IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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UNIFIED PATENTS, LLC,

Petitioner,

v.

OZMO LICENSING LLC,

Patent Owner.

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U.S. Patent 9,264,991

Issue Date: February 16, 2016

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*Inter Partes* Review No.: IPR2023-00193

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# PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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## PETITIONER'S UPDATED EXHIBIT LIST

| ***Exhibit #*** | ***Description*** |
|---|---|
| **1001** | U.S. Patent 9,264,991 ("the '991 Patent") |
| **1002** | Prosecution history of the '991 Patent ("File History") |
| **1003** | Declaration of Petitioner's Expert, Dr. Zygmunt J. Haas |
| **1004** | U.S. Patent 7,389,352 to *Cromer* et al. ("*Cromer*") |
| **1005** | S. *Ganu* et al., *Architecture and Prototyping of an 802.11-Based Self-Organizing Hierarchical Ad-Hoc Wireless Network (SOHAN)* ("*Ganu*") |
| **1006** | WO 2006/000617 to Sinivaara et al. ("*Sinivaara*") |
| **1007** | P. Manzoni et al., *Providing Interoperability Between IEEE 802.11 and Bluetooth Protocols for Home Area Networks* ("*Manzoni*") |
| **1008** | U.S. Patent 7,643,463 to Linsky et al. ("*Linsky*") |
| **1009** | Declaration of Petitioner's Expert Dr. Ingrid Hsieh-Yee ("Librarian Declaration") |
| **1010** | Claim Construction Order and Memorandum from *Ozmo Licensing LLC v. Acer Inc.*, Dkt. 36, Case No. 6:21-cv-01225 (W.D. Tex Sep. 20, 2022) ("*Markman Order*") |
| **1011** | Curriculum vitae for Dr. Ingrid Hsieh-Yee |
| **1012** | Parts VII to X of "Understanding MARC Bibliographic: Machine-Readable Cataloging," Library of Congress, available at: http://www.loc.gov/marc/umb/um07to10.html |
| **1013** | IEEE Xplore Digital Libra Metadata record for *Ganu*, available at https://ieeexplore.ieee.org/document/1373825, and Table of Contents for volume 2, *2004 IEEE 15th International Symposium on Personal, Indoor and Mobile Radio Communications*, available at https://ieeexplore.ieee.org/xpl/conhome/9435/proceeding?isnumber=29981, accessed and obtained on September 28, 2022 |

| ***Exhibit #*** | ***Description*** |
|---|---|
| **1014** | Copyright registration record for PIMRC 2004 (conference proceedings containing *Ganu*), available from the public catalog of the US Copyright Office at: https://cocatalog.loc.gov/cgi-bin/Pwebrecon.cgi?v1=1&ti=1,1&Search%5FArg=PIMRC&Search%5FCode=TALL&CNT=25&PID=9J8gxJHd8I4rTK-m9z8uNoDbHwbHg&SEQ=20220928203215&SID=1, accessed and obtained on September 28, 2022 |
| **1015** | IEEE Xplore Digital Library copy of *Ganu*, obtained on September 29, 2002 |
| **1016** | Bibliographic and MARC records for *PIMRC 2004, 2004 IEEE 15th International Symposium on Personal, Indoor and Mobile Radio Communications*(conference proceedings containing *Ganu*), available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma994151173405961, accessed and obtained on September 28, 2022 |
| **1017** | Compilation of archived IEEE webpages, available at: https://web.archive.org/web/20040710111848/http://www.ieee.org:80/portal/index.jsp, archived July 10, 2004; https://web.archive.org/web/20040718051206/http://webapps1.ieee.org/conferenceSearch/details.do?tagNo=9573, archived July 18, 2004; https://web.archive.org/web/20010207003457/http://ieeexplore.ieee.org/lpdocs/epic03, archived February 7, 2001; and https://web.archive.org/web/20040823035644/http://shop.ieee.org/store/search.asp?mscssid=SQWFCQGUPSG59LETBWMTGL9713B63BEE&CID_LDAP=&PROMO_SRC_CODE=&BUYER_TYPE=&account_type=&member_grade=&hftype=&AUTH=, archived August 23, 2004. |
| **1018** | PIMRC 2004 Conference Website, and Conference Program Schedule downloaded from the same website, available at: https://web.archive.org/web/20040721000953/http://www.pimrc2004.org/, archived July 21, 2004. |
| **1019** | WO 01/52447 to Judd et al. ("*Judd*") |
| **1020** | "WPAN Applications" IEEE submission dated 1998, available at: https://www.ieee802.org/11/Documents/DocumentArchives/1998_docs/82957S-Shell-WAPAN-Applications.pdf. |

| ***Exhibit #*** | ***Description*** |
|---|---|
| **1021** | U.S. Patent Application Publication 2006/0194538 to Palin et al. ("*Palin*") |
| **1022** | U.S. Patent 7,194,642 |
| **1023** | U.S. Patent 8,208,449 |
| **1024** | U.S. Patent Application Publication 2004/0048577 |
| **1025** | Excerpts from Newton's Telecom Dictionary (20th ed. 2004) |
| **1026** | Declaration of the CEO of Unified Patents, Kevin Jakel |
| **1027** | U.S. Patent Application Publication 2002/0028655 |
| **1028** | Excerpts from Eric Cole, Network Security Bible (2005) |
| **1029** | IEEE Std 802.11, 1999 Edition (Reaffirmed 2003) |
| **1030** | U.S. Patent No. 8,599,814 ("the '814 Patent)—parent (by continuation) to the '991 Patent |
| **1031** | Docket for *Ozmo Licensing LLC v. HP Inc.*, W.D. Tex Case No. 6:21-cv-00383 |
| **1032** | Docket for *Ozmo Licensing LLC v. Acer Inc.*, W.D. Tex Case No. 6:21-cv-01225 |
| **1033** | Docket for *Ozmo Licensing LLC v. Dell Technologies Inc.*, W.D. Tex Case No. 6:22-cv-00642 |
| **1034** | Statistics for United States District Courts — National Judicial Caseload Profile (showing average times-to-trial) |
| **1035** | Responsive Declaration of Petitioner's Expert, Dr. Zygmunt J. Haas |

# I. INTRODUCTION

The arguments in Ozmo's Response (Paper 21, "Resp.") are legally flawed, premised on a misunderstandings and mischaracterizations of the *Cromer-Ganu* combination and the prior art, and ignores the POSA's routine skill to adapt teachings of the art in making combinations. The Board should reject Ozmo's arguments.

