

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS, LLC,
Petitioner,

v.

OZMO LICENSING LLC,
Patent Owner.

Case No. IPR2023-00193
U.S. Patent No. 9,264,991

PATENT OWNER PRELIMINARY RESPONSE

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I. INTRODUCTION

Patent Owner Ozmo Licensing LLC (“Patent Owner”) respectfully submits this Preliminary Response in accordance with 35 U.S.C. § 313 and 37 C.F.R. § 42.107, responding to the Petition for *Inter Partes* Review (the “Petition”) filed by Unified Patents, LLC (“Petitioner”) challenging Claims 1, 3-4, 6-7, and 14-18 (“the challenged claims”) of U.S. Patent No. 9,264,991 (the “’991 Patent”).

This Preliminary Response focuses on a set of claim elements that easily and simply demonstrate that Petitioner fails to establish a basis for Institution. Patent Owner does not address the numerous other arguments that Petitioner makes for Institution, but Patent Owner disagrees with those arguments. However, it is unnecessary to address all of Petitioner’s arguments because the below elements clearly demonstrate that Petitioner fails to establish a reasonable likelihood that any of Claims 1, 3-4, 6-7, and 14-18 of the ’991 Patent is unpatentable.

For the reasons set forth more fully below, institution should be denied.

II. THE ’991 PATENT, THE REFERENCES RELIED UPON IN THE PETITION, AND THE PROPOSED GROUNDS FOR INSTITUTION

A. U.S. Patent No. 9,264,991

The ’991 Patent discloses a method and system for integrating short-range wireless personal area networks (“WPANs”) into longer-range wireless local area networks (“WLANs”). *See* Ex. 1001 at 1:17-21.

An example of a WLAN is an 802.11x (x = a, b, g, n & etc.) network. The

802.11x standard, commonly known as “Wi-Fi,” has been widely deployed for wireless connectivity since its adoption in a variety of settings including in homes, offices, and public establishments. WLANs generally support two different configurations: infrastructure mode and ad-hoc mode. *See* Ex. 1001 at 1:32-45 and 1:61-63.

A WLAN configuration in the far more prevalent infrastructure mode requires a dedicated access point (“AP”) to manage connections (a) between associated 802.11x-compliant wireless circuits (“stations” or “STAs”), such as laptop computers, desktop computers, tablet computers, mobile phones, printers, smart televisions, and the like, (b) between those associated STAs and the Internet, or (c) and between those associated STAs and other WLANs. In other words, a WiFi 802.11x infrastructure mode STA sends and receives *all its communications* directly via a local AP that is associated with that STA, without first directing those communications through any other node. By contrast, all WiFi 802.11x ad hoc mode STAs may send and receive *any communication to any other node* in its network, and, unlike its infrastructure mode counterpart, need not direct all its communications through the single AP with which it is associated at any single point in time. Importantly, in ad hoc mode, the nodes with which an STA can communicate can dynamically vary over time (hence the term “ad hoc”), unlike in infrastructure mode in which all communications to/from an STA must be directed

through the single AP with which that STA is associated. *See* Ex. 1001 at 1:60-2:36.

Devices in a WPAN communicate directly without the need for an intermediary device such as an AP to manage connections. The most common example of a WPAN is a Bluetooth connection/network formed between two Bluetooth-equipped devices. *See* Ex. 1001 at 2:14-22.

Bluetooth WPAN devices operate in the same 2.4-GHz frequency band in which WLAN devices frequently operate. The co-existence of WPAN and WLAN communication protocols in a single frequency band often results in severe interference due to their varying methods of accessing the wireless medium and a lack of synchronization between them. Furthermore, a device's ability to operate in a WLAN or a WPAN may be limited by the hardware and software it includes, as the Bluetooth WPAN and 802.11 WLAN often require different transceiver integrated circuits and may also require different antennas. While the disharmonious coexistence of Bluetooth WPANs and 802.11 WLANs had long been tolerated, there remained a need for a solution that could seamlessly integrate WPAN and WLAN communication protocols. *See* Ex. 1001 at 2:29-36 and 3:20-24.

The '991 Patent notes that the prior art efforts to address these issues were insufficient. For example, one option was to use WLAN protocols, such as 802.11,

in WPAN devices (along the lines of what Petitioner proposes as prior art in the subject petition, as will be discussed below). But, this led to power dissipation and/or low transmission rate problems, and could introduce undesirable amounts of latency in communications involving the WPAN devices. *See* Ex. 1001, 2:37-3:6.

The '991 Patent further describes noise, linearity and/or overhead protocol problems with integrating then-existing WPAN and WLAN networks. WLANs typically operated at relatively high data rates compared to WPANs. It was thus undesirable, for example, to have an STA associated with a Bluetooth WPAN included in a WLAN, since communication between an AP and its associated STAs occurs at the lowest common data rate supported by all STAs connected to that AP. *See* Ex. 1001, 3:6-19.

