Trials@uspto.gov
571-272-7822

Paper 37
Entered: April 20, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY MOBILE COMMUNICATIONS INC.,
Petitioner,

v.

SSH COMMUNICATIONS SECURITY OYJ,
Patent Owner.

Case IPR2015-01869
Patent 8,544,079

Before BRYAN F. MOORE, TRENTON A. WARD, and WILLIAM M. FINK, *Administrative Patent Judges.*

MOORE, *Administrative Patent Judge.*

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

I. INTRODUCTION

Petitioner, Sony Mobile Communications Inc., filed a Supplemental Petition requesting an *inter partes* review of claims 1–32 of U.S. Patent No. 8,544,079 (Ex. 1001, "the '079 patent"). Paper 7 ("Pet.").[1] In response, Patent Owner, SSH Communications Security Oyj, filed a Preliminary Response. Paper 10 ("Prelim. Resp."). On April 22, 2016, we instituted an *inter partes* review of all of the challenged claims. Paper 11, 25 ("Institution Decision" or "Dec. on Inst.").

On July 21, 2016, we issued a Decision on Rehearing granting in part Patent Owner's request for rehearing and modifying the grounds instituted in the Institution Decision. Paper 16 ("Dec. on Reh'g"), 11. On August 8, 2016, we issued an Order (Paper 18, 7), we issued an Order further modifying the Institution Decision regarding the claims remaining for trial. Thus, the claims and grounds remaining for trial in this proceeding are as follows:

Challenged Claims	Basis	References
1–3, 5–10, 12–20, 22–27, and 29–32	§ 103(a)	Bellovin
1, 3–8, 10–12, 14–18, 20–23, and 25, 27–29	§ 103(a)	Shuen and RFC 1234

[1] Petitioner was authorized to file a Supplemental Petition to add a claim chart providing a comparison of disclosure in US Provisional Application No. 60/104,878 (Ex. 1004) to the issued claims in US Patent No. 6,870,845 (Ex. 1003), in accordance with the Federal Circuit's discussion in *Dynamic Drinkware* of *In re Wertheim*, 646 F.2d 527, 537 (CCPA 1981). Paper 6.

Dec. on Reh'g, 11, 12; Paper 18, 7.

Patent Owner filed a Patent Owner Response. Paper 19 ("PO Resp."). Petitioner filed a Petitioner's Reply. Paper 23 ("Pet. Reply"). Patent Owner filed a Motion to Exclude certain reply evidence. Paper 25 ("Mot. to Exclude"). Petitioner filed an Opposition to Patent Owner's Motion to Exclude. Paper 28 ("Opp. to Mot. to Exclude"). The record includes a transcript of the Oral Hearing that occurred on January 18, 2017. Paper 32 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision issues pursuant to 35 U.S.C. § 318(a). Petitioner has shown by a preponderance of the evidence that claims 1–32 of the '079 patent are unpatentable.

A. Related Matters

Patent Owner indicates that the following *inter partes* review proceeding may affect, or be affected by, a decision in this proceeding: *Sony Mobile Communications Inc. v. SSH Communications Security Oyj*, Case IPR2016-01180 (challenging Patent No. 9,071,578). Paper 33, 2–3.

B. The '079 Patent

The '079 patent describes apparatus and methods for communicating transport layer User Datagram Protocol (UDP) packets across multiple network domains via a Network Address Translator (NAT), which, among other things, translates source and destination addresses in the header of the UDP packets from addresses in a first network domain to different addresses in a second network domain. Ex. 1001, 1:54–65, 6:15–21. To perform the

translation, the NAT maintains mappings of addresses from the first domain to the second domain, with each mapping often associated with a communication session between two devices on opposite sides of the NAT. *Id*. at 11:50–65. The mappings are maintained for the network address translation by sending keepalive packets to the NAT device before time out of the mapping. *Id*.

C. Illustrative Claim

Of the challenged claims, claims 1, 8, 12, 18, 23, 25, 29, and 31 are the only independent claims.

Claim 1, reproduced below, is illustrative.

> 1. A method of maintaining communication of datagrams comprising:
>
> communicating the datagrams, in accordance with the User Datagram Protocol, from and/or to a device via a network address translator device that performs network address translation; and
>
> maintaining mapping for the network address translation by sending from the device at least one keepalive packet to the network address translator device before a time out of the mapping for the network address translation.

Ex. 1001, 15:16–25.

D. Prior Art Relied Upon

Petitioner relies upon the following prior art references:

Patents

Bellovin	US 6,870,845 B1	Mar. 22, 2005	Ex. 1003
’878 Provisional	US 60/104,878	Oct. 22, 2002	Ex. 1004
Shuen	US 5,572,528	Nov. 5, 1996	Ex. 1015

Other References

D. Provan, RFC 1234, *Tunneling IPX Traffic through IP Networks*, IETF, Network Working Group, June 1991, *available at* http://ietf.org/rfc/RFC1234.txt (Ex. 1007) ("RFC 1234")

IETF December 1998 Proceedings (Ex. 1005) ("IETF Meeting Minutes")

J. Carmichael and S. Sarkar, *LU6.2 over TCP/IP*, TN3270E, IETF December 1997 (Ex. 1009) ("Carmichael")

Petitioner also relies on the Declaration of Scott Bradner (Ex. 1002, "Bradner Dec."). Patent Owner relies on the Declaration of Mathew Holdrege. (Ex. 2012, "Holdrege Dec.").

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see also Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard in an *inter partes* review proceeding). Under the broadest reasonable interpretation standard, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art, in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. "network address translator device" and "network address translation"

Petitioner proposes constructions for the claim terms "network

address translator device" and "network address translation," recited in all challenged claims. Pet. 9. Specifically, Petitioner proposes that "network address translator device" means "a device for mapping addresses during a network connection" and "network address translation" means "mapping addresses during a network connection." *Id*. Petitioner relies on the Specification, which states "[t]he typical operation of a NAT may be described so that it maps IP address and port combinations to different IP address and port combinations. The mapping will remain constant for the duration of a network connection, but may change (slowly) with time." *Id*. at 9 (quoting Ex. 1001, 2:19–23).

Patent Owner construes "network address translation device" to mean "at least include[ing] a device capable of translating address information in outbound packets and inbound packets between two address realms, and to include mappings that are each usable both in the translation of address information of packets in one direction and an associated reverse translation of packets in the opposite direction." PO Resp. 20–21.

In its Preliminary Response, Patent Owner suggested a construction, which we disagreed with, that also requires a network address translator to be bidirectional, which we disagreed with.

In its Preliminary Response, Patent Owner relied on Petitioner's Declarant, Mr. Bradner's, reference to Ex. 1018, an article on NATs, from which the "concepts and names of Network Address Translation and Network Address Translators" stem. Prelim. Resp. 16 (citing Ex. 1002 ¶ 43.) In discussing this article, Mr. Bradner states that "[i]n the simplest

case, a NAT is placed between the local area network (LAN) within a home or enterprise and the connection to the Internet" (Ex. 1002 ¶ 47), at which the NAT translates between a "private address" in a LAN's domain and "public addresses" in the Internet's domain (*Id.* ¶¶ 48–49). Mr. Bradner further states that a NAT "must maintain a table . . . that maps the addresses used in the translations" (*Id.* ¶ 51) and that the NAT can perform reverse mapping of reply packets (*Id.* ¶¶ 50, 51). Prelim. Resp. 16.

Patent Owner also asserted that "Network Address Translator," is a term of art coined in the article (Ex. 1018) and the associated functions of translating bidirectionally between two different domains were formalized in the IETF document RFC 1631 (Ex. 1006). Prelim. Resp. 16 (citing Ex. 1002 ¶ 44).

In its Patent Owner Response, Patent Owner further relies on IETF RFC 2663 (Ex. 2014), which is titled "IP Network Address Translator (NAT) Terminology and Considerations[2]" and which was written just after the earliest filing date of the '079 patent. PO Resp. 9. This document discloses definitions of terminology related to NATs and Patent Owner asserts this document is still currently used as a definitional reference. *Id.* (citing Ex. 2012 ¶¶ 43–44).

Patent Owner relies on the following statement from RFC 2663: "all flavors of NATs should share the following characteristic[:] . . . Transparent Address assignment [in which] . . . NAT binds addresses in private network

[2] RFC 2663 is co-authored by Patent Owner's Declarant. Ex. 2014.

with addresses in global network *and vice versa* to provide *transparent routing for the datagrams traversing between address realms*." PO Resp. 12–13 (citing Ex. 2014, 6–7). Based in part on this quotation, Patent Owner asserts "Apart from the issue of NAT device bi-directionality, one of ordinary skill in the art of packet switched networks would also understand 'network address translation' to require the translation of packets between two address realms." PO Resp. 21 (citing Ex. 2012 ¶ 65).

