a preponderance of the evidence that claims 16 and 17 would have been obvious in light of Sanmateu, Taylor, and Pahlavan, claim 22 would have been obvious in light of Sanmateu, Taylor, and La Porta, and claim 24 would have been obvious in light of Sanmateu, Taylor, and Aust.

F. Grounds 5–8: Obviousness of Claims 12–15, 18–22, 25 Over Ye and ’005 patent, of Claims 16 and 17 Over Ye, ’005 patent, and Pahlavan, of Claim 23 Over Ye, ’005 patent, and Sanmateu, and of Claim 24 Over Ye, ’005 patent, and Au

Petitioner asserts Grounds 5 to 8 as an alternative basis for a determination that claims 12–25 are unpatentable. Pet. 44–66 (citing Rysavy Decl. ¶¶ 140–141, 144–146, 148–158, 177–188, 191, 196–197, 199–200, 206–217). As before, Patent Owner has not addressed Petitioner’s contentions. Because we have determined unpatentability of claims 12–25 based on Petitioner’s Grounds 1–4, we do not reach these alternative grounds of unpatentability of claims 12–25. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”).

IV. ANALYSIS — MOTION TO AMEND

VCT's Motion to Amend seeks to substitute new claim 26 for independent claim 12, and cancel claims 12–25, contingent on a finding of unpatentability of “any of original claims [12–25].” Mot. Amend 1, 8.⁶ The proposed substitute claim is set forth below, with the proposed amendments indicated.

26. A method for vertical handoff in a wireless network vertical comprising:

monitoring, by a mobile node, a wireless local area network signal carrying an active network connection;

initiating, by the mobile node, vertical handoff to a wireless wide area network signal upon determining that a signal strength of the wireless local area network signal is [[undesirable]] below a threshold;

establishing, by the mobile node, a TCP tunnel between the mobile node and an interface of a wireless wide area network behind a network address translation gateway;

tunneling the active network connection via the TCP tunnel over the wireless wide area network signal;
and

caching and replaying information over the wireless wide area network signal.

Mot. Amend 8.

A. *The Applicable Law*

In an *inter partes* review, amended claims are not added to a patent as of right, but rather must be proposed as a part of a motion to amend.

35 U.S.C. § 316(d). The Board must assess the patentability of proposed

⁶ VCT's reference to “claims 1–11” is assumed to be in error and meant to refer to claims 12–25. Mot. Amend 1.

substitute claims “without placing the burden of persuasion on the patent owner.” *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc); 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) (“Guidance”). Subsequent to the issuance of *Aqua Products* and the Board’s Guidance, the Federal Circuit issued a decision in *Bosch Automotive Service Solutions, LLC v. Matal*, 878 F.3d 1027 (Fed. Cir. 2017) (“*Bosch*”), as well as a follow-up Order amending that decision on rehearing. See *Bosch Auto. Serv. Sols., LLC v. Iancu*, Order on Petition for Panel Rehearing, No. 2015-1928 (Fed. Cir. Mar. 15, 2018).

In accordance with *Aqua Products*, the Board’s Memorandum, and *Bosch*, Patent Owner does not bear the burden of persuasion to demonstrate the patentability of the substitute claims presented in the motion to amend. Rather, ordinarily, “the petitioner bears the burden of proving that the proposed amended claims are unpatentable by a preponderance of the evidence.” *Bosch*, 878 F.3d at 1040 (as amended on rehearing). See also *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 (PTAB Feb. 25, 2019) (precedential). The Board itself also may justify any finding of unpatentability by reference to evidence of record in the proceeding. *Id.* (citing *Aqua Products*, 872 F.3d at 1311 (O’Malley, J.)). Thus, the Board determines whether substitute claims are unpatentable by a preponderance of the evidence based on the entirety of the record, including any opposition made by the Petitioner.

Notwithstanding the foregoing, Patent Owner’s proposed substitute claims must meet the statutory requirements of 35 U.S.C. § 316(d) and the

procedural requirements of 37 C.F.R. § 42.121. *See Lectrosonics*, Paper 15 at 4–8. Patent Owner must demonstrate: (1) the amendment proposes a reasonable number of substitute claims; (2) the proposed claims are supported in the original disclosure; (3) the amendment responds to a ground of unpatentability involved in the trial; and (4) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

B. Predicate Requirements

1. Reasonable Number of Substitute Claims

By statute, in a motion to amend, a patent owner may propose a reasonable number of substitute claims for each challenged claim. 35 U.S.C. § 316(d)(1)(B). There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one substitute claim. 37 C.F.R. § 42.121(a)(3). VCT proposes a single substitute claim for one of the challenged independent claims, and therefore meets this requirement. Mot. Amend 8.

2. Support in the Original Disclosure

A motion to amend may not present substitute claims that introduce new subject matter. 35 U.S.C. § 316(d); 37 C.F.R. § 41.121(a)(2)(ii). New matter is any addition to the claims without support in the original disclosure. *See TurboCare Div. of Demag Delaval Turbomach. v. Gen. Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001) (“When [an] applicant adds a claim . . . the new claim[] . . . must find support in the original specification.”). VCT has identified written description support in the originally filed disclosure of the subject patent for the new limitations added to the proposed substitute claim. Mot. Amend 2–3.