# II. CLAIM CONSTRUCTION

In its Decision Granting Institution ("DI", Paper 10), the Board encouraged the parties to address the scope of the claimed "*second network protocol*" ([1e.2]-[1g], claims 6-7). DI 6-8. The language of the claims provides guidance. Pet. 54; DI 7. For example, the Board noted that limitation [1f] "provides that the *second network protocol* '*is an overlay protocol with respect to the first network protocol in that communications using the second network protocol are partially consistent with the first network protocol*,'" and noted claims 6 and 7.[1] DI 7. The Board further noted that the '991 Patent's exemplary *second network protocol* "is an overlay protocol that is partially compatible with the WLAN [(*first network*)] *protocol*, but not entirely, in terms of power, frame contents and sequences, timing, etc. The secondary network (WPAN) protocols might be 802.11x frames

[1] All emphasis in this Reply is added by Petitioner, unless otherwise stated.

with new frame arrangements adapted for WPAN needs, such as reduced latency, power, etc." DI 7-8 (citing Ex-1001 9:60–66).

In its Decision, the Board also rejected Ozmo's implicit claim construction arguments regarding the *second network protocol*. DI 13. Specifically, the Board noted Ozmo's arguments that *Ganu's* modifications[2] are not implemented at OSI Layer 2, stating that Ozmo's arguments "turn[ed] on an implicit interpretation of the *second network protocol*," namely, that this term is restricted to certain layers of the OSI model that are not discussed in "the relevant portions of the intrinsic record." DI 12-13.

In response, Ozmo proposes an unreasonable construction of "*partially consistent*" (Resp. 14-15) in a veiled attempt to reargue that "protocol" as claimed is limited to OSI layers 1 and 2 (Resp. 36-39; §III.A). Specifically, Ozmo's expert opines that "*partially consistent*," construed by the *Acer* and *Dell* courts to mean "conforms to a part, but not the entirety of," also "includes some notion of rule breaking or violation." Ex-2004 ¶52; Resp. 15. In support, Ozmo cites a single example from the '991 Patent, discussing a device(s) powering-down during "mutually agreeable inactivity periods," that does not reference "*protocol*" or "*partially consistent*." Ex-1001 11:39-50; Resp. 15; Ex-2004 ¶52. This example

[2] Ozmo's argument is premised on its misunderstanding of *Ganu*. §III.A.

does not mention or require OSI layers (Ex-1035 ¶7) nor supports Ozmo's implicit argument regarding the scope of "protocol."

However, the Board does not need to determine whether Ozmo's newly proposed construction of "*partially consistent*" is proper, because the *Cromer-Ganu* combination meets any reasonable construction,[3] and also meets Ozmo's proposed construction. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019). As an initial matter, Ozmo does not argue that modifying the 802.11 ad-hoc protocol by (1) "append[ing]" the "transmit power to each outgoing beacon" and "the received signal strength for each incoming beacon" and (2) adding an 802.11-like association message in an ad-hoc network (Petition 48-49 (citing Ex-1005 001, 003))

[3] The Petition demonstrates that *Ganu's* modified-802.11 ad-hoc protocol is, in the proposed combination, a *second network protocol* (Pet. 49-50 (citing Ex-1001 Claims 1 and 7, Abstract, 7:13-17; 9:60-66; Ex-1003 ¶132) under any reasonable construction meeting (1) the *Acer* constructions of the "*overlay protocol*" and "*partially consistent*" [1f] (Pet., 53-56) and (2) the "*lower average power consumption*" and "*modification of the 802.11x wireless protocol*," requirements of claims 6 and 7 (Pet. 65-66, see also (DI 7). The "*overlay protocol*" and "*partially consistent*" constructions in *Dell* are the same as those in *Acer*. *Cf*. Ex-1010, 36-37 *with* Ex-2002, 2, 6-7.

would not result in a *second network protocol* that is "*partially consistent*" under any proposed construction, including their own. *See, generally*, Resp. Rather, Ozmo argues—incorrectly (§III.A.1)—that *Ganu's* teachings were implemented at only the application layer and are not modifications to the 802.11 ad-hoc protocol. Resp. 36-39. Thus, Ozmo provides no argument that *Cromer-Ganu* combination fails to meets any proposed construction.

The *Cromer-Ganu* combination also meets Ozmo's proposed construction under the understanding of *Ganu* presented by either Petitioner or Ozmo—i.e., 802.11 modifications or application-level changes. **First**, under Petitioner's understanding, *Ganu* "ma[de] non-compliant 802.11 beacon frames," and "add[ed] association messages to the 802.11 ad-hoc protocol in a non-compliant discovery phase." Ex-1005 001, 003; Pet. 47-49, 53-56; Ex-1003 ¶141. *Ganu's* modified beacon frame formats, ad-hoc association messages, and new ad-hoc discovery phase would "violate" or "break" the rules of 802.11 ad-hoc protocol used in *Cromer's* infrastructure network (*first network protocol*) because they do not fully comply with that standard. Ex-1035 ¶8; Pet. 9-10 (citing Ex-1029), 53-56; *see also* Resp. 3 ("There is no association process in ad hoc" networks.). These changes also result in ad-hoc devices performing actions that are not performed by 802.11 ad–hoc devices, as discussed below.