Also, although WLAN standards, such as 802.11x, specify power save modes that allow forms of power savings, there was still a need to enable power save modes that were better optimized to meet the needs of WPAN devices. *See* Ex. 1001, 3:15-19.

The '991 Patent discloses an apparatus that provided a technical solution to these unsolved technological problems by integrating WPANs into a WLAN infrastructure. *See* Ex. 1001 at 3:20-33. The '991 Patent claims and teaches, *inter alia*, an improved way to facilitate communications between wireless devices that are configured to communicate indirectly. The invention improved upon existing

wireless communications, which were unable to integrate a WPAN into a WLAN infrastructure without suffering from one or more of the aforementioned problems by allowing the network-enabled hub to initiate and maintain connections with nodes of an external wireless network via a first network connection using a first network protocol and, a second network connection using a second network protocol that is an overlay protocol with respect to the first network protocol, and that is partially consistent with the first network protocol. *See* Ex. 1001 at 14:39-15:3.

Compared to the prior art, the claimed apparatus for integrating a WPAN into a WLAN is also more cost effective to design, since the communications using the second network protocol impinge on at least some antennae used for communications using the first network protocol. *See* Ex. 1001 at 8:64-65.

Compared to the prior art, the claimed wireless apparatus for integrating a WPAN into a WLAN allows the two to operate in the same frequency spectrum without causing excessive interference with each other. *See* Ex. 1001 at 9:52-66.

Compared to the prior art, the claimed wireless infrastructure for integrating a WPAN into a WLAN is also more energy efficient, which can extend the battery life of WPAN devices that are battery powered. *See* Ex. 1001 at 9:16-24.

In addition, compared to the prior art, the claimed wireless infrastructure for integrating a WPAN into a WLAN, also enables lower latency communication

involving WPAN devices. *See* Ex. 1001 at 10:31-65.

B. References Relied Upon in the Petition and Proposed Grounds for Institution

The Petition relies on a combination of four references: U.S. Patent No. 7,389,352 (“Cromer,” Ex. 1004); S. Ganu *et al.*, *Architecture and Prototyping of an 802.11-Based Self-Organizing Hierarchical Ad-Hoc Wireless Network (SOHAN)* (“Ganu,” Ex. 1005); International Pub. No. WO 2006/000617 (“Sinivaara,” Ex. 1006); and, International Pub. No. WO 01/52447 (“Judd,” Ex. 1019).

These references are briefly described below.

1. U.S. Patent No. 7,389,352 (“Cromer”) (Ex. 1004)

Cromer recognized that a limitation of Wi-Fi technology (*i.e.*, 802.11x technology) in supporting WPAN environments was that it did not allow a single device to concurrently support both infrastructure and peer-to-peer environments, thereby requiring a computer system serving a user to include two Wi-Fi devices, one for the WLAN environment and one for the WPAN environment. *See* Ex. 1004 at 1:46-55.

To solve this problem, Cromer teaches a computer system (*i.e.*, client device 100) that uses a single Wi-Fi device to operate in both a WLAN and a WPAN environment by using a watchdog timer to switch between infrastructure and ad-hoc modes of the Wi-Fi device. That is, Cromer teaches dispensing with a WPAN

device such as Bluetooth, and relying solely on a WLAN device (*i.e.*, supporting the 802.11x protocol) operating in ad hoc mode when communicating with the WPAN environment, and in infrastructure mode when communicating with the WLAN environment. In particular, in infrastructure mode, the Wi-Fi device of Cromer loads and uses information included in an infrastructure register 110 (Layer 1), and the client device 100 uses an infrastructure driver 120 (Layer 2) to send and receive information over the network. Likewise, in ad-hoc mode, the Wi-Fi device of Cromer loads and uses information included in an ad-hoc register 130 (Layer 1), and the client device uses an ad-hoc driver 140 (Layer 2) to send and receive information over the network. *See* Ex. 1004 at 3:24-38 and FIGs. 1 and 2.

The client device 100 of Cromer is described to be a user device. In particular, a user's client device can display a presentation by interfacing to a projector over a WPAN and separately request access to the Internet over a WLAN. No link is made between these two activities; Cromer does not teach configuring the client device as a hub that flows information between the WPAN and WLAN. *See* Ex. 1004 at 2:1-13.

2. S. Ganu et al., Architecture and Prototyping of an 802.11-Based Self-Organizing Hierarchical Ad-Hoc Wireless Network (SOHAN) (“Ganu”) (Ex. 1005)

Ganu teaches a self-organizing *hierarchical* ad-hoc wireless network to provide improvements in system capacity and performance relative to “flat” ad-hoc

networking approaches. See Ex. 1005 at pg. 880, col. 1.

The hierarchal network architecture of Ganu includes low-power end-user “mobile nodes” (MNs) at a lowest tier of the hierarchal routing network, higher-power radio “forwarding nodes” (FNs) that support multi-hop routing at a middle routing tier, and wired access points (APs) at a highest routing tier. See Ex. 1005 at pg. 880, col. 2 and Figure 1. The higher routing tier APs of Ganu are capable of connecting to any lower routing tier FN or equivalent routing tier AP within range and do not connect with the lowest routing tier MNs. Unlike typical 802.11x WLAN deployments, which operate in 802.11x infrastructure mode, the APs of Ganu operate in 802.11x ad-hoc mode. See Ex. 1005 at pg. 881, col. 1.