However, as Petitioner points out, VCT has failed to provide support for the portions of the substitute claim that are common to the corresponding cancelled claim. Oppos. Amend 2. As stated in *Lectrosonics*, “the motion must set forth written description support for each proposed substitute claim as a whole, and not just the features added by the amendment.” IPR2018-01129, Paper 15 at 8. Nevertheless, challenged independent claim 12 as issued was unchanged during prosecution and was submitted with the original application. Ex. 2112, 40–41. *Mentor Graphics Corp. v. EVE-USA, Inc.*, 851 F.3d 1275, 1297 (Fed. Cir. 2017) (“Original claims are part of the original specification and in many cases will satisfy the written description requirement”). Therefore, we decline to deny the Motion to Amend on this basis.

Petitioner also argues substitute claim 26 is indefinite, because it is unclear what is meant by “behind a network address translation gateway” in the claim requirement, “a TCP tunnel between the mobile node and an interface of a wireless wide area network behind a network address translation gateway.” Oppos. Amend 3–8. Petitioner argues “[t]his phrase leaves a [person or ordinary skill in the art] guessing whether the claim is satisfied by a tunnel entirely behind a NAT gateway *or* requires the tunnel to traverse the NAT gateway.” *Id.* at 3. Because, as discussed below, the record demonstrates obviousness of claim 26 under either interpretation of this requirement, this issue is moot.

3. *Responding to a Ground of Unpatentability*

37 C.F.R. § 42.121(a)(2)(i) states that “[a] motion to amend may be denied where . . . [t]he amendment does not respond to a ground of unpatentability involved in the trial.” In considering the motion, the entirety

of the record is reviewed to determine whether a patent owner's amendments respond to a ground of unpatentability involved in the trial.

The proposed substitute amendments add limitations in an attempt to distinguish the claimed subject matter over Sanmateu and Ye, the primary references relied on by Petitioner. Mot. Amend 4. Therefore, this predicate requirement is satisfied.

4. *Not Enlarging the Scope of the Claims*

As stated in 35 U.S.C. § 316(d)(3), an “amendment . . . may not enlarge the scope of the claims of the patent.” *See also* 37 C.F.R. § 42.121(a)(2)(ii) (“A motion to amend may be denied where . . . [t]he amendment seeks to enlarge the scope of the claims of the patent.”). “A new claim enlarges if it includes within its scope any subject matter that would not have infringed the original patent.” *Thermalloy, Inc. v. Aavid Eng'g, Inc.*, 121 F.3d 691, 692 (Fed. Cir. 1997).

Petitioner does not argue that the substitute claim enlarges the scope of the challenged claims, and upon review of the added limitations we determine that this predicate requirement is satisfied.

C. *Obviousness of Claim 26 Over Sanmateu, Taylor, and Aust*

Petitioner argues claim 26 would have been obvious in light of Sanmateu, Taylor, and Aust.⁷ Oppos. Amend 8–17. We note that VCT does not provide any counterarguments — it has not submitted a reply to

⁷ Petitioner asserts in the alternative that claim 26 would have been obvious in light of Ye (Ex. 1114), the '005 patent (Ex. 1129), and Aust, and also in light of Ye, the '005 patent, RFC-3024, and Levkowitz (Ex. 1144). Oppos. Amend 17–29. Because we have determined unpatentability of claim 26 based on Sanmateu, Taylor, and Aust, we do not reach these alternative grounds of unpatentability for claim 26.

Petitioner's Opposition to the Motion to Amend, or appeared at the oral hearing. In analyzing Petitioner's obviousness arguments, we refer to the foregoing discussions of claim construction, the applicable law of obviousness, the level of skill in the art, the disclosures of Sanmateu and Taylor, and the obviousness of challenged claim 12 in light of Sanmateu and Taylor, as well as the following.

As an initial matter, we determine that the elements of claim 26 common to challenged independent claim 12 would have been taught or suggested by the combination of Sanmateu and Taylor, as discussed above. Pet. 12–14, 18–21; Oppos. Amend 8–9.

In addition, the “monitoring” and “initiating” steps of claim 26 modify the corresponding limitations of claim 12 by specifying that those steps are performed “by the mobile node.” Mot. Amend 8. The record establishes that the mobile node in Sanmateu performs those steps. Oppos. Amend 9–10 (citing Rysavy 2nd Decl. ¶¶ 79–80). The “initiating” step also additionally requires a determination that the “signal strength” of the network signal be “below a threshold,” instead of the claim 12 requirement that the network signal be “undesirable.” Mot. Amend 8. The record establishes that Sanmateu operates in this fashion. Oppos. Amend 10 (citing Rysavy 2nd Decl. ¶ 80).

Claim 26 additionally requires:

establishing, by the mobile node, a TCP tunnel between the mobile node and an interface of a wireless wide area network behind a network address translation gateway; and

tunneling the active network connection via the TCP tunnel over the wireless wide area network signal.