**Second**, the *Cromer-Ganu* combination still meets Ozmo's proposed construction under Ozmo's constricted reading of *Ganu* (§III.A). Specifically, Ozmo relies on an example of powering down during a mutually agreeable inactivity period to support its proposed construction.[4] Resp. 15. Ozmo states that this example demonstrates a violation because a "hub" (a supposed virtual AP) can go to sleep whereas an infrastructure AP cannot. Resp. 15. *Ganu* similarly described ad-hoc STAs (MNs, FNs, APs) performing actions that 802.11 ad-hoc STAs do not, such as forming a hierarchy of ad-hoc nodes, performing discovery and association procedures, and modifying the MAC frame format. *See, e.g.,* Pet. 53-56; Ex-1035 ¶9. Thus, to the extent that the example cited by Ozmo meets this construction, so does the *Cromer-Ganu* combination under any reading of *Ganu*. Ex-1035 ¶9

However, if considered, the Board should reject Ozmo's construction. First, Ozmo's newly proposed construction is incorrect because, like its OSI-layer premised construction (DI 12-13), it is not supported by the intrinsic record. Neither the '991 Patent nor its file history use the terms "rule breaking" or "violations." *See, generally*, Ex-1001, Ex-1002. Thus, introducing these vague new concepts only causes confusion as to the scope of "*partially consistent*." Second, the description

[4] This example is not described as functioning on OSI layer 1 or 2. Ex-1001 11:39-50; Ex-1035 ¶7.

cited by Ozmo does not use the term "*partially consistent*," or even "*protocol*." Instead, this example merely describes various characteristics of the networks absent mentioning those terms. This example also does not describe achieving those characteristics within OSI Layer 1 or 2 functionality. Ex-1035 ¶¶7, 10. Further, the '991 Patent claims the mutually-agreeable inactivity period example in "logic." Ex-1001 15:65-16:9 (claims 11-12). This "logic" is not required to be part of any protocol nor any specific component of the claimed "hub." *Id*.; *cf*. Ex-1001 15:39-48 (claim 8). Thus, Ozmo still has not provided a basis to support its argument that the claimed protocol(s) is restricted to OSI Layers 1 and 2. Ex-1035 ¶10. As the proposed construction is unsupported and renders other claim language superfluous, the Board should reject it.[5]

## III. OZMO'S PATENTABILITY ARGUMENTS FAIL

As the Board found, the Petition sets forth reasonable, consistent, and supported arguments demonstrating why the *Cromer-Ganu* combination renders obvious the challenged claims. *See, generally*, DI. Nothing in Ozmo's reply changes this determination. The *Cromer-Ganu* combination is supported by several

[5] The *Dell* court order involved terms that were not construed in *Acer*. Ex-2002 2 ("protocol"), 5 ("wireless LAN"), 6 ("802.11x"). Petitioner agrees that the Board does not need construe these terms. Resp. 14-15.

undisputed facts. For example, *Cromer* taught client 100 "communicating concurrently" in a WLAN and with peer-to-peer devices in a WPAN using the 802.11 infrastructure and ad-hoc protocols, respectively. *See, e.g.*, Ex-1004 1:8-10; Pet. 11-15, 21-28, 41-47, 58-60; Resp. 7-8. *Ganu* disclosed a "self-organizing hierarchical ad-hoc wireless network (SOHAN)" that "help[ed] to scale network throughput, reduce delay and lower power consumption at end-user devices" compared to 802.11 ad-hoc networks. Ex-1005 001; Pet. 18-21, 21-28, 41-54, 58-60; Resp. 9, 20. Ex-1035 ¶11.

The Petition demonstrates that a POSA would have been motivated to incorporate features from *Ganu* into *Cromer*. Specifically, a POSA would have been motivated to modify *Cromer*'s client 100 to (1) forward traffic between its peer-to-peer devices and AP and (2) incorporate changes to the 802.11 ad-hoc protocol as discussed by *Ganu*. Pet. 21-28, 41-54, 58-60. In response, Ozmo argues that (A) *Ganu* does not modify the 802.11 ad-hoc protocol (Resp. 36-39), (B) there is no reason to combine *Cromer* and *Ganu* (Resp. 15-25), and (C) the combination could not be made successfully without violating *Ganu* (Resp. 25-36). As demonstrated below, the Board should reject Ozmo's arguments.

### A. *Ganu* Modifies the 802.11 Ad-hoc Protocol ([1e-f], etc.)

*Ganu* unequivocally modified the 802.11 ad-hoc protocol, contrary to Ozmo's argument that *Ganu's* teachings are implemented at only the application layer. Resp.

36-39. As detailed in the Petition, *Ganu* taught "modifying the 802.11 ad-hoc protocol by (1) having FNs 'append transmit power to each outgoing beacon' and MNs 'append' 'the received signal strength for each incoming beacon' and (2) adding 802.11-like association to organize MNs into cells with power-efficient selections of FNs" based on MNs, "listen[ing] to the beacons and send[ing] an association message"—modifications to message types delineated by 802.11. *See, e.g.*, Pet. 9-10, 41-55 (*citing*, *e.g.*, Ex-1005; Ex-1003; Ex-1001; Ex-1029; Ex-1028; Ex-1025). *Ganu* also stated that it "use[d] augmented 802.11 MAC beacons and associations" in its SOHAN. Ex-1005 003. It further noted "that for ease of implementation, the beacons used in [its] prototype are application-level packets." Ex-1003 003. While *Ganu* stated that its application-level, proof-of-concept prototype experienced issues under only "higher loads," *Ganu* stated that such issues were addressed by modifying 802.11 firmware: "using firmware-generated beacons should solve this problem" and "implementing the discovery protocol in firmware will result in better network performance." Ex-1005 001-002, 004-005; Ex-2006 90:1-94:7; Ex-1035 ¶13. As Ozmo acknowledges, *Ganu* also stated that "802.11 beacons are generated by" "firmware." Ex-1005 003; Resp. 37-39. Thus, *Ganu* taught modifying the 802.11 ad-hoc protocol, provided a proof-of-concept prototype implemented at the application layer, and noted that implementing *Ganu*'s 802.11 modifications in firmware would cure the limited deficiencies of that prototype. Ex-

1035 ¶13. Nothing about prototyping the concept using a proof-of-concept prototype, implemented at the application layer for convenience, suggests Ganu does not teach modifying 802.11. *Ganu* modifies the 802.11 protocol. Ex-1035 ¶13.