Petitioner asserts that the definition of NAT was not a well-defined term at the time of RFC 2663 and the filing of the '079 patent. Pet. Reply 7 (citing Ex. 2014 (RFC 2663) ("There are many variations of address translation that lend themselves to different applications").

Despite the discussion of the bidirectional nature of the "NAT" in the above papers and despite the term being allegedly "coined" in such papers, in the Institution Decision we disagreed that a "NAT" necessarily requires return or reverse packets to be translated to properly be considered a "NAT." Dec. on Inst. 7–8; *see also Zodiac Pool Care, Inc. v. Hoffinger Indus., Inc*., 206 F.3d 1408, 1414 (Fed.Cir.2000) (cautioning that "both intrinsic and extrinsic evidence [may be considered, however, a court should] turn[ ] to extrinsic evidence only when the intrinsic evidence is insufficient to establish the clear meaning of the asserted claim."). We continue to disagree.

In general, in an *inter partes* review, claim terms are given the broadest reasonable construction as would be given by one skilled in the art at the time of invention, when reading the claim terms in the context of the

specification and prosecution history. *Cuozzo*, 136 S. Ct. at 2144–46. There are, however, two distinct exceptions. The first is the circumstance in which a patentee sets forth a definition by acting as his own lexicographer. *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed.Cir.2012) (citation omitted). The second is the circumstance in which a patentee disavows the full scope of a claim term either in the specification or during prosecution. *Id.*; *see also PPC Broadband, Inc. v. Corning Optical Commc'ns RF*, LLC, 815 F.3d 734, 745 (Fed. Cir. 2016) (citing disavowal as an exception to the broadest reasonable interpretation standard). Here, Patent Owner relies on several embodiments in the Specification and the knowledge of its Declarant, but does not cite to sufficient evidence: 1) of the patentee becoming a lexicographer defining a NAT as bidirectional between two "realms," or 2) of a clear disavowal of a NAT which translates addresses in a single direction or operates in a single "realm."

The Specification describes prior art NATs as having "two main forms, of address translation, illustrated schematically in FIGS. 1a and 1b," the first of which, "Host NAT," is not described or depicted as necessarily performing reverse mapping. Ex. 1001, 1:54–58. Patent Owner disagrees, asserting that because "Basic NAT is symmetrical with respect to address translation, Fig. 1a would represent the IP address translation in either direction." PO Resp. 18 (citation omitted). However, the Specification also states "in practice there are many possible ways for physically connecting a NAT." *Id.* at 19 (citing Ex. 1001, 2:1–2.) This suggests the network arrangement is flexible. *See* Pet. Reply 5–6. Patent Owner interprets this

statement more narrowly as meaning that NAT could be physically connected on the same side of the NAT device (i.e., "located on the same side of the box"), rather than a broader meaning regarding the network topology. PO Resp. 19–20. Petitioner states "This interpretation is overly simplistic, because Figs. 1a and 1b are expressly stated to be "schematic" (1:55-56), and no person of ordinary skill would read the figures as limiting NAT device connections." Pet. Reply 5. We agree. Patent Owner relies on its Declarant's testimony to support this assertion (Ex. 2012 ¶ 62), but because this testimony does not cite to sufficient evidence that this statement should be viewed that narrowly, we find this testimony unsupported and conclusory.

Patent Owner also describes how the various embodiments of the '079 patent describe a NAT as being bidirectional translation between two realms. PO Resp. 17–21. In addition, Patent Owner relies on its Declarant, Mr. Holdrege, stating:

> [Patent Owner's] constructions [of NAT] are supported by the disclosure of the '079 patent and the opinion of SSH's expert, which is based on: 1) his years of experience working in the field of packet switched networks, including being a central figure as a co-chair of the NAT Working Group within the IETF at the time the '079 patent was filed; 2) his analysis of the of the '079 patent; 3) his review of Sony's expert testimony with regard to NAT devices as discussed, which he considers to support the above construction; 4) the numerous IETF documents incorporated by reference into the '079 patent; 4[5]) the definitions of NAT in RFC1631 (cited by Sony's expert) and RFC 2663 (which has been relied on for the last 17 years for its NAT definitions). Ex. 2012 ¶ 66.

PO Resp. 21. Petitioner's Declarant disagrees with Patent Owner's Declarant as to these constructions. Ex. 1002 ¶ 96, 97.

As we observed in the Institution Decision, the Specification of the '079 patent states that "Keepalive packets need to be transmitted in one direction only, although they may be transmitted also bidirectionally." Dec. on Inst. 8 (quoting Ex. 1001, 12:23–25). Patent Owner responds that the "Board overlooks the fact that the same NAT mapping is used in both the outbound translation and the inbound reverse translation, and thus, the keepalive packet need only travel through the NAT in either direction." PO Resp. 20 (citing Ex. 2012 ¶¶ 63, 67–69). Nevertheless, considering all the arguments and evidence in the record, we are not persuaded that *both* inbound and outbound translation are required by the language of the claims. Even Patent Owner's own characterizations of "network address translation" do not require bidirectional translation. Specifically, Patent Owner states in its Response that "one of ordinary skill in the art of packet switched networks would also understand 'network address translation' to require the *translation of packets between two address realms*." PO Resp. 21 (citing Ex. 2012 ¶ 65) (emphasis added). Translation of packets between two address realms, however, does not require bidirectional translation between two address realms. We acknowledge that the bidirectional nature of network address translators, as well as operation in two "realms," is addressed in the definitional references cited by Patent Owner as a feature of NAT. Nevertheless, we determine that this optional feature of NATs does not define all NATs such that it should limit the claims.

Thus, we determine, that the broadest reasonable interpretation, consistent with the Specification, of "network address translator device" is "a device for mapping addresses during a network connection" and of "network address translation" is "mapping addresses during a network connection."

2. "keepalive packet" and "keepalive datagram"

Petitioner argues that the terms "keepalive packet" and "keepalive datagram" should be construed to mean "a block of data for transmission in a packet-switched system that is used to maintain address mappings." Pet. 9–10 (citing Ex. 1002 ¶¶ 98–100). Petitioner relies on the '079 patent Specification which states: "the 'keepalive' aspect of the invention [is] ensuring that the network address translations performed in the network do not change after the translations that occur have been determined." Ex. 1001, 11:51–54. The '079 patent further states that "[a] possible way of ensuring the maintaining of mappings is to send keepalive packets frequently enough that the address translation remains in the cache." Ex. 1001, 11:63–65.

Patent Owner argues in its Preliminary Response that Petitioner's definition ignores the express language of each claim of the '079 patent, in which the recited keepalive packet/datagram is one that maintains a mapping for a network address translation by being sent to or via a network address translator device before a time out of the mapping. Prelim. Resp. 18. Patent Owner maintains that position in its Patent Owner Response. PO Resp. 22. We agree. We decline to adopt Petitioner's broad construction of keepalive

and defer to the language of the claims which is nevertheless consistent with Petitioner's citations to the Specification quoted above. Thus, we determine the broadest reasonable interpretation, consistent with the Specification, of keepalive packet/datagram is "a packet/datagram that maintains a mapping for a network address translation by being sent to or via a network address translator device before a time out of the mapping."

3. "time out of the mapping of the network address translation"

Preliminarily Patent Owner argued,

> In accordance with the '079 patent and consistent with how one of ordinary skill in the art would understand the phrase, the proper construction of "timeout of the mapping of the network address translation" is a property of the mapping in which the mapping expires after it has not been used in the translation of a packet for a period time *uniquely associated* with the mapping.

Prelim. Resp. 18–19 (citing Ex. 1001, 11:58–61) (emphasis added). Petitioner does not propose an explicit construction of this limitation. Pet. Reply 13; Pet. 7–10.

As argued preliminarily by Patent Owner, this term distinguishes the scenario where a NAT mapping is deleted based solely upon another mechanism, such as a TCP FIN bit indicating the closing of a communication session. Prelim. Resp. 18–19 (citing Ex. 1001, 11:56–68). Nevertheless, this exemplary statement follows the Specification's broader statement that keepalives are used to "ensur[e] that the network address translations performed in the network do not change after the translations that occur have been determined." Ex. 1001, 11:51–54. Furthermore, the claim language does not require a unique association with the mapping but

broadly recites a time out of the mapping (*see, e.g.*, "before a time out of the mapping for the network address translation"). We determine that the claims are not limited to a time out "uniquely" associated with the mapping but rather a time out that is associated with the mapping such that the mapping is no longer maintained. In its Patent Owner Response, Patent Owner does not dispute this construction.[3] PO Resp. 22.