The FNs of Ganu can include two interfaces, one to communicate with other equal routing tier FNs and lower tier MNs, and another to communicate with higher routing tier APs, with the two interfaces each operating on different channels to minimize interference with one another. See Ex. 1005 at pg. 881, col. 2.

The network of Ganu organizes itself in a discovery phase, during which application layer “beacons”—generated by a routing application running over the ad-hoc WiFi protocol—are sent by FNs and APs while MNs running the same ad-hoc WiFi protocol (but not the routing application) scan different channels, listen to the Ganu-beacons, and send ad hoc WiFi association messages (all over

unmodified WiFi) to the best “cost” higher tier FN or AP using a discovery metric. The discovery metric is minimization of a transmit power of each outgoing application layer “beacon” from the APs/FNs and a received signal strength for each incoming application layer “beacon” at the MNs, which, assuming reciprocity of channel (*i.e.*, the power conditions on the uplink and downlink of the channel between the AP/FN and the MN), is used to choose a FN (or AP) node with a minimum transmit power as a next hop neighbor for a given MN. *See* Ex. 1005 at pg. 882, cols. 1-2.

The FNs and APs— also nodes in the network— exchange local neighbor tables indicating, for each such FN or AP node, which other APs and FNs are relatively proximate to that FN or AP node. This exchange enables each FN or AP node to efficiently route data between MNs and APs using the lowest power set of connections, with each FN maintaining a continuously-updated (*e.g.*, as MNs move) latest, best-cost path between MNs and APs. Importantly, if an FN is ever disconnected from the network (*i.e.*, there is no entry for an AP that exists in that FN’s neighbor table), packets are thereafter discarded and a routing failure occurs at that FN. *See* Ex. 1005 at pg. 881, col. 2 and Table 1.

3. International Pub. No. WO 2006/000617 (“Sinivaara”) (Ex. 1006)

Sinivaara teaches methods of enabling a short-range wireless terminal (also

an “STA”) to operate in an ad-hoc mode Wi-Fi network without leaving another Wi-Fi mode infrastructure network. *See* Ex. 1006, 3:14-17. Sinivaara teaches that a drawback of current networks was that, if a user’s STA enters an ad-hoc operation mode to connect to an ad hoc mode WiFi network, an existing association between that STA and an infrastructure mode WiFi network is removed, and the user’s terminal must then repeat authentication to form a new association with the infrastructure mode WiFi network to re-enter that network. *See* Ex. 1006, 2:25-34. To solve this problem, Sinivaara teaches that the terminal move to a power save state with respect to the infrastructure mode WiFi network while it communicates with the ad hoc mode WiFi network, without disassociating from the infrastructure mode WiFi network. In particular, Sinivaara sets forth a procedure in which operations in the ad-hoc mode WiFi network are suspended at regular intervals, such that during those intervals the terminal can receive beacons of the infrastructure mode WiFi network to remain associated with the infrastructure network. In that same procedure, the terminal moves to a power save state with respect to the infrastructure mode WiFi network and thus maintains association with that network, to permit operation in the ad hoc mode WiFi network during the feigned infrastructure mode WiFi power save state. *See* Ex. 1006, 3:18-33.

4. International Pub. No. WO 01/52447 (“Judd”) (Ex. 1019).

Judd teaches repeaters for use in wireless communication systems. *See* Ex.

1019, 1:4-5. Judd further teaches that such repeaters include features which improve isolation between antennas, thereby achieving greater system gain and extended system range. *See* Ex. 1019, 1:13-20.

C. Proposed grounds of institution

The proposed grounds are summarized in the table below:

Ground	'991 Patent Claims	Primary Reference	Secondary Reference(s)	Type of Challenge
1	1, 3-4, 6-7, 14, and 16-17	Cromer	Ganu	pre-AIA 35 U.S.C. § 103
2	1, 3-4, 6-7, 14, and 16-17	Cromer	Ganu, Sinivaara	pre-AIA 35 U.S.C. § 103
3	15, 18	Cromer	Ganu, Judd	pre-AIA 35 U.S.C. § 103
4	15, 18	Cromer	Ganu, Sinivaara, Judd	pre-AIA 35 U.S.C. § 103

III. THE CHALLENGED INDEPENDENT CLAIM

The Petition should be denied Institution because it fails to establish a reasonable likelihood that any of Claims 1, 3-4, 6-7, and 14-18 of the '991 Patent is unpatentable. The challenged independent claim is as follows.