Mot. Amend 8. As discussed above for claim 24, the record establishes that one of ordinary skill would have modified the Sanmateu-Taylor system to incorporate the tunneling approach disclosed in Aust. Pet. 40–43 (citing Ex. 1113, 868; Rysavy Decl. ¶¶ 213–215). The applicable tunneling is illustrated in Petitioner’s annotated version of Figure 2 of Aust, set forth below.

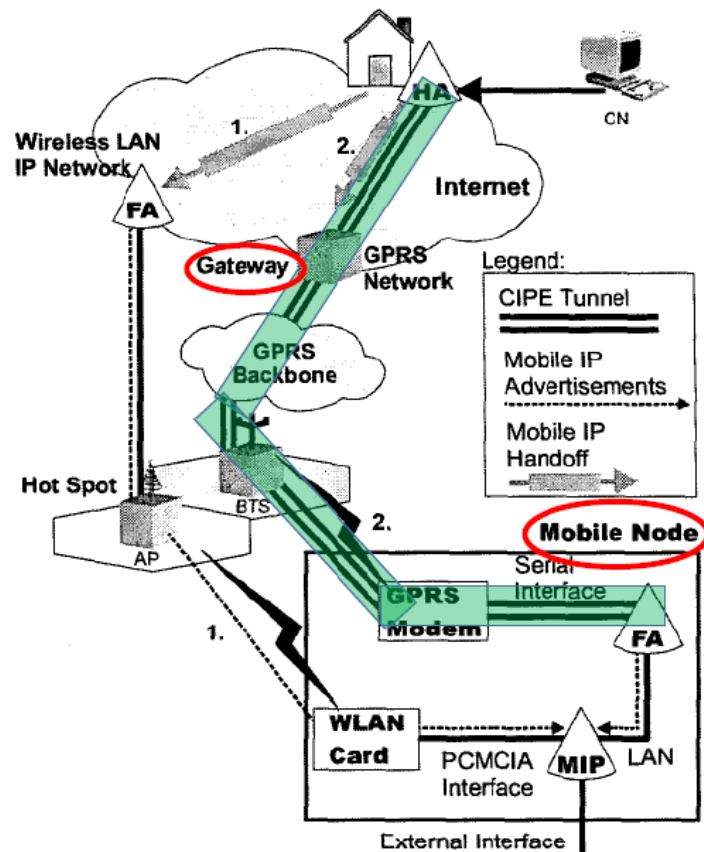


Figure 2: System Architecture

Oppos. Amend 11. This figure depicts a system in which a mobile node communicates with its home agent via a tunnel passing through a GPRS wide area network, including a network address translation gateway, as shown by the green highlighting supplied by Petitioner. Oppos. Amend 12 (citing Ex. 1113, 870; Rysavy 2nd Decl. ¶¶ 81–82). Based on Petitioner’s

unrebutted expert testimony, we determine that a person of ordinary skill would have been motivated to combine Sanmateu, Taylor, and Aust to use the tunneling approach, as claimed, whether “behind a network address translation gateway” is construed to be entirely behind a gateway, or to require the traversing the gateway. Oppos. Amend 12–13 (citing Ex. 1113, 870; Rysavy 2nd Decl. ¶¶ 83–84). Moreover, although Aust describes a UDP (“User Datagram Protocol”) tunnel, based on Petitioner’s unrebutted expert testimony, we determine that a person of ordinary skill would have found it obvious to use a TCP tunnel, as required by the claim. Oppos. Amend 13–17 (citing Ex. 1113, 870; Rysavy 2nd Decl. ¶¶ 85–96).

Accordingly, we determine that Petitioner has proven by a preponderance of the evidence that substitute claim 26 would have been obvious in light of Sanmateu, Taylor, and Aust. Therefore, the Motion to Amend is denied.

V. CONCLUSION⁸

In summary:

Claims	35 U.S.C. §	References	Claims Shown Unpatentable	Claims Not shown Unpatentable
12–15, 18–21, 23, 25	103(a)	Sanmateu, Taylor	12–15, 18–21, 23, 25	
16, 17	103(a)	Sanmateu, Taylor, Pahlavan	16, 17	
22	103(a)	Sanmateu, Taylor, La Porta	22	
24	103(a)	Sanmateu, Taylor, Aust	24	
12–15, 18–22, 25	103(a)	Ye, '005 patent		
16, 17	103(a)	Ye, '005 patent, Pahlavan		
23	103(a)	Ye, '005 patent, Sanmateu		
24	103(a)	Ye, '005 patent, Aust		
Overall Outcome			12–25	

⁸ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	12–25
Substitute Claims Proposed in the Amendment	26
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	26
Substitute Claims: Not Reached	

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has demonstrated by a preponderance of the evidence that claims 12–25 of the '917 patent are *unpatentable*; and

FURTHER ORDERED that VCT's Motion to Amend is *denied*;

FURTHER ORDERED that, because this is a Final Written Decision, any party to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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U.S. Patent 7,245,917 B2

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