We determine the broadest reasonable interpretation, consistent with the Specification, of "time out of the mapping of the network address translation" is "a property associated with the mapping in which the mapping expires after it has not been used in the translation of a packet for a period time associated with the mapping."

4. "address information that equals address information in the headers of datagrams"

Patent Owner preliminarily argued that "'address information' is the source and destination addressing information in the header of the packet/datagram according to which the NAT device will perform network address translation." Prelim. Resp. 19 (citing Ex. 1014, 13; Ex. 2006, 28–31; Ex. 1029). We agreed with that construction in our Decision to Institute and, in light of a review of the arguments and evidence presented during the trial, see no reason to alter that construction. *See* Dec. on Inst. 10–11.

[3] Patent Owner reasserts the bidirectionality of a "NAT" when discussing this construction. PO Resp. 22–24. As explained in the discussion of the term "NAT," we do not adopt Patent Owner's narrow definition of that term.

Patent Owner does not dispute this construction,[4] but seeks to clarify it by stating the "header of the UDP datagram . . . includes the following . . . for identifying the source and destination in communicating the packet from one device to another: Source IP Address, Destination IP Address, Source Port, and Destination Port [are necessary or the result would be a] datagram not being delivered to the correct location." PO Resp. 24–25 (citing Ex. 2012 ¶ 31). Although Petitioner does not propose an explicit construction for this limitation, Petitioner asserts that "'[a]ddress information' does not require port designations." Pet. Reply. 1. We agree with Petitioner that port information is not part of the source and destination address information required by the claims.

Port designations generally designate a specific application program located at the device. PO Resp. 25. Patent Owner relies on the description of "Port NATs" in the Specification to show that port designations must be included as address information. PO Resp. 19 (citing Ex. 1001, 1:60–66). However, Patent Owner does not explain sufficiently why the claims show be limited by the specific description of "Port NAT' when the word port does not appear in the claims and only the broader term "network address translation" is recited in the claims.

Patent Owner also asserts "having the complete addressing information, i.e., the IP addresses and UDP port information, being equal

[4] Patent Owner reasserts the bidirectionality of a "NAT" when discussing this construction. PO Resp. 22–24. As explained in the discussion of the term "NAT," we do not adopt Patent Owner's narrow definition of that term.

between different datagrams *is the only way* to ensure that the different datagrams are routed in the same manner across the network to the same device and to the same program within the device." PO Resp. 27. Patent Owner relies on the Institution Decision's quotation from the Specification that "[k]eepalive packets do not need to contain any meaningful information other than the necessary headers that are equal to the data packet headers to ensure that the keepalive packets will be handled exactly in the same way as the actual data packets." Dec. on Inst. 10–11 (quoting Ex. 1001, 12:7–12). In the Institution Decision, consistent with the Specification, we determined that the use of the term "equal" is used in the context of a keepalive being treated the same as a regular packet. *Id.*

We did not intend to imply, however, as Patent Owner suggests, that all aspects of routing would be the same as between a regular and keepalive datagram. For example, the claims do not state that the "header" must be the same to treat packets in "exactly the same way" as stated in the portion of the Specification quoted above; rather, the claims recite simply that address information in keepalives equals address information in the headers of packets/datagrams. Additionally, the claims do not state that "different [packets/]datagrams are routed in the same manner across the network to the same device and to *the same program within the device*," as suggested by Patent Owner. *See* PO Resp. 27 (emphasis added). The importance of the above quoted statement from the Specification is that keepalives have the same *address* so they will be sent to the same *address* as regular packets, not that the keepalives must be handled by the same port number. Thus, we

decline to import Patent Owner's suggested limitation to address and port information over the explicit language of the claims.

Accordingly, we determine the broadest reasonable interpretation of the term "address information" in the limitation "address information that equals address information in the headers of datagrams" is "the source and destination addressing information in the header of the packet/datagram according to which the NAT device will perform network address translation."

B. Principles of Law

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 ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In that regard, an obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR*, 550 U.S. at 418; *see also Translogic*, 504 F.3d at 1259. Obviousness is established when the prior art

itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art. *In re Rinehart*, 531 F.2d 1048, 1051 (CCPA 1976).

In this case, the level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc*., 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

C. Obviousness of Claims over Bellovin

Petitioner asserts that claims 1–3, 5–10, 12–16–20, 22–27, and 29–32 are unpatentable under 35 U.S.C. § 103(a) as obvious over Bellovin. Pet. 10. To support its contentions, Petitioner provides detailed explanations as to how the prior art meets each claim limitation. *Id*. at 15–17, 22–41[5].

We have reviewed the Petition, the Patent Owner's Response, and Petitioner's Reply, as well as the relevant evidence discussed in those papers and other record papers. We determine the record supports Petitioner's contentions and adopt Petitioner's contentions discussed below as our own. For the reasons that follow, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1–3, 5–10, 12–16, 18–20, 22–27, and 29–32 would have been obvious over Bellovin. We are not

[5] Petitioner asserts Bellovin with several "Keepalive References" as an alternative ground of obviousness. Pet. 17-24. We instituted on Bellovin alone. Dec. on Inst. 24–25. Thus, we do not adopt or rely on Petitioner's contentions regarding the "Keepalive References."

persuaded that Petitioner has established by a preponderance of the evidence that claim 17 would have been obvious over Bellovin.

1. Priority

Bellovin was published on March 22, 2005 from an application that was filed on August 4, 1999. *See* Ex. 1002 ¶ 101. Bellovin claims priority to U.S. Provisional Patent Application No. 60/104,878 ("the '878 Provisional application") which was filed on October 20, 1998. Ex. 1003. The October 20, 1998 date of the filing of the '878 Provisional application predates the June 15, 1999 filing date of the parent application for the '079 patent. In order for the filing date of a provisional application to apply to a published patent document, for prior art purposes, the relevant disclosure of the published patent document must be carried forward from the provisional application. *See Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1381–82 (Fed. Cir. 2015). In addition, the provisional application must provide written description support for the claimed invention. *Id.* Petitioner asserts the '878 Provisional Application supports each of the claims of Bellovin. Pet. 10–14. Patent Owner does not challenge these assertions. *See generally* PO Resp. We agree with Petitioner.

Additionally, for all the challenged limitations of the '079 patent, Petitioner shows support in Bellovin and substantially similar support in the '878 Provisional application. Pet. 24–41. Patent Owner does not challenge the status of Bellovin as prior art. *See generally* PO Resp. For the reasons above, we determine that Bellovin is prior art to the '079 patent.

2. Bellovin

Bellovin discloses a system for telephone calls over packet networks. Figure 1 of Bellovin is reproduced below.

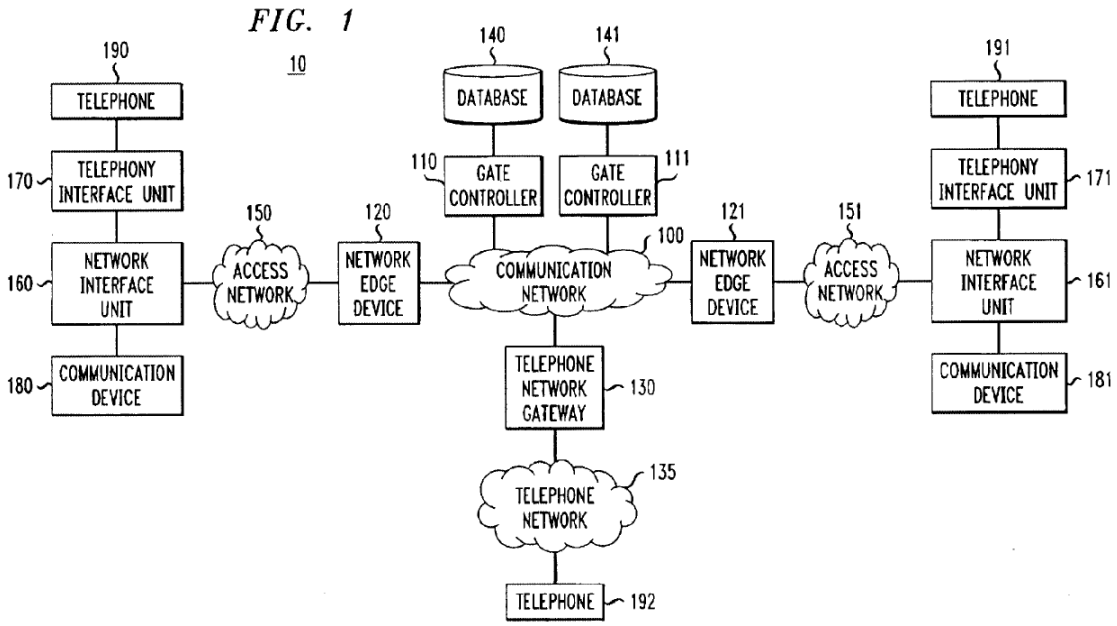


Figure 1, above, depicts communication network 10 of the invention. Communication network 10 can be "a network that supports, for example, Internet Protocol (IP) signaling." Ex. 1003, 4:52–53; Ex. 1004, 1–2. Bellovin's system uses UDP over IP. Ex. 1003, 20:44; Ex. 1004, 27.