Independent Claim 1 reads:

1. A network-enabled hub, usable for facilitating data communications between two or more wireless devices that are configured to communicate indirectly with each other via the network-enabled hub, comprising:

an interface to a wireless radio circuit that can send and receive data wirelessly, providing the hub with bi-directional wireless data communication capability;

a processor configured to:

process data received via the wireless radio circuit;

generate data to be transmitted by the wireless radio circuit;

initiate and maintain network connections with nodes of a wireless network external to the network-enabled hub, maintaining at least a first network connection using a first network protocol and a second network connection using a second network protocol, that can be maintained, at times, simultaneously with each other, wherein 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 wherein at least some of the communications using the second network protocol impinge on at least some antennae used for communications using the first network protocol; and

implement data forwarding logic, implemented in a network-enabled hub using hardware and/or software, that forwards data between an originating node and a destination node, wherein the originating node is a node in one of the first and second networks and the destination node is a node in the other of the first and second networks.

IV. CLAIM CONSTRUCTION

A. Claim Construction Standard

In an *inter partes* review proceeding, claim terms are construed according to the same claim construction standard used in district courts as articulated in

Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005 (*en banc*)).

B. Plain and Ordinary Meaning

For the purposes of this Preliminary Response, it is Patent Owner’s position that no special claim construction is needed for the claim terms that are discussed herein, other than the plain and ordinary meaning of those claim terms, as will be seen based on Patent Owner’s discussion of the lack of reasonable likelihood of unpatentability based on the proposed grounds.

V. THE PETITION DOES NOT ESTABLISH A REASONABLE LIKELIHOOD THAT ANY OF CLAIMS 1, 3-4, 6-7, AND 14-18 OF THE ’991 PATENT IS UNPATENTABLE

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”).

Petitioner has failed to meet its burden, as described more fully below.

A. Ground 1 should be denied for failure to establish a reasonable likelihood that Cromer and Ganu render Claims 1, 3-4, 6-7, 14, and 16-17 unpatentable.

Petitioner’s obviousness argument fails because it fails to show how its combination of references satisfies at least claim limitations [1e.2], [1pre], and [1h].

As the basis for its obviousness argument, Petitioner relies on a specific modification of Cromer by Ganu (the “Cromer Modification”). Petitioner does not disclose the full details of the Cromer Modification at the outset of the Petition, and it is not until reaching a discussion of Limitation [1e.2] that Petitioner lays bare its theory, finally giving the reader sufficient details of the Cromer Modification to appreciate its utter insufficiency in satisfying claim limitations [1e.2], [1pre] and [1h]. In the Cromer Modification, as set forth for item [1e.2], Cromer’s Client device 100 is said to be modified to communicate with Cromer’s Peer-to-Peer device 180 using what Petitioner refers to as “*Ganu’s* modified-802.11 ad hoc protocol” (instead of using Cromer’s 802.11 protocol in ad-hoc mode). *See* Petition at pg. 47. Under this Cromer Modification, Cromer’s Client device 100 maintains its original 802.11 infrastructure mode link with the Access Point 160.

Petitioner thus asserts that Ganu’s allegedly “modified” 802.11 ad hoc protocol is a *different* protocol from the ad hoc mode protocol specified in the 802.11 standard, such that the Cromer Modification embodies both a “first network protocol” (*i.e.*, the purported Ganu “modified-802.11 ad hoc protocol”) and a “second network protocol” (Cromer’s original 802.11 ad hoc protocol when communicating with Peer-to-Peer device 180), in purported satisfaction of Claim Limitation [1e.2], which recites “maintaining at least a first network connection

using a first network protocol and a second network connection using a second network protocol.”

At this point two things become clear: *First*, Petitioner fails to satisfy claim element [1e.2] because Ganu’s communication routine is clearly *not* implemented using a different network protocol from the ad hoc mode protocol specified in the 802.11 standard—to the contrary, Ganu merely teaches an *application-level* protocol running on top of an unmodified ad-hoc WiFi network protocol. *Second*, the Cromer Modification set forth by Petitioner at [1e.2] cannot possibly satisfy other the claim limitations of Claim 1, including [1pre] and [1h]. These shortcomings are addressed in turn below.

1. The “Cromer Modification” fails to satisfy claim limitation [1e.2]: “maintaining at least a first network connection using a first network protocol and a second network connection using a second network protocol”

In the Cromer Modification, as Petitioner reveals in discussing claim limitation [1e.2], Petitioner purports to combine the teachings of Cromer and Ganu in a particular manner. The network connection between the client device 100 and Access Point 160 of Cromer is maintained on an 802.11 infrastructure mode network, as taught by Cromer (*i.e.*, the “first network connection”), while the network connection between the client device 100 and the peer-to-peer device 180 of Cromer is maintained on an 802.11 ad hoc mode network that is allegedly

modified “using Ganu’s modified-802.11 ad-hoc protocol” (*i.e.*, the “second network connection”). *See* Petition at pg. 47. An annotated version of FIG. 1 of Cromer is shown below to illustrate Petitioner’s purported structure.