In response, Ozmo recycles its argument that *Ganu's* "prototype [uses] application-level packets" and that the "the preferred modification" taught by *Ganu* "should be in the application layer." Resp. 36-39. These arguments fail for multiple reasons. First, Ozmo's argument is premised on an unsupported, implicit OSI-Layer construction of the term protocol. §II. Thus, Ozmo's arguments focusing only *Ganu*'s prototype are legally flawed. Second, Ozmo's application-layer arguments, like others "focus on [only] the actual proof-of-concept prototype described in *Ganu*," and ignore *Ganu's* full teachings. DI 14. As discussed above and confirmed by Dr. Haas, *Ganu* taught modifying the 802.11 ad-hoc network protocol, expressly stating that the shortcomings of its application-layer "proof-of-concept" prototype would be addressed by implementing its modifications in "firmware." Ex-1005 003, 005; Ex-2006 90:1-94:7; Ex-1035 ¶14. And, Ozmo admits that *Ganu* disclosed that 802.11 beacons are generated in 802.11 firmware. Ex-1005 003; Resp. 37-39. Thus, *Ganu* expressly taught modifying the 802.11 firmware. Ex-1035 ¶14.

Second, Ozmo's arguments directed to the "preferred modification" of *Ganu* are not supported. For example, Ozmo cites unsupported expert testimony that a POSA would understand *Ganu* as preferring modifying applications over firmware.

Resp. 38-39; Ex-2006 ¶95. This unsubstantiated opinion is entitled to no significant weight in light of *Ganu's* express teachings of implementing its modifications in firmware—"using firmware-generated beacons" and "implementing the discovery protocol in firmware"—to overcome the limited issues with application-level implementations. Ex-1005 005. Thus, *Ganu* expressly preferred implementing its 802.11 protocol modifications in firmware. Ex-1035 ¶15.

### B. The *Cromer-Ganu* Combination Is Obvious

Nothing in Ozmo's Response refutes that a POSA would have found the *Cromer-Ganu* combination obvious.

#### 1. Power Savings

The Petition demonstrates that the *Cromer-Ganu* combination would have been motivated to achieve, *inter alia*, power savings over conventional 802.11 ad-hoc networks as expressly taught by *Ganu*. *See, e.g.*, Pet. 48-51, Ex-1005 001-003, Ex-1003 ¶¶131-134; *see also* Pet. 19-21, 65, Ex-1003 ¶161. Ozmo does not materially dispute *Ganu's* improved power savings, even if *Ganu*'s teachings were limited to only application-layer changes. Resp. 22-24. To be clear, Ozmo states that *Ganu's* power savings are "questionable" but provides no technical analysis or reason why *Ganu* would not provide improved power savings over conventional 802.11. *Id.*; Ex-1035 ¶17. Rather, Ozmo incredibly (1) suggests that power savings is not an "issue," (2) ignores that *Ganu* expressly taught the same objective, and (3)

argues that *Ganu's* power-savings are negated by complexity and limited detriments that *Ganu* both attributed to its prototype implementation and addressed by modifying 802.11 firmware. The Board should reject these arguments.

Ozmo argues that power savings is not a motivation for combining *Cromer* and *Ganu* because "the challenged independent claim does not address power issues." Resp. 22. This argument fails. First, even Ozmo describes that the '991 Patent "provided a technical solution to" "unsolved technological problems," including a "need to enable power save modes that were better optimized to meet the needs of WPAN devices," a "stringent requirement[] of battery-operated devices." Resp. 5, Ex-1001 3:15-24. Also, power savings are expressly claimed. *See*, *e.g.*, Challenged Claim 6. DI 3, 5, 7-8, 14-15. Therefore, contrary to Ozmo's implications, power savings is pertinent to the Challenged Claims. Such power savings, achieved by modifying 802.11 ad-hoc protocols, was taught at least by *Ganu*. Ex-1035 ¶18.

Second, Ozmo's arguments are legally misplaced. A motivation to combine need not be embodied by *any* challenged claims; in fact, the rationale for combining references need not be contemplated by the patentee at all. *KSR Intern. Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007) ("In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed

purpose of the patentee controls."). Thus, power savings is a proper basis for combining prior art.

In arguing otherwise, Ozmo's relies on a misplaced understanding of *Unified Patents Inc. v. DivX, LLC* [6]. For example, Ozmo cites the Board's summary of a patent owner's arguments to support its proposition that "a generic desire to build something better, is insufficient, without more," to demonstrate obviousness. Resp. 22 (*citing DivX* at 11). This is not what *DivX* stands for.[7] Rather, the Board in *DivX* found that the Patent Owner had "put[] forth evidence," demonstrating why the prior art would not likely achieve the stated motivation. *DivX* at 12. Here, Ozmo makes no such showing that the *Cromer-Ganu* combination would not result in power savings, even under its incorrect reading of *Ganu* (§III.A). Ex-1035 ¶19. Therefore, *Ganu's* express teachings of power savings is more than sufficient to support its combination with *Cromer* for the same reasons discussed in the Petition. Pet. 21-28, 41-56.

Next, Ozmo asks the Board to ignore *Ganu's* express teaching of power savings, stating that a POSA "would not have had to look beyond *Cromer*" for power

[6] *Unified Patents Inc. v. DivX, LLC*, 2021 WL 451027 (PTAB 2021).