To provide for telephone calls over UDP, Bellovin teaches Telephony Interface Units ("TIUs") indicated as items 170 (left) and 171 (right) in Fig. 1. Ex. 1003, 4:36–51, 5:31–46; Ex. 1004, 1–2, 12. TIUs are also referred to as "broadband telephony interfaces (BTIs)" in Bellovin. Ex. 1003, 5:46; Ex. 1004, 40.

Bellovin discloses using a NAT. Ex. 1004, Fig. 6; Ex. 1003, Fig. 5. In this example, two NAT translations are performed at each of the "edge routers" or "ERs" (ERO and ERT), which are also called "network edge devices" or "NEDs." Ex. 1003, 5:1. Bellovin discloses that the NAT mappings can time out sometime after a call is completed. Ex. 1003, 18:58–59; Ex. 1004, 20.

During a telephone call between BTIs, calls can be placed "on hold." When this happens, the BTIs will not exchange any voice data. In that sense, calls placed on hold could be mistaken for dropped calls or equipment failures. Ex. 1004, 42. Customers desire not to be billed for such matters. Therefore, to be able to distinguish "on hold" calls (billable) from equipment failures or dropped calls (not billable), Bellovin specifies that a BTI will send a series of "KEEPALIVE" messages to its nearest router (Ex. 1003, 31:21–39; Ex. 1004, 40) or to the corresponding BTI at the other end of the call (Ex. 1003, 33:45–61; Ex. 1004, 42).

3. Claims 1, 8, 12, 18, 23, 25, and 29

Claim 1 recites "communicating the datagrams, in accordance with the User Datagram Protocol, from and/or to a device via a network address translator device that performs network address translation." Petitioner establishes sufficiently that Bellovin teaches this limitation. Petitioner relies on Bellovin's disclosure of "Distributed Open Signaling Architecture ("DOSA"), which is said to include its own "application-layer retransmission scheme to achieve reliable transport of messages . . . independent of any lower layer reliable transmission protocol," and therefore

uses "merely UDP/IP" as an underlying transport, which provides none of those services. Pet. 25–26 (Ex. 1004, p. 27; *see also* Ex. 1003, 20:33–45). Petitioner also relies on Bellovin's NAT discussed in the '878 Provisional in Section 4.5, "Privacy," and especially 4.5.1, "Network Address Translation," (Ex. 1004, pp. 19–20), and Bellovin in Section 5, "Network Address Translation," in the Bellovin Patent (Ex. 1003, 17:9–19:45 and 60:54–61:8 (Cl. 1)). Pet. 26–27 (citing Ex. 1002, ¶¶ 175–184). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Claim 1 also recites "maintaining mapping for the network address translation by sending from the device at least one keepalive packet to the network address translator device before a time out of the mapping for the network address translation." Petitioner establishes sufficiently that Bellovin teaches this limitation.

Petitioner states the following about the relationship between the Bellovin's time out and Bellovin's keepalive message:

> If a KEEPALIVE message is not received prior to a timeout, the calls are terminated, under the assumption that the call has been dropped or equipment has failed. When a KEEPALIVE message is received, it preserves the resources necessary to maintain a telephone call. (Ex. 1003, 28:9-15)(Ex. 1004, p. 36)(Ex. 1002, ¶¶130-135, 190).
>
> Bellovin teaches that keepalives preserve the resources necessary to maintain a call, and that a call state includes a NAT mapping.

Pet. 16–17. In Bellovin, keepalive messages occur only when a call is on hold. Ex. 1003, 31:21–30 ("While having a connection on hold, it is necessary for the BTI to periodically inform the Edge Router that it is still alive and healthy . . ."). Also, in Bellovin, global addresses are released when the call is terminated. Ex. 1003, 18:53–69.

Petitioner states that "it was obvious that Bellovin's keepalives would maintain Bellovin's NAT mappings, especially because maintenance of NAT mappings was *necessary* to maintain a call." Pet. 17. We are persuaded by Petitioner's argument. Although Bellovin's keepalive messages do not directly maintain Bellovin's NAT mappings, they maintain the call, termination of which results in a loss of those mappings. Ex. 1003, 18:53–69, 31:21–30.

We construed "time out of the mapping of the network address translation" as "a property associated with the mapping in which the mapping expires after it has not been used in the translation of a packet for a period time associated with the mapping." We agree with Petitioner that Bellovin's disclosure that a call will be terminated if a keepalive was not sent is associated with the NAT mappings to be considered a time out of the call as required by the claims. Thus, Petitioner has established sufficiently that Bellovin's keepalive message maintains the global addresses prior to a time out of those addresses, as recited in the claims (*see e.g.*, claim 1: "sending from the device at least one keepalive packet to the network address translator device before a time out"). We agree with Petitioner's

contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner acknowledges that the Board relied on keepalives sent while a call is in the hold state that indicate that a call is alive and should be maintained. PO Resp. 38. However, Patent Owner asserts that "these timers [do not] reflect[] whether or not the NAT mappings have been used in the translation of a packet." *Id*. at 38–39. Patent Owner implicitly limits keepalives to messages sent only when a keepalive "knows" that a mapping has been used. *Id.* Patent Owner asserts that Bellovin's keepalives are engineered to detect network errors rather than determine whether a NAT mapping was used or not. *Id.* at 39–43.

As discussed above, we construed a timeout as "a property associated with the mapping in which the mapping expires after it has not been used in the translation of a packet for a period time associated with the mapping." We construe a keepalive as defined by the explicit language of the claims, i.e. a keepalive packet/datagram is "one that maintains a mapping for a network address translation by being sent to or via a network address translator device before a time out of the mapping." We did not create, by the use of the phrase "after it has not been used," a requirement that the keepalive must have some "knowledge" of the timeout of a mapping and be sent specifically to maintain a mapping which has been used and is due to timeout. Nor does the Specification support such a knowledge requirement. Ex. 1001, 11:51–12:29; *see* PO Resp. 22–23 (construing timeout citing to Ex. 2012 ¶ 68, but not citing to the Specification); *see also*, PO Resp. 4, 41–

43 (suggesting monitoring, i.e. "knowledge," of the "use" of mapping is required without citation to the Specification);

Bellovin teaches that the mappings will "expire[] after it has not been used in the translation of a packet for a period time associated with the mapping," as required by claim 1. In Bellovin, global addresses are released when the call is terminated. Ex. 1003, 18:53–69. Bellovin specifies that, during a hold, a BTI will send a series of "KEEPALIVE" messages to its nearest router (Ex. 1003, 31:21–39; Ex. 1004, 40) or to the corresponding BTI at the other end of the call (Ex. 1003, 33:45–61; Ex. 1004, 42) to prevent the call from being terminated. Thus, consistent with the claim construction, it is evident that the mapping "has not been used" because the call is on hold. Thus, even if Bellovin's keepalives can be correctly characterized as related to error detection, the keepalives are sent to maintain a mapping. In other words, if the keepalive was not sent, the mapping could timeout due to a call termination.

For the reasons stated above, we disagree with Patent Owner's arguments regarding this limitation. Based on the foregoing, we determine the record supports Petitioner's contentions that claim 1 of the '079 patent would have been obvious in view of Bellovin.

Claim 18 recites the "network address translator device is configured to maintain the mapping . . . in response to reception of at least one keepalive packet." Patent Owner suggests that this limitation requires the mapping to be maintained in direct response to the keepalive. *See* Tr. 22:1–12. We disagree. As noted above, in Bellovin the keepalive prevents

termination of a call which "maintains" a mapping that would have been deleted if the call had been terminated. We determine that this is sufficiently "in response to" the reception of the keepalive. Therefore, we disagree with Patent Owner's arguments regarding this limitation. Based on the foregoing, we determine the record supports Petitioner's contentions that claim 18 of the '079 patent would have been obvious in view of Bellovin.

Patent Owner does not argue claims 8, 12, 23, 25, and 29 separately. Claims 8, 12, 18, 23, 25, and 29, contain similar limitations to claim 1 and we determine Petitioner has shown sufficiently that Bellovin teaches those limitations for the reasons above. *See* Pet. 32–34.