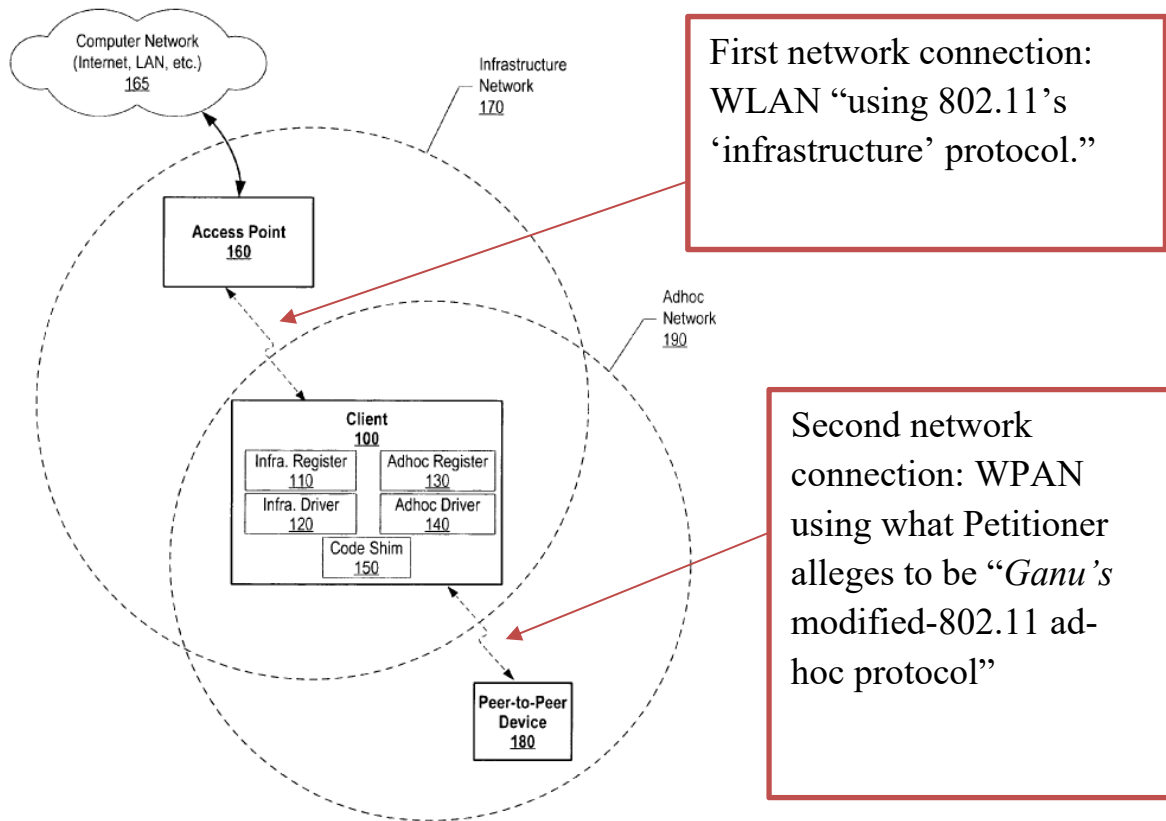


Figure 1

Thus, Petitioner asserts that Ganu teaches a modification to a conventional 802.11 ad-hoc mode protocol, and that this purported modified 802.11 ad-hoc mode protocol is used in place of the conventional 802.11 ad-hoc mode protocol of

Cromer for the connection between the client device 100 and the peer-to-peer device 180. In further support of this position, Petitioner points to Fig. 4 of Ganu, and alleges “*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.’” *See* Petition at pgs. 48-49.

Petitioner’s statements as to the teachings of Ganu are plainly and clearly erroneous. Ganu does *not* teach any modification to the 802.11 ad-hoc mode protocol. To the contrary, Ganu plainly states that “the beacons used in the prototype are *application-level packets*, since *actual 802.11 beacons* are generated by the firmware in most of the *existing 802.11b network adapters* and *are not customizable*.” *See* Ex. 1005 at pg. 882 (emphasis added). The 802.11 ad-hoc protocol used in the system of Ganu is a conventional, unmodified 802.11 ad-hoc mode protocol. This is further apparent from the so-called “beacon” format shown in Fig. 4 of Ganu, an annotated version of which is reproduced below.