[7] Indeed, an express "desire to build something better" as in *Ganu* expressly stated by *Ganu* would meet even the heightened TSM test. *KSR* at 402.

savings because the 802.11 standard "already had 'STA Power Management modes.'" Resp. 22; Ex-2004 ¶67. However, *Ganu* expressly recognized the 802.11 standard and yet stated that improved power-savings for "battery-operated end-user device[s]" was achievable over 802.11 by modifying it. Ex-1005 001-003; Ex-1004 3:49-51; Ex-1001 9:40-47. *Ganu* disclosed that such devices included "personal digital assistant[s]," like the PDA disclosed by *Cromer*. *Id.* Further, *Ganu* stated that "the objective" of its teachings was "energy conservation" for these devices (Ex-1005 0003), and Ozmo does not counter that choosing the most energy- efficient topology by minimizing MN transmit power would conserve energy as set forth in the Petition. *See, e.g.*, Pet. 19-21, 48-51, 65; Ex-1005 003. Further, *Ganu's* reduced overhead likewise saves power. *Id*. Ex-1035 ¶20. Thus, the Board should reject Ozmo's unsubstantiated argument that the 802.11 standard's power management was recognized as sufficient and its implicit request that the Board ignore *Ganu's* teachings of power savings.

Finally, Ozmo argues that any benefit of power savings would be outweighed by "increased overhead and complexity." Resp. 23-25. Again, Ozmo relies on *Ganu's* prototype for this deficiency while ignoring that *Ganu* showed reduced overhead, even in its prototype, and that *Ganu's* solution to those issues was to modify the 802.11 firmware. Ex-1005 003, 005; §III.A. Further, there is no legitimate argument that modifying the 802.11 protocol, as taught by *Ganu*, is

unduly burdensome or complex, as *Ganu* itself demonstrated how to do so in a system similar to *Cromer*. Ex-1035 ¶21; §III.B.4, *infra*.

**2. Forwarding ([1pre], [1h])**

Ozmo argues that a POSITA would not have been motivated to implement *Ganu's* teaching of forwarding between peripherals and an AP into *Cromer*'s WLAN/infrastructure and WPAN/ad-hoc networks. Resp. 16-18, 20. Ozmo's argument is premised on the logical fallacy that, because techniques for forwarding between infrastructure and ad-hoc networks were so widely known, "any combination with *Ganu* [is] pointless." Resp. 16-17. However, a feature is not unobvious because that feature is widely known; to the contrary, the extensive knowledge and use of such a feature supports obviousness. Ex-1035 ¶22. If anything, Ozmo simply explains why *Cromer* did not discuss forwarding in much detail, as patents routinely "omit[] what is well known in the art." *Hybritech v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986). Further, that forwarding was so widely known[8] speaks directly to the reasonable expectation of successfully modifying *Cromer*'*s* client 100 to forward traffic. Pet. 21-28, 58-59; Ex-1035 ¶22. Additionally, Ozmo admits that forwarding from a WPAN to a WLAN requires only "simple techniques" that were "well within the ability of a

[8] Pet. 21-28, 58-59; Resp. 18 (citing Ex-2008).

POSITA." Resp. 16-17. Thus, combining *Ganu's* forwarding with *Cromer* would have been obvious. Ex-1035 ¶22.

Ozmo's argument fundamentally misunderstands Petitioner's proposed combination.[9] Petitioner argues that "a POSA would have been motivated to incorporate *Ganu's* teaching of FNs using data forwarding techniques to relay" traffic. Pet. 26. The *Cromer-Ganu* combination is not premised on bodily incorporating all features and components of *Ganu*, including those used to route traffic through *Ganu's* hierarchical ad-hoc network. Rather, the combination proposes data forwarding occurring between *Cromer*'s ad-hoc (as modified by *Ganu*) and WLAN networks, as was known. Pet. 26-28; Resp. 16-17. Further, even if *Ganu*'s routing tables were required, Ozmo's argument ignores the POSA's routine skill to adapt teachings. It would have been within the POSA's skills to adapt *Ganu*'s routing tables to account for an infrastructure connection between client 100 and *Cromer*'s AP. Ex-1035 ¶23; *see also* §III.C.

Thus, incorporation of *Ganu's* teaching of forwarding is obvious, motivated, and with a reasonable expectation of success. Ex-1035 ¶24.

[9] Ozmo's arguments also conflate *forwarding* and *routing* operations. Ex-1035 ¶23, fn2.

### 3. The *Cromer-Ganu* Protocols Reduce Interference ([1f])

*Ganu's* modified-802.11 ad-hoc protocol, in the *Cromer-Ganu* combination, is an *overlay protocol* ([1f]) that satisfies the court's construction. Ex-1010 23-26; Ex-2002 6-7; Pet. 53-56. Specifically, "the WLAN and WPAN protocols of *Cromer-Ganu* share common aspects of 802.11." Pet. 53, 55; Ex-1003 ¶143. Included among these aspects are "physical layer formatting" and "MAC frame formatting," such as "the non-appended portions of *Ganu's* beacon frames." *Id*. Further, "a POSA understood [these shared aspects] reduced interference and allowed" the "co-existence" of the *Cromer-Ganu* networks, consistent with *Cromer's* teaching of concurrent communications and connections. *Id*.; Ex-1029 1 (WLANs may coexist with multiple overlapping WLANs).

In response, Ozmo argues that no modification of *Cromer* is "necessary or even prudent" to incorporate a *second network protocol* "to reduce interference such that the second and first networks can co-exist." Resp. 19-22. Ozmo's arguments fail. First, Ozmo again mistakes the law. Obviousness is demonstrated where the combined prior art teaches the claims and a reasoned explanation for combining those teachings is provided. *KSR* at 415-18. The Petition does this. Pet. 41-56, 71-74, 76. And, again, that explanation need not be the benefit stated by patentee nor

one embodied by a claim.[10] *KSR* at 401. Thus, Ozmo's argument that "a POSITA would [not] have been drawn to *Ganu* for its teachings of … an overlay protocol" is legally misguided.