4. Claims 2, 9, 13, 19, 24, 26, 30, and 31

Claim 2 recites wherein the at least one keepalive packet comprises a header with address information that equals address information in the headers of the datagrams. As discussed below, Petitioner establishes sufficiently that Bellovin teaches this limitation.

Petitioner asserts "In a BTI to BTI keepalive embodiment, keepalive packets are directed (addressed) from one BTI to another. In that case, it is obvious that the addresses must match the addresses of non-keepalive datagrams, because otherwise the keepalive packets could not be properly routed." Pet. 28 (citing Ex. 1003, 33:45-61; Ex. 1004, 19–20, 42, Fig. 6; Ex. 1002 ¶¶ 131–135, 193)." We agree with Petitioner that the keepalive packets directed at a BTI are directed to the same BTI as the packets of the voice call thus the address information must be equal to the voice call packets. Ex. 1002 ¶¶ 131–135, 193. We agree with Petitioner's contentions

and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner relies on its construction of "address information," which we did not adopt, to argue that in Bellovin the UDP ports of the keepalive messages are different than the regular messages. PO Resp. 43–47. Because this argument is not commensurate with the scope of the claims as properly construed, we are not persuaded by this argument.

Patent Owner does not argue claims 9, 13, 19, 24, 26, and 30 separately. Claims 9, 13, 19, 24, 26, and 30 contain similar limitations to claim 2 and we determine Petitioner has shown that Bellovin teaches those limitations for the reasons above. *See* Pet. 33–35, 37, 39, 40.

Claim 31 contains the additional requirement that the keepalive datagram should be sent "through" the NAT address translator rather than "to" it, as in claims 1 and 2. Petitioner relies on Bellovin's disclosure of the "BTI to BTI" version of keepalive messages, as discussed below with respect to claim 7. *Id.* at 46–47 (citing Ex. 1003, 33:45–61; Ex. 1002 ¶¶ 295–297). For example, Petitioner asserts "it is apparent from Fig. 1 of Bellovin that packets must travel via two Edge Routers when transmitted from one BTI to another." *Id*. at 32 (citing Ex. 1003, Fig. 1). Patent Owner does not argue claim 31 separately. We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

As to claim 17, Petitioner relies on its analysis regarding claim 4 and the lack of a meaningful payload. Pet. 36. We did not institute on claim 4

as obvious over Bellovin because Petitioner had not shown the lack of a "meaningful payload" as a result of our determination that Petitioner failed to identify sufficient reason to combine Bellovin with the Carmichael reference. *See* Dec. on Reh'g 8. For that reason, in this Decision we determine that claim 17 should not have been instituted as to this ground and we determine that Petitioner has not sufficiently that Bellovin teaches the limitation of claim 17.

5. Claim 3, 10, 14, 20, and 27

Claim 3 recites "wherein the at least one keepalive packet comprises an indicator that identifies it as a keepalive packet." Petitioner establishes sufficiently that Bellovin teaches this limitation. Petitioner relies on the section concerning BTI-to-Edge Router keepalive messages which includes the word "keepalive" in the keepalive messages. Pet. 28–29 (citing Ex. 1003, 31:22–39; Ex. 1004, 40; Ex. 1002 ¶¶ 194–199). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner does not argue claims 3, 10, 14, 20, and 27 separately. Claims 10, 14, 20, and 27 contain similar limitations to claim 3 and we determine Petitioner has shown sufficiently that Bellovin teaches those limitations for the reasons above. *See id*. at 28–29, 34, 36, 37–40.

6. Claims 5 and 15

Claim 5 recites "determining a shortest period for the time out of the mapping for the network address translation, and based on the determination, sending the at least one keepalive packet frequently enough

to maintain the mapping for the network address translation in the network address translator device." Petitioner establishes sufficiently that Bellovin teaches this limitation.

Petitioner relies on Bellovin's disclosure of using of keepalive message packets to maintain calls on "hold", and the fact that those keepalive message packets are already sent "periodically… [so] that the reservation should be maintained" (Ex. 1003, 31:22–25), indicating that some timeout period is determined and the packets are sent frequently enough to maintain the mapping. Pet. 29–30 (citing Ex. 1002 ¶ 211). Petitioner also asserts it would have been obvious to determine the shortest timeout period, because if keepalive packets were sent at intervals longer than the shortest period, the mapping would in fact time out, and the function of the keepalive would not be served. *Id*. at 30 (citing Ex. 1002 ¶ 211). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.[6]

Patent Owner does not argue claims 5 and 15 separately. Claim 15 contains similar limitations to claim 5 and we determine Petitioner has shown sufficiently that Bellovin teaches those limitations for the reasons above. *See id*. at 36.

[6] We do not adopt Petitioner's discussion of Shuen on page 30 because the combination of Shuen and Bellovin was not instituted for trial. *See* Pet. 30.

7. Claims 6 and 16

Claim 6 recites "taking the possibility of packet loss into account in determining a frequency of sending the at least one keepalive packet."

Petitioner asserts Bellovin teaches that the interval between keepalive messages is engineered to minimize the chances of false error detection. Pet. 30–31. We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner does not argue claims 6 and 16 separately. Claim 16 contains similar limitations to claim 6 and we determine Petitioner has shown sufficiently that Bellovin teaches those limitations for the reasons above. *See id*. at 36.

8. Claim 7, 22, and 32

Claim 7 recites "maintaining the mapping for the network address translations by a plurality of network address translator devices by sending the at least one keepalive packet via the plurality of network address translator devices." Petitioner establishes sufficiently that Bellovin teaches this limitation.

Petitioner relies on the "double NAT" configuration of Bellovin to meet this limitation. Pet. 31–32. (citing Ex. 1003, 5:27–30, 18:43–51, 19:4–33, 33:45–61, 60:53–61:7, Figs. 1, 5, 6; Ex. 1002 ¶¶ 219–222). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner does not argue claims 7, 22, and 32 separately. Claim 22 contains similar limitations to claim 7 and claim 32 contains similar

limitation to claims 2 and 7. Petitioner has shown sufficiently that Bellovin teaches those limitations for the reasons above. *See Id*. at 38, 41.

9. Summary

We have reviewed the proposed ground of obviousness over Bellovin against claims 1–3, 5–10, 12–16, 18–20, 22–27, and 29–32, and Patent Owner's arguments and evidence in response to the ground. For the reasons stated above, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1–3, 5–10, 12–16, 18–20, 22–27, and 29–32 are unpatentable.

D. Obviousness of Claims over Shuen and RFC 1234

Petitioner contends that claims 1, 3–8, 10–12, 14–18, 20–23, and 25, 27–29 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Shuen and RFC 1234. Pet. 41. To support its contentions, Petitioner provides detailed explanations as to how the prior art meets each claim limitation. *Id.* at 41–60.

Shuen is directed in general to mobile networking. Ex. 1015, Title. In mobile networking, computers are not permanently connected to a network in a particular place. Computers can change their connectivity when they physically move to a new location, or when their network interfaces are changed. Ex. 1015, 5:17–21. Shuen teaches a way to avoid confusion that could happen when a computer connected to a network changes its connectivity. *Id.* at 3:21–32. Shuen teaches that a mobile computer on a private network has a "home router." *Id.* at 13:1–47.

The home router acts as a NAT, assigning the mobile computer a particular address. *Id.* at 6:38–43. The address might not be valid, however, if the mobile computer moves off the private network and on to the public Internet or a different private network. *Id.* at 15:37–16:3. To address this problem, Shuen teaches that the mobile computer should, when it establishes a new connection, register its new address (called its "local address") with its home router. *Id.* at 16:60–17:11. The home router will then establish a mapping (called a "binding") between the new "local address" and the mobile computer's permanent, "virtual address." *Id.* at 8:14–28, 16:60–17:11. This virtual address can then still be used by other computers to reach the relocated mobile computer, because the home router provides the necessary address translation. *Id.* The home router, however, will delete the mapping (binding) upon expiration of a "time to live." *Id*. at 27:63–28:17. To avoid expiration of the mapping, Shuen teaches that the mobile computer can send "binding update packets."

RFC 1234 was written by Don Provan of Novell, Inc. (the assignee of the Shuen patent). Ex. 1007, 1. RFC 1234 sets forth a technique for "tunneling" packets in Novell's proprietary IPX networking protocol through standard IP networks (*Id*.), i.e., "encapsulating" the content of the IPX packets within packets meeting the standard Internet protocol requirements, and in particular, the requirements of the User Datagram Protocol. *Id*. at 1–2.