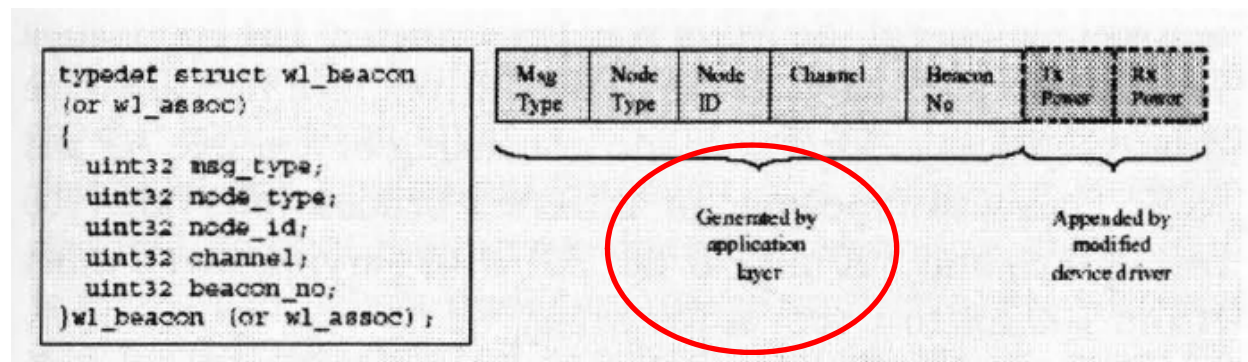
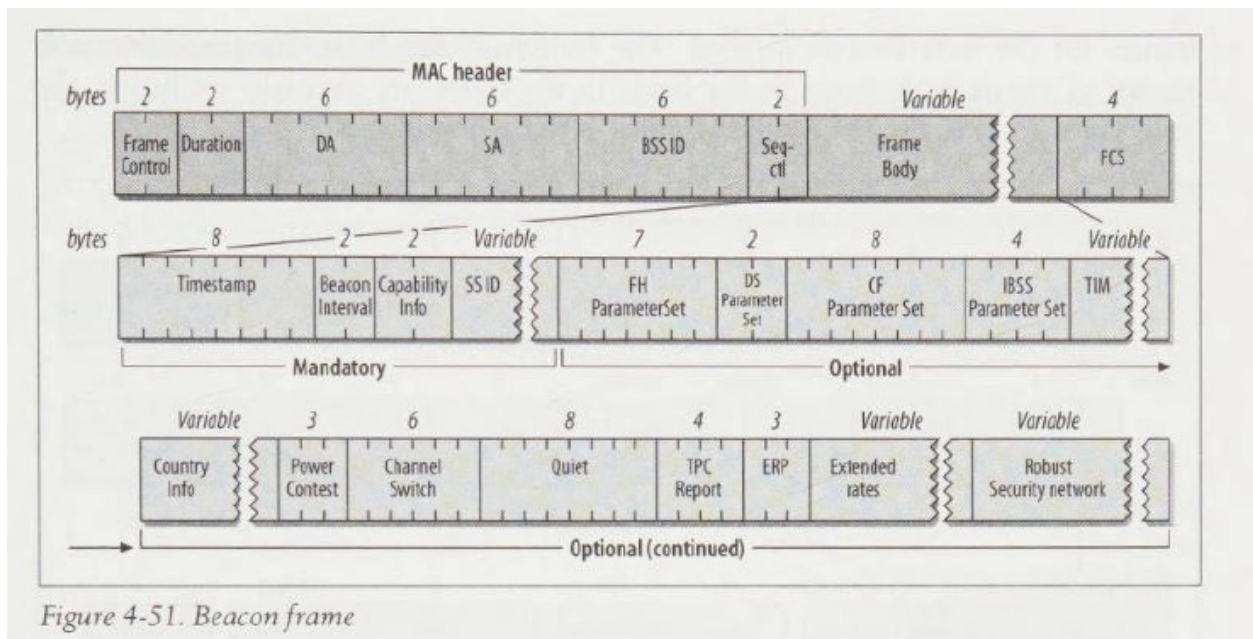


Figure 4. Beacon and Association Message Format

Ganu clearly teaches that its “beacons” are “generated by [the] application layer,” and are not generated by the layer at which 802.11 beacons are generated (*i.e.*, Layer 2, as acknowledged in Cromer). *See* Ex. 1004 at 4:20-22 and FIG. 2. Furthermore, the application layer “beacon” format of Ganu is clearly and unambiguously *not* a modification of a conventional 802.11 beacon frame. An 802.11 beacon frame format is reproduced below for comparison. *See* Ex. 2001 at Figure 4-51.



As is readily apparent from the above, the Ganu application layer “beacons” are of an entirely distinct format than 802.11 beacon frames and are tailored for the express purpose of forming the Ganu self-organizing hierarchal network, which formation occurs at the application level.

In addition to those fields “generated by the application layer,” the Ganu “beacon” format includes “Tx Power” and “Rx Power” fields that are “appended by modified device drivers,” as contradistinguished from 802.11b adapters, which according to Ganu are not even modifiable. *See* Ex. 1005 at pg. 882. In particular, Ganu teaches a “discovery metric” in which transmission power and received signal strength are included in its application layer “beacons,” which are only processed by the routing function of the FNs and APs that occurs in Layer 3 (*i.e.*, to select a “best-cost” path between the MNs and the APs). These fields are *not* appended to a conventional 802.11 beacon frame, as erroneously set forth by Petitioner, meaning they are not appended by an **802.11 adapter**. Petitioner describes the teachings of Ganu as “modifying the 802.11 ad-hoc protocol by (1) using two new power fields—“Tx Power” and “Rx Power”—appended to 802.11 MAC beacon frames.” *See* Petition at pg. 20. This statement is a false characterization of Ganu. As is evident from FIG. 4 of Ganu, and as described above, the Tx Power and Rx Power fields of Ganu are *not* appended to 802.11 MAC beacon frames, which is true because there is not even a Tx Power nor Rx Power field in an 802.11 MAC beacon frame. This means that any such field appended to an 802.11 beacon frame is payload traffic with respect to that Layer 2 frame (*i.e.*, the WiFi frame), carrying only higher-than-WiFi/Layer 2 traffic, akin to IP headers (Layer 3), TCP headers (Layer 4), or HTML traffic (Application