Second, Ozmo admits that 802.11 already contained "many ways of reducing interference between two 802.11 networks." Resp. 19. These aspects of 802.11 included "operating on different channels" and "CSMA-CA techniques." Resp. 19-20. Thus, *Cromer's* infrastructure and ad-hoc networks utilized "common aspects" of 802.11 to reduce interference. Pet. 53- 56. *Ganu* likewise expressly disclosed using well-known 802.11 techniques to reduce interference within its hierarchical network. For example, *Ganu* stated that "[o]ptionally, an FN may have two radio cards" for carrying traffic "on [] different frequnc[ies]" or "channels … so as to minimize interference" between concurrent FN-MN and FN-AP communications. Ex-1005 002. Thus, reducing interference, including between different networks (such as *Cromer's* infrastructure and ad-hoc networks), was fundamental to the operation of both *Cromer* and *Ganu* and achieved in the *Cromer-Ganu* combination Pet. 53-56, 76 (*Sinivaara* reductions); Ex-1035 ¶26. The Petition relies on, *inter*

[10] Again, *Ganu* expressly disclosed at least one benefit—power savings—that is an objective of the '991 Patent. §III.B.1.

*alia*, such "common aspects of 802.11" shared by "the WLAN and WPAN protocols of *Cromer*-*Ganu*" to "reduce[] interference and allow[] their co-existence." Pet. 55-56, 76. Thus, the *Cromer*-*Ganu* combination is an *overlay protocol* under any reasonable construction. Ex-1035 ¶26.

#### 4. Reasonable Expectation of Successful Combining *Cromer* and *Ganu*

Ozmo argues that Petitioner and its expert have not given "due consideration" to what is required to modify the 802.11 ad-hoc protocol as disclosed by *Ganu* and relied upon in the Petition. Resp. 24-25. Specifically, Ozmo argues that "[e]stablished wireless protocols" are rigorously tested and that "modifying existing wireless protocols [also] requires a great deal of testing." Resp. 25. Ozmo also notes "MAC 'deployability problems,'" but neither Ozmo nor its expert provide further explanation. Resp. 25; Ex. 2004 ¶70. Ozmo also states that required software modifications have not been considered in the combination. Resp. 34-35. The Board should reject these arguments.

##### a. <u>Modification and Testing of Wireless Protocols</u>

Ozmo's arguments regarding the testing and modification of wireless protocols (Resp. 24-25) fail for multiple reasons. First, Ozmo does not explain how this required testing is unreasonable at all—not even with a conclusory statement that such alleged problems would prevent the successful combination of *Cromer* and

*Ganu*. Resp. 24-25. Rather, its arguments are divorced from a POSA's skill as demonstrated by, *e.g.*, *Ganu's* 802.11 modifications and 802.11's extensive history of revisions—prior to the '991 Patent—that cannot be disputed. Ex-1035 ¶28. Thus, Ozmo itself has not given these "facts" their supposed "due consideration." Resp. 25. Ozmo instead provides a smoke-and-mirrors approach by throwing out a supposed need for "rigorously stress test[[ing]" (Resp. 25) *Cromer-Ganu* without regard to the routine nature and skill of such tests and the lack of any undue experimentation. *E.g.*, Pet. 41-56; Ex-1035 ¶28. Indeed, a POSA would have recognized that no more than routine experimentation would have been required to implement *Ganu*'s teachings, as they are straightforward. Ex-1035 ¶28. Thus, Ozmo's cursory arguments do not rebut the expectation of success of the combination of *Cromer* and *Ganu*.

Ozmo's arguments regarding MAC deployability "problems" are likewise unexplained. But, these "deployability problems" relate to the administrative process of "obtaining the approval of the IEEE and FCC organizations for any modifications to 802.11," not some technical hurdle. Ex-2006, 1; Ex-1035 ¶29. Also, *Ganu* disclosed modifying 802.11, rendering Ozmo's supposed "due considerations" moot.

Regardless, the '991 Patent's disclosure regarding modifying the 802.11 protocol demonstrates that "testing" and "MAC deployability" "problems" were not,

in fact, an impediment to making such changes. Specifically, the '991 Patent descriptions of these modifications are provided at only a high level of generality, *e.g.*:

- "[D]river[s] or firmware" may or may not "require[] modifications to accommodate the PS-STA." Ex-1001 5:29-40, 5:41-57;
- "[T]he 802.11x device driver may also require slight modification to accommodate [PS-STA power savings]." Ex-1001 7:9-20; and
- "The secondary network (WPAN) protocols might be 802.11x frames with new frame arrangements adapted for WPAN needs, such as reduced latency, power etc." Ex-1001 9:64-66.

Further, the '991 Patent provides only limited references to MAC, such as the transmittal of MAC addresses and contention for the wireless medium—features that were part of 802.11. *See, e.g.*, Ex-1001 13:10-11, 12:13-52, FIG. 11; Ex-1029. Given these limited descriptions, it is unclear from the '991 Patent how it solves these supposed testing or MAC deployability problems. Ex-1035 ¶31. Instead, it relies on a POSA's routine skill.

Additionally, *Ganu* expressly taught the modification of the 802.11 protocol with a similar, if not more detailed, disclosure. §III.A; Ex-1005 (*generally*). For example, *Ganu's* protocol similarly used "802.11x frames with new frame arrangements adapted for WPAN needs, such as reduced latency, power etc." *E.g.*, Pet. 48-50; §III.A. That *Ganu's* level of disclosure regarding its 802.11 modification

is similar to the '991 Patent further demonstrates modifying wireless protocols was well within a POSA's routine skill; Ex-1035 ¶32.