1. Claims 1, 8, 12, 18, 23, 25, and 29

Claim 1 recites "communicating the datagrams, in accordance with the User Datagram Protocol, from and/or to a device via a network address translator device that performs network address translation." Petitioner establishes sufficiently that the combination of Shuen and RFC 1234 teaches this limitation.

Petitioner relies on Shuen's disclosure of devices from or to which datagrams are transferred including at least the "mobile hosts" that are depicted as item 320 in the figures. Pet. 44 (citing Ex. 1015, 1:10–14, 16:4–15; Figs. 1 and 2). Petitioner also relies on Shuen disclosure of "home routers" which are depicted as item 340 in the figures, and which constitute a subset of "routers" in general (depicted as item 310 in the figures) to show network address translator devices that perform network address translation. *Id*. at 44–45 (citing Ex. 1015, 12:51–54; 13:1–20; 13:42–47). Specifically, the home routers translate network addresses for mobile devices. *Id*. at 45 (citing Ex. 1015, 8:23–27, 12:51–54, 12:63–13:47, 16:4–15; 16:40–52; 17:6–11, 17:12–44; Ex. 1002 ¶¶ 153–160, 310–312).

Petitioner relies on RFC 1234 disclosure of how to "encapsulate IPX datagrams in UDP packets," for example by placing an IPX datagram "in the data portion of a UDP packet" to show communicating datagrams in accordance with the User Datagram Protocol. *Id*. at 45–46 (citing Ex. 1007, p. 2). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Based on Petitioner's citations to specific prior art disclosures and supporting evidence, we are persuaded that Petitioner sets forth sufficient articulated reasoning with rational underpinning to support the legal conclusion that it also would have been obvious to modify the teachings of Shuen, with RFC 1234's teachings, to include UDP tunneling. *Id*. at 42–43. For example, Petitioner asserts:

> It would have been obvious to use Shuen with RFC 1234's teaching of IPX over UDP, because RFC 1234 is directed to the same IPX protocol described in Shuen. (Ex 1007, pp. 1-2) (Ex. 1002, ¶303). Shuen further explains that its teachings may be applied in the context of larger, interconnected networks "such as the Internet" (Ex. 1015, 20:51) and may be implemented under "multiple protocols" and not only IPX (Ex. 1015, 17:39-43). This specific invitation to apply the Shuen teachings in the context of an IP network would have motivated one of skill in the art to seek out additional information such as RFC 1234, especially when both documents were authored by employees of the same assignee and relate to the same IPX protocol. *See Ex parte Mettke*, Appeal 2008-0610, 2008 Pat. App. LEXIS 6761, *43-*44 (BPAI Sept. 30, 2008). Furthermore, the relevant field is predictable, and the results of the combination would have been predictable: namely, the use of UDP with Shuen. (Ex. 1002, ¶¶303-305). In this way, Shuen represents a known base system, for which RFC 1234 recommends an improvement. (Ex. 1002, ¶¶303-305). The combination was within ordinary skill. (Ex. 1002, ¶305). The combination is thus obvious under *KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 1739-40 (2007). (Ex. 1002, ¶¶303-305).

Id. We agree that Shuen suggests use of other protocols and is a base system, which one of skill in the art would be motivated to modify and

expect a predictable result using the teachings of RFC 1234, an improvement. *See* Pet. 42–43.

Claim 1 also recites "maintaining mapping for the network address translation by sending from the device at least one keepalive packet to the network address translator device before a time out of the mapping for the network address translation." Petitioner establishes sufficiently that the Shuen teaches this limitation.

Petitioner relies on a "time to live" value, after which the mapping expires, which is part of the address mapping for a mobile host within the home router (NAT). *Id*. at 46–47 (citing Ex. 1015, 23:48–59). The mobile host device can extend this time to live value by sending a "binding update" packet, just as the claimed "keepalive packet" ensures that the mapping is maintained. *Id*. at 47 (citing Ex. 1015, 26:38–50, Fig. 10 (detailing the fields of a binding update packet)). Shuen explains that

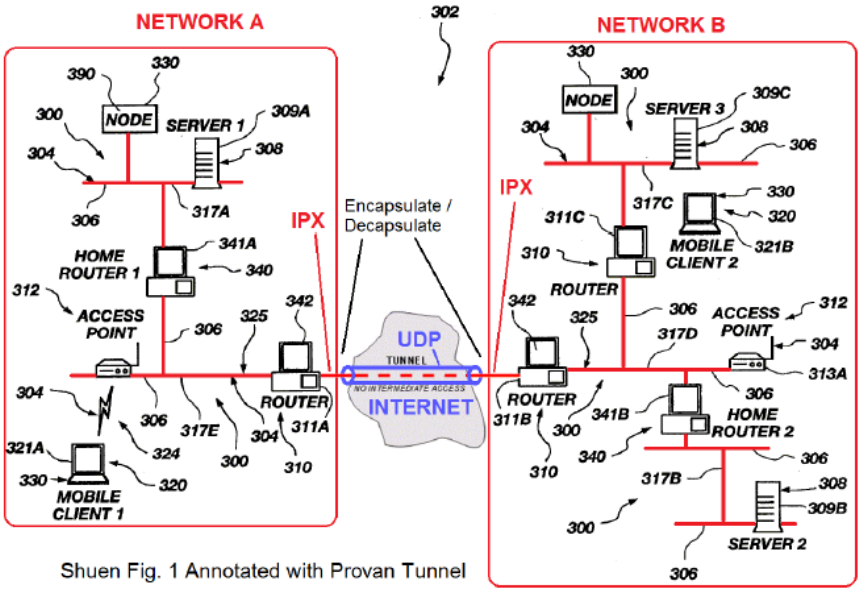
> [o]nce a mobile host 320 logs on to a home router 340, to ensure that the home router 340 continues to forward packets 400 to the mobile host 320, the mobile host 320 sends to the home router 340 a binding update 464 containing the next sequence number 450J in order. The binding update 464 must arrive before the time to live 448 expires…. This binding update 464 refreshes the time to live counter of the existing binding of a mobile host 320."

Id. at 47 (quoting Ex. 1015, 27:63–28:4, citing Ex. 1002 ¶¶ 315–317) (emphasis omitted). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.[7]

[7] Patent Owner asserts "Sony seems to also suggest that the asserted

Patent Owner asserts that claim 1 requires the NAT to operate according to UDP protocol because claim 1 recites "communicating the datagrams, in accordance with the User Datagram Protocol, from and/or to a device via a network address translator." Patent Owner asserts that "the packets that are communicated from/to Shuen's mobile device to/from another device via the Home Router (the alleged NAT) are outside of the UDP tunnel (e.g., deencapsulated), and thus are IPX packets, not UDP datagrams." PO Resp. 54. Reproduced below is Patent Owner's illustration of a possible combination of Shuen and RFC 1234 as an annotated version of Shuen Fig. 1.

combination could involve the use of the Shuen methodology in a protocol other than IPX." PO Resp. 61 (citing Pet. 42–43). Patent Owner argues that "no evidence is presented to show that this would have been within the capabilities of one of ordinary skill in the art." *Id.* However, we do not rely on this alternative theory (*See* Tr. 19:1–20:15) to determine any issue in this Decision. Thus, it is unnecessary to consider Patent Owner's arguments regarding this theory.



Shuen Fig. 1 Annotated with Provan Tunnel

Patent Owner's annotated Fig. 1 of Shuen, above, shows an application of the tunneling of RFC 1234 to the device of Shuen. *Id*. at 55. Patent Owner asserts that based on the combination as illustrated above, the home router, which is the alleged NAT, would not be associated with UDP tunneling and would only operate in the IPX domain. *Id*. at 56. Patent Owner asserts

> Because the claims require UDP datagrams to be communicated via or through the network address translator device (NAT), and because the Home Router (the alleged NAT) in the Shuen/RFC1234 combination would communicate only via IPX (and have no association with the UDP/IP protocol), the asserted combination would not result in an arrangement as claimed, including the required communication of UDP datagrams from and/or to a device via a NAT.

Id. at 57 (citing Ex. 2012 ¶ 134). We disagree, because Patent Owner's argument depends on an undeveloped claim interpretation. As noted above, claim 1 recites "communicating the datagrams, in accordance with the User

Datagram Protocol, from and/or to a device via a network address translator device that performs network address translation." There is no explicit requirement that the NAT communicate exclusively via UDP, rather only that the datagrams are communicated "from and/*or to*" a device via a NAT in accordance with the UDP. *See* Pet. Reply 22. In other words, the claim does not require that UDP must be used exclusively for the entire path between a first device and a second device. *See id.* at 22–23.

Patent Owner also argues, based on its proposed claim construction that Shuen "does not employ a 'network address translation device' as called for by the claims, i.e., a device operational to map addresses in one address domain (realm) to addresses in another address domain (realm), and to perform reverse mapping of the addresses for return communications." PO Resp. 60. We did not adopt this construction. Thus, we disagree with this argument as not commensurate with the scope of the claims as properly construed.

Patent Owner also argues that combination of Shuen and RFC 1234 does not disclose "at least one keepalive packet," as required by the claims. Patent Owner asserts "the claims effectively require the recited keepalive packet(s) to be TCP/IP compliant, specifically either UDP or TCP." PO Resp. 60; PO Resp. 5, 64. Patent Owner does not include in its Patent Owner Response an explanation of why keepalives must be TCP/IP complaint. That explanation appears to be at paragraph 40 of

Mr. Holdrege's declaration (Ex. 2012).[8] It is impermissible to incorporate by reference arguments from another paper. 37 C.F.R. § 42.6(a)(3) ("Arguments must not be incorporated by reference from one document into another document."). Although it is acceptable to cite to other documents for support for an argument, it is not proper to cite to other documents for the entire argument. Here, there is no exposition as to what Patent Owner's argument is; we must go to the cited document to understand Patent Owner's argument. This is an impermissible under 37 C.F.R. § 42.6(a)(3).

Nevertheless, as explained above, we do not read "communicating the datagrams, in accordance with the User Datagram Protocol, from and/or to a device via a network address translator device," as recited in claim 1, to require that all the devices in the network operate according to UDP. Claim 1 only requires that the keepalives are, at least, sent (according to UDP protocol) to a NAT to maintain mappings. In the combination of Shuen and RFC 1234, keepalives are sent (via a UDP tunnel using UDP protocol) to a NAT to maintain mappings. Pet. 46–47 (citing Ex. 1015, 23:48–59, 26:38–50, 27:63–28:4; Ex. 1002 ¶ 316–318). Thus, Patent Owner's argument is not commensurate with the scope of the claims as properly construed and we are not persuaded by this argument.

[8] Paragraph 40 of Mr. Holdredge's declaration is cited in paragraph 140 Mr. Holdredge's declaration, which is cited in the Patent Owner Response at page 60.

Based on the foregoing, we determine the record supports Petitioner's contentions that claim 1 of the '079 patent would have been obvious in view of the combination of Shuen and RFC 1234.

Patent Owner does not argue claims 8, 12, 18, 23, 25, and 29 separately. Claims 8, 12, 18, 23, 25, and 29, contain similar limitations to claim 1 and we determine Petitioner has shown that the combination of Shuen and RFC 1234 teaches those limitations for the reasons above. *See* Pet. 52–60.

2. Claim 3, 10, 14, 20, and 27

Claim 3 recites "wherein the at least one keepalive packet comprises an indicator that identifies it as a keepalive packet." Petitioner establishes sufficiently that Shuen teaches this limitation. Petitioner relies Shuen's binding update packet that includes "OPERATION CODE = 3" which denotes that it is a "BINDING UPDATE" along with a new time to live value, which instructs the NAT router to maintain its mapping. Pet. 48 (citing Ex. 1015, 26:37–50, Fig. 10). Shuen also discloses mobile hosts using binding updates to obtain new local private addresses when roaming, but notes "[t]his binding update 464 is sent even if no roaming has occurred," in which case it "refreshes the time to live counter of the existing binding." *Id*. at 48–49 (citing Ex. 1015, 28:2–4). Additionally, Petitioner asserts "It would have been obvious that Shuen's system must recognize the operation code of 3 represents a 'keepalive' if the local address matches the local address in the home router mapping table." *Id.* at 49 (citing

Ex. 1002 ¶¶ 321–322). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner does not argue claims 3, 10, 14, 20, and 27 separately. Claims 10, 14, 20, and 27 contain similar limitations to claim 3 and we determine Petitioner has shown that the combination of Shuen and RFC 1234 teaches those limitations for the reasons above. *See Id*. at 53–55, 57, 59.

3. Claims 4, 11, 17, 21, and 28

Claim 4 recites "generating the at least one keepalive packet by generating a packet without any meaningful payload." Petitioner establishes sufficiently that Shuen teaches this limitation.

Petitioner asserts that Fig. 4 depicts the structure of packets for Shuen. Pet. 47. Figure 4, reproduced below, shows the data structure of packet header 398.

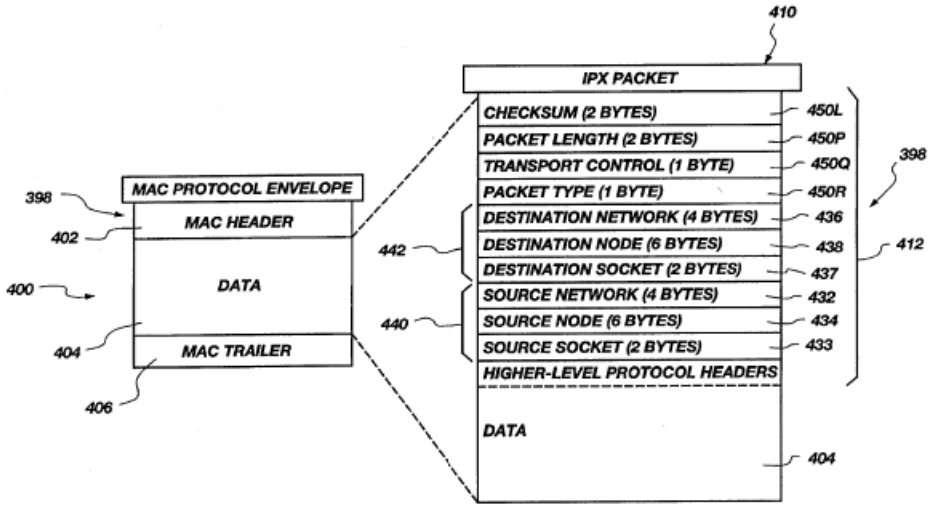


Fig. 4

Figure 4 above is a schematic block diagram of a packet structure according to Shuen.

Petitioner asserts that Figure 10 depicts the IPX portion of the header for a binding update packet. *Id.* at 47. Figure 10, reproduced below, shows the data structure of binding update 464.

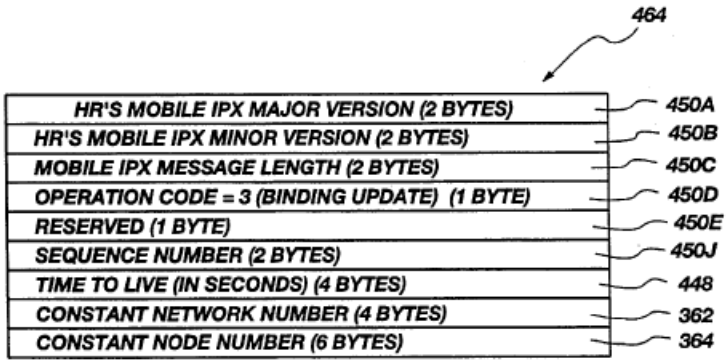


Fig. 10

Figure 10, above, is described in the Shuen as "a schematic block diagram of a header for a binding update packet." Ex. 1015, 11:3–4. Petitioner asserts "One of skill in the art would recognize that this packet lacks a 'meaningful payload' since it includes only header information needed to perform the time to live reset (i.e., maintain the mapping), has a length of 24 bytes, and lacks a data segment." Pet. at 49 (citing Ex. 1015, Fig. 10; Ex. 1002 ¶¶ 324–329). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own. We also rely on the explanations discussed below.

Patent Owner asserts "Shuen's Fig. 10, which Sony characterizes as a binding update packet (actually a packet portion), is carried as the data

payload 404 of IPX packet 410 as shown in Fig. 4." PO Resp. 62. Patent Owner further asserts "The 'Higher-Level Protocol Headers' as appears in Fig. 4 is part of DATA 404, which is the payload of the IPX packet 410." *Id.* Petitioner responds that the "Higher-Level Protocol Headers" section of the packet in Fig. 4 is separated by a dotted line above the data section. Pet. Reply 26.

Petitioner argues the confusion on this point comes because there is protocol layering. *Id.* at 25. Petitioner also points to Fig. 4 of the '079 patent which shows such layering, i.e. a header that appears to be included in a payload. *Id.* at 25–26. Fig. 4 of the '079 patent is reproduced below.