Layer) (*see* OSI model, Ex. 1025 at 13-14), all appended by some part of the device driver besides the **802.11 adapter**. The Tx Power and Rx Power are fields that are processed only by the Ganu application-level protocol (*i.e.*, to determine a “best cost” path between the APs and the MNs), while the 802.11 ad hoc mode protocol drivers themselves process only the **unmodified** 802.11 MAC beacon frames. The only relation between the Tx and Rx Power fields and the device drivers is that the Tx and Rx Power values need to be *read* from the device drivers, but there is no need for the 802.11 **adapter** to be modified since they are not modifiable as per Ganu and since they are only processed by the application in Ganu (as contradistinguished from the 802.11 WiFi adapter).

That Petitioner’s purported “modified-802.11 ad hoc protocol” in support of its position for element [1e.2] is an outright misstatement of the Ganu system is further apparent from FIG. 5 of the reference, reproduced below, which illustrates the software stack of Ganu. As described in the reference, Layer 2 “handles the discovery and MAC layer functionality,” and Layer 3 “is responsible for handling the maintenance of the local neighbor tables,” which is the focus of the Ganu teachings. Ex. 1005 at pg. 883. The modifications set forth by Ganu to Layer 3 are intended to serve Ganu’s functionality *as a router running a routing application* over an unmodified 802.11 ad hoc mode WiFi protocol. No modifications to Layer

2 (*i.e.*, modifications to the 802.11 network protocol itself) occur in the Gnu system.

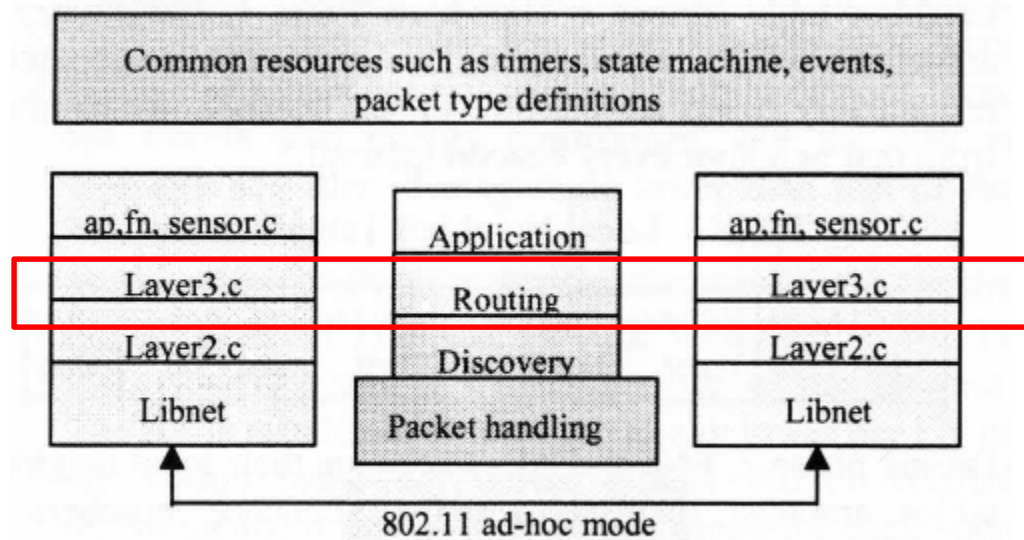


Figure 5. Software architecture of SOHAN

Accordingly, regardless of whatever changes Gnu may teach as to application level routines, Petitioner fails to cite any teachings in Gnu as to modifications of the 802.11 protocol itself, which is essential to Petitioner's own argument for satisfaction of Item [1e.2]. Adding an application that provides commands to the Wi-Fi network protocol stack without modifying it in any way does not amount to any inconsistency between the second protocol and the first protocol. Because Petitioner has failed to set forth sufficient reasons to show how this claim limitation is satisfied, in view of clear statements in the references to the

contrary, institution should be denied for this reason alone. However, additional deficiencies in the Petition are also manifest, as explained below.

2. The Cromer Modification cannot satisfy remaining claim limitations, namely, [1pre] and [1h].

Patent Owner does not agree that Petitioner’s purported combination (the “Cromer Modification”) satisfies Claim Limitation [1e.2]. Even if it did, it cannot also satisfy limitations [1pre] and [1h].

a) The Cromer Modification – erroneously asserted to satisfy limitation [1e.2] – cannot satisfy limitation [1pre].

Claim limitation [1pre] recites “A network-enabled hub, usable for facilitating data communications between two or more wireless devices that are configured to communicate indirectly with each other via the network-enabled hub” based on the teachings of Cromer and Ganu.