**b. Obvious Software Modifications**

Ozmo's implication that Petitioner and Dr. Haas did not fully consider necessary software modifications (Resp. 34-35) is likewise in error. Petitioner and Dr. Haas provide a detailed analysis of the operation of both the hardware and software of *Cromer*, the modifications to *Cromer's* required to implement the features of *Ganu* into *Cromer*, and the reasons why a POSA would have found the combination obvious and reasonably likely to succeed. *See, generally*, Pet. §IV. Dr. Haas's comments that he did not discuss what "changes need to be made to [*Cromer*'s] code" (Ex-2006 99:4-11) is merely an acknowledgement that *Cromer* does not provide examples of code to modify (Ex-2006 99:15-19). Dr. Haas testifies that changes would be required to *Cromer's* software (Ex-2006 9:1-4), and his complete testimony demonstrates why those modifications would have been predictable and reasonably likely to succeed. *See, e.g.*, Ex-1003 §VII; Ex-2006 90:1-99:19; Ex-1035 ¶33. And, again, *Ganu's* disclosures regarding the modification of the 802.11 ad-hoc protocol are at least as detailed as the '991 Patent. *See*, §III.B.4.a. Also, the '991 Patent does not detail how to make specific software change to the 802.11 protocol; nor does it provide any code for its second network protocols. Ex-

1001 (generally). The reason it does not provide such detail is clear—such software modifications are within the routine skill of a POSA. Ex-1035 ¶33.

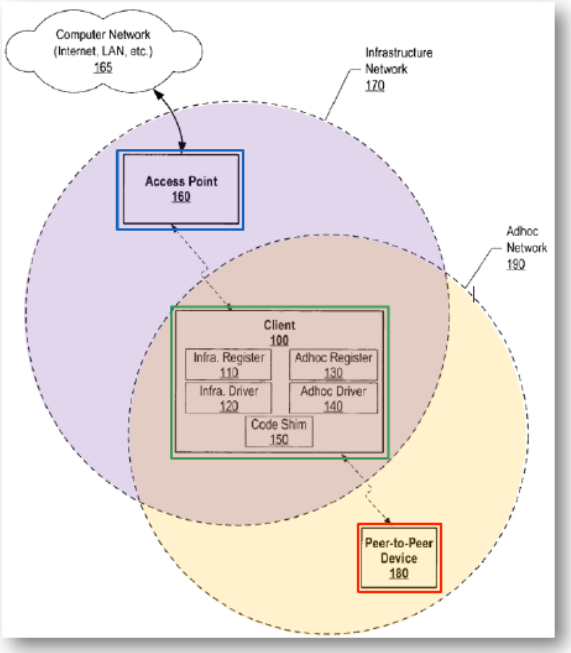
### C. The *Cromer-Ganu* Combination Is Consistent with the Teachings of *Ganu*

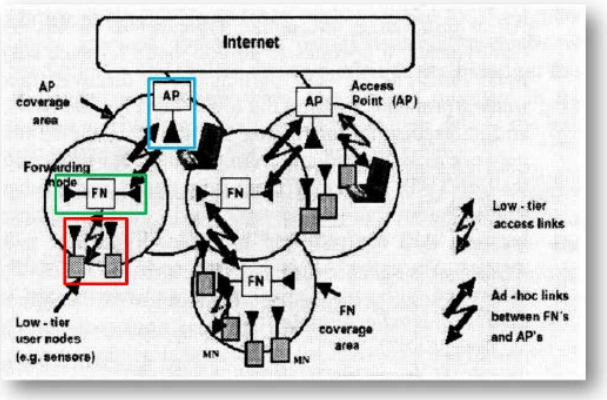
Ozmo incorrectly argues that the *Cromer-Ganu* combination could not be successful without violating the teachings of *Ganu*. Resp. 25-36. Ozmo argues that *Ganu* teaches that data forwarding requires ad-hoc network connections, *Ganu's* routing tables, and, seemingly, continuous, uninterrupted, and absolutely reliable ad-hoc communications. *Id*. According to Ozmo, the absence of such features "vitiate[s] the purpose" of *Ganu*. Resp. 28. However, Ozmo's arguments mischaracterize, or misunderstand, both the *Cromer-Ganu* combination and *Ganu's* teachings.

The Petition details a straightforward combination. *Cromer* taught a device that concurrently communicated over a WLAN infrastructure network and a WPAN ad-hoc network using 802.11. *E.g.*, Pet. 11-15, 21-28, 58-60. *Ganu* taught modifications to ad-hoc networks and data forwarding between battery-operated devices (MNs) and APs using a device (FN) located between the two. Pet. 18-28, 41-56, 58-60. *Ganu* stated that these features achieved, e.g., power savings and reduced overhead. *Id*. *Ganu* also taught multi-hop routing through multiple layers of a self-organizing hierarchical ad-hoc network (SOHAN). The Petition

demonstrates that a POSA would have found it obvious to modify *Cromer's* 802.11 ad-hoc protocol with the teachings of *Ganu*. *Id*. The Petition further demonstrates that a POSA would have found it obvious for *Cromer's* client to forward data between peer-to-peer devices and an AP as taught by *Ganu's* teachings of forwarding by a similarly located device (FN):

***Cromer*** ***Ganu***




*Id*.; Ex-1004 Fig. 1 (annotated); Ex-1005 Fig. 1 (annotated); Pet. 21-28.

Contrary to Ozmo's claims (Resp. 25-36) *Ganu's* teaching of data forwarding is not predicated on all devices using the same protocol or on implementing *Ganu's* routing tables. Ex-1035 ¶36. For example, *Ganu* repeatedly mentioned that its forwarding nodes (FN) relayed data, often placing a single FN as the only device

between the MN and AP. Ex-1005. While such data relaying could also be accomplished through a particular routing procedure (Ex-1005 001), *Ganu's* relaying disclosed a forwarding procedure to a POSA. Ex-1035 ¶36. *Ganu* also disclosed that its AP forwarded data outside of the ad-hoc network—like the forwarding in the *Cromer-Ganu* combination. Pet. 41-56, 58-60; Ex-1035 ¶36. Such data forwarding would involve *Ganu's* modified 802.11 protocol within the network, and another protocol outside the network. Ex-1035 ¶36. Thus, *Ganu's* teachings of data forwarding are not limited to its routing tables and involve more than one protocol. Ex-1035 ¶36.