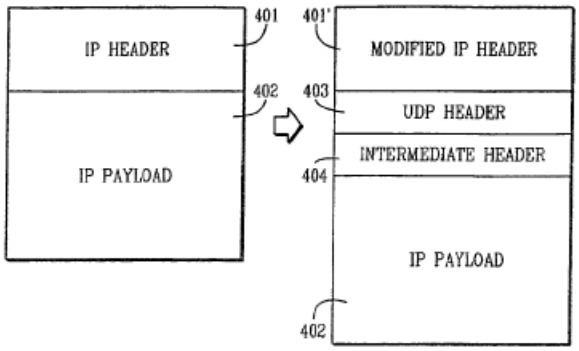


Fig. 4

Fig. 4 of the '079 patent, above, shows a UDP header 403 inserted between the IP header and the IP payload. Pet. Reply 26 (citing, Ex. 1001, 9:14–19 ("Basically, a UDP header 403 and a short intermediate header 404 are inserted after the IP header 401 already in the packet (with the protocol field copied to the intermediate header). The IP header 401 is slightly modified to produce modified IP header 401'. *The IP payload 402 stays the*

same.") (emphasis added). This arrangement is substantially similar to the arrangement in Shuen. Petitioner has shown sufficiently that Shuen's binding updates have no meaningful payload because the "header" information is separate from the "payload" in the same way that the header of the UDP packet is separate from the payload in Fig. 4 of the '079 patent. Pet. 48–49 (citing Ex. 1015, 26:37–50, Fig. 10; Ex. 1002 ¶¶ 323–328).

Patent Owner also asserts "Shuen's IPX formatted binding updates would be encapsulated within UDP datagrams as specified in RFC 1234, which expressly states: 'Each IPX datagram is carried in the data portion of the UDP packet.'" PO Resp. 61–62 (citing Ex. 1007 at 1). Thus, according to Patent Owner, the binding update would be carried in the payload of the UDP datagrams. *Id.* at 62. Petitioner relies on the combination of Shuen and RFC 1234 and relies explicitly on Shuen's description of the IP and UDP packets discussed above. Pet. 47–49. Therefore, the information in the IPX binding update may be part of a modified header as disclosed in Shuen, not part of the payload. Thus, we disagree with Patent Owner's argument.

Claim 17 recites 'configured to discard received keepalive packets." Because Shuen's binding updates, as explained above, have no meaningful payload Petitioner asserts "a device receiving a keepalive packet would have no reason to store it permanently after receiving it[, thus, it] would have been obvious to discard the packet to clear memory for additional incoming packets." Pet. 55–56 (citing Ex. 1002 ¶¶ 324–328, 384–385). We agree

with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner does not argue claims 11, 17, 21, and 28 separately. Claims 11, 17, 21, and 28 contain similar limitations to claim 4 and we determine Petitioner has shown that the combination of Shuen and RFC 1234 teaches those limitations for the reasons above. *See Id*. at 54–57, 59.

4. Claims 5 and 15

Claim 5 recites "determining a shortest period for the time out of the mapping for the network address translation, and based on the determination, sending the at least one keepalive packet frequently enough to maintain the mapping for the network address translation in the network address translator device." Petitioner establishes sufficiently that the Shuen teaches this limitation.

Petitioner relies on the duration of the mapping for a specific mobile host in Shuen which is determined via its assigned "time to live" value. Pet. 49 (citing Ex. 1015, 23:48–58). The binding update keepalive packets "must arrive [at the router] before the time to live 448 expires." *Id*. at 49–50 (citing Ex. 1015, 28:1). Thus, according to Petitioner "the time to live is the shortest period for the timeout of the mapping, and it is determined by the programmer of the Shuen system [and] Shuen further discloses sending the keepalive packet frequently enough to maintain the mapping." *Id*. at 50 (citing Ex. 1015, 27:63–28:8; Ex. 1002 ¶¶ 329–336). We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner does not argue claims 5 and 15 separately. Claim 15 contains similar limitations to claim 5 and we determine Petitioner has shown sufficiently that Shuen teaches those limitations for the reasons above. *See Id*. at 55.

5. Claims 6 and 16

Claim 6 recites "taking the possibility of packet loss into account in determining a frequency of sending the at least one keepalive packet." Petitioner establishes sufficiently that Shuen teaches this limitation.

Petitioner asserts

> One of skill in the art would have found it obvious that this "tak[e]s the possibility of packet loss into account" because the mobile host continues to try sending multiple binding update packets after the repeated expiration of several cycles of MaxTransitTimeout [Shuen's criteria for the amount of time before retrying a binding update]. (Id.) If packet delivery were perfect, there would be no need for multiple attempts – the mobile host device could wait once for MaxTransitTimeout to expire, and that would indicate a router crash. However, because of the possibility of packet loss, a failure to reach the router within the specified time may not indicate that the router is crashed, but instead that packets were dropped. To account for this, the mobile host alters the frequency of the keepalive packets (i.e., sending once every MaxTransitTimeout, instead of once at the end of every time to live cycle).

Pet. 50–51. We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner does not argue claims 6 and 16 separately. Claim 16 contains similar limitations to claim 6 and we determine Petitioner has

shown sufficiently that Shuen teaches those limitations for the reasons above. *See id*. at 55.

6. Claim 7 and 22

Claim 7 recites "maintaining the mapping for the network address translations by a plurality of network address translator devices by sending the at least one keepalive packet via the plurality of network address translator devices." Petitioner establishes sufficiently that Shuen teaches this limitation. Petitioner states

> One purpose of the Shuen system is to permit a mobile host device to roam away from the NAT home router that initially assigned its local address and across "router boundaries" (Ex. 1015, 16:8) where it would obtain a different local address from a closer router or access point. (See Ex. 1015, 16:4-22; 18:23-49). One of skill in the art would find it obvious that any subsequent communication with the original home router, e.g. for the purpose of sending keepalive binding update packets, would travel via a plurality of network address translator devices, because NATs were widely used in the Internet during relevant timeframe. (Ex. 1001, 2:13-19)(Ex. 1002, ¶¶344-348). Shuen contemplates that such binding update packets are sent from multiple different access points: "In cases where a mobile host 320 switches quickly from the range of one access point 312 to that of another, two binding updates 464 might arrive at the home router 340 in an order different from that in which they were sent." (Ex. 1015, 26:45-49). Shuen further specifically contemplates that the network packets' travel path might include multiple NAT home routers as depicted in Fig. 1 (depicting "Home Router 1" as 341A and "Home Router 2" as 341B). Any NAT in the path of a binding update packet will view the packet as normal traffic, which will have the effect of resetting time out values, and thus act to maintain a NAT mapping (Ex. 1002, ¶¶343-348).

Pet. 51–52. We agree with Petitioner's contentions and adopt Petitioner's contentions discussed above as to this limitation as our own.

Patent Owner does not argue claims 7 and 22 separately. Claim 22 contains similar limitations to claim 7. Petitioner has shown sufficiently that Shuen teaches those limitations for the reasons above. *See Id*. at 57–58.

7. Summary

We have reviewed the proposed ground of obviousness over the combination of Shuen and RFC 1234 against claims 1, 3–8, 10–12, 14–18, 20–23, and 25, 27–30, and Patent Owner's arguments and evidence in response to the ground. For the reasons stated above, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1, 3–8, 10–12, 14–18, 20–23, and 25, 27–29 are unpatentable.

III. PATENT OWNER'S MOTION TO EXCLUDE

Patent Owner moves to exclude Ex. 1040 cited by Petitioner in its Petitioner's Reply as hearsay and as irrelevant. Mot. to Exclude 1. Petitioner relies on Ex. 1040 to support its obviousness case by stating "[i]n a co-pending action in the United Kingdom, the Patents Court found similar claims of related EP(UK) 2 254 311 invalid." Pet. Reply 1 n.1. This issue is moot because this Final Written Decision does not cite to or rely upon Ex. 1040 or the Petitioner's statement quoted above regarding Ex. 1040. For that reason, we do not address the matter on the merits and dismiss Patent Owner's Motion to Exclude as moot.

IV. CONCLUSION

Based on the complete record, Petitioner has demonstrated by a preponderance of the evidence that: (1) claims 1–3, 5–10, 12–16, 18–20, 22–27, and 29–32 of the '079 patent would have been obvious over Bellovin; and (2) claims 1, 3–8, 10–12, 14–18, 20–23, 25, and 27–29 would have been obvious over Shuen and RFC 1234.

V. ORDER

For the reasons given, it is

ORDERED that claims 1–32 of the '079 patent are held to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed*; 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.

PETITIONER:

Matthew Smith
Keeley Vega
TURNER BOYD LLP
smith@turnerboyd.com
vega@turnerboyd.com

PATENT OWNER:

Christopher McKee
Bradley Wright
Michael Cuviello
BANNER & WITCOFF, LTD
cmckee@bannerwitcoff.com
bwright@bannerwitcoff.com
mcuviello@bannerwitcoff.com