In addressing [1pre], Petitioner has yet to articulate the Cromer Modification, upon which it later relies – albeit unsuccessfully – in an attempt to satisfy limitation [1e.2]. With regard to [1pre], Petitioner states – in contradiction with its later articulation of the Cromer Modification: “Client device 100, *when configured as a FN as taught by Ganu*, was a *network-enabled hub* because it provides communication between *Cromer’s* WLAN and WPAN, providing relay/repeater functionality between the two networks.” *See* Petition at pg. 25 (emphasis added).

To substantiate that a “network-enabled hub” is disclosed by the combination of Cromer and Ganu, Petitioner adopts the position that the client device 100 of Cromer be configured as a Ganu FN *to enable relay/repeater functionality*. Such a position, however, is plainly inconsistent with Petitioner’s purported combination as later revealed in a failed attempt to satisfy limitation [1e.2].

In particular, the [1e.2] Cromer Modification relies on the client device 100 being configured to: 1) form a WLAN (infrastructure mode) connection with access point 160, and 2) form a WPAN (ad-hoc mode) connection with peer-to-peer device 180, with only the WPAN connection being “modified” (*i.e.*, to include an application level Ganu “beacon” structure).

The [1e.2] Cromer Modification is clearly not a device that can satisfy limitation [1pre]. Ganu teaches a network structure in which all network connections operate in, specifically, 802.11 ad-hoc mode. Ganu teaches an “802.11-based self-organizing hierarchical ad-hoc wireless network (SOHAN),” in which all of the MNs, FNs, and APs operate in, specifically, ad-hoc mode such that the FNs enable relay functions between MNs and APs. *See* Ex. 1004 at pg. 880 and Fig. 1. Ganu provides this teaching because it needs to leverage 802.11 ad hoc mode’s capability to dynamically vary the nodes with which it communicates (*see* Background, herein) as various “best-cost” paths between APs, FNs, and MNs

change with varying network conditions and as MNs move above. Contrary to Petitioner's argument in advocating for Limitation [1pre], configuring the client device 100 "as a FN as taught by Ganu," is clearly *not* achievable in the Cromer Modification, espoused by Petitioner in its failed attempt to satisfy limitation [1e.2] for a simple reason.

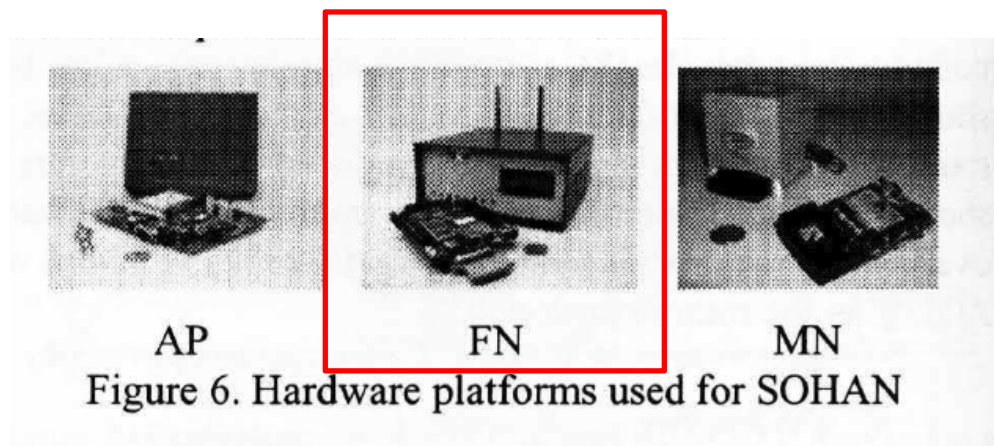
For a Cromer client device 100 to be configured as a Ganu FN to enable Ganu-like data relay functions, as set forth by Petitioner in limitation [1pre], all of the connections to/from that Ganu FN need to be operating an *ad hoc* mode 802.11 protocol. Specifically, *both* of the following connections would need to be implemented using the *802.11 ad hoc mode protocol*, as taught by Ganu, for the Ganu FN to operate as taught in the Ganu reference:

- Connection between the Cromer client device 100 and an access point (*i.e.*, access point 160 of Cromer), and
- Connection between the Cromer client device 100 and a peer-to peer device (*i.e.*, device 180 of Cromer).

An 802.11 infrastructure mode connection between the Cromer client device 100 and the Cromer access point 160, as set forth by Petitioner in the [1e.2] Cromer Modification, could not be implemented between the devices while those same two devices are connected using Ganu's required 802.11 *ad hoc* mode connection. This is simply impossible—a single connection cannot simultaneously

be an 802.11 ad hoc mode connection routing traffic point-to-point to any other node in the network, and an 802.11 infrastructure mode connection routing all traffic via a single associated AP. Implementing the 802.11 infrastructure mode connection between the client device 100 and the access point 160 of Cromer necessarily means not being able to enable the data relay functions of Ganu