*Ganu* also disclosed routing tables as part of a specific routing method. Ex-1005 001. *Ganu's* routing tables were built based on MN association messages sent following periodic, modified-802.11 beacons. Ex-1005 003; Pet. 41-56. The routing tables population occurred during a discovery phase in which SOHAN FNs and APs sent beacons. Ex-1005 003. *Ganu* updated the table using a variable "refresh timer" that was set based on whether beacons were or were not received. Ex-1005 003. These tables were exchanged among SOHAN FNs and APs. Ex-1005 003. *Ganu's* SOHAN required only two tiers. Ex-1005 002 ("more than one tier."). Ex-1035 ¶37.

In response, Ozmo mischaracterizes *Ganu* to argue that *Cromer-Ganu* combination won't work. Each of its arguments fail. For example, Ozmo argues

that "*Ganu's* architecture is incompatible with that of *Cromer* because *Ganu* teaches a pure scalable ad hoc network with ad hoc APs that are essential" and that *Ganu* could not "successfully function without any ad hoc APs."[11] Resp. 30, 33-34. Ozmo's conclusions are incorrect and unsupported by *Ganu*. Ex-1035 ¶38. While *Ganu* stated that the most scenarios involve internet traffic (Ex-1005 001), it did not state that this is the only scenario to which its teachings apply. Further, *Ganu's* SOHAN only required two-tiers. Ex-1005 002. The fact that APs, and the tier at which *Ganu* typically placed them, is not required by *Ganu* is consistent with a POSA's knowledge that ad-hoc networks do not require an AP but, rather, only two stations. Ex-1035 ¶38 (Ex-1029 23-24; Ex-1028 398). Additionally, *Ganu* did not state that it requires APs. Thus, *Ganu's* teachings are broadly applicable to ad-hoc

[11] Ozmo also mischaracterizes Dr. Haas's testimony regarding the necessity of APs in *Ganu*. Resp. 30. Dr. Haas merely states that, without an AP, the "communication between the mobile node [and] the Internet would not work" (Ex-2006 104:15-17), not that *Ganu's* routing would fail or that an "ad hoc" AP was necessary.

networks—such as that disclosed in *Cromer*—regardless of the express placement an AP in that network. Ex-1035 ¶38.[12,13]

As another example, Ozmo states that "[c]ritical to [*Ganu*'s SOHAN] organization is the use of routing tables in FNs to map which MNs are currently 'associated'" (Resp. 29) and that these associations require periodic updating and listening to ad-hoc beacons (Resp. 32-33). Ozmo appears to argue that, if client 100 missed a beacon, such tables governing the ad-hoc network routing would not be populated and, hence, traffic would be dropped. Resp. 28-29, 32-33. However, *Cromer* provided concurrent communications in both infrastructure and ad-hoc networks (WPAN). Pet. 11-15, 21-28, 41-56, 58-60. Also, the 802.11 standard described beacons synchronizing ad-hoc and infrastructure networks. Pet. 9-10. Thus, *Cromer* receives the beacons necessary to maintain its network connections. Ex-1035 ¶39. *Ganu's* beacons are sent according to its 802.11-modified protocol.

[12] Moreover, APs were known to be part of both infrastructure and ad-hoc networks. Ex-1004; Ex-1005; Ex-1029; Ex-1035 ¶38, fn4. Thus, a POSA would have understood that *Cromer*'s ad-hoc networks could also contain other APs. *Id*.

[13] As stated above, ad-hoc network connections, including with APs, were not required to implement *Ganu*'s teaching of forwarding. Ex-1035 ¶38, fn5.

Ex-1005; Ex-1035 ¶39. *Ganu* did not disclose changes to beacon frequency, and Ozmo does not support its suggestion that *Ganu's* modified-802.11 beacons are sent more frequently. Ex-1035 ¶39.

Also, routing tables are not required in the *Ganu-Cromer* combination to enable forwarding (§III.B.2), but, even if they were, Ozmo's arguments ignore a POSAs skill to make routine adaptations (Ex-1035 ¶40)—bodily incorporation of *Ganu's* features is not required. For example, missing transmissions, dropping packets, dealing with changing network conditions, and devices entering and leaving a network are rudimentary considerations that are routinely addressed by design choices for wireless networks, especially ad-hoc networks. Ex-1035 ¶40. A POSA would have been well aware of these considerations and had the skills to address them as needed, particularly to ensure that a network provided effective communications. Ex-1035 ¶40. Also, *Ganu* disclosed a variable "refresh timer" used to update tables based on whether beacons (such as FN beacons) were or were not received. Ex-1005 003. *Cromer* similarly disclosed a "watchdog timer" controlling the frequency with which client 100 returned to the ad-hoc network. *E.g.*, Ex-1004 2:14-15. Thus, a POSA would have found it obvious to change client 100's watchdog timer, as necessary, to cause client 100 to return to the *Cromer-Ganu* ad-hoc network to both send and receive these beacons, or other messages, as network

conditions changed to maintain any required tables (to the extent these tables were necessary), as taught by *Ganu*. Ex-1035 ¶40.

The *Cromer*-*Ganu* combination is proper and does not violate *Ganu*. Ex-1035 ¶41.

## IV. CONCLUSION

For the reasons set forth above and in the Petition, Petitioner requests that the Board find all claims unpatentable.

Dated: January 10, 2024

Respectfully submitted,

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## CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. §42.24, the undersigned certifies that this document complies with the type-volume limitations. This document contains 5,582 words as calculated by the "Word Count" feature of Microsoft Word 2016, the word processing program used to create it.

Dated: January 10, 2024

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**CERTIFICATION OF SERVICE ON PATENT OWNER**

Pursuant to 37 C.F.R. §§42.6(e) and 42.8(b)(4), the undersigned certifies that on the 10th of January, 2024, a complete and entire copy of this PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE and all supporting exhibits were served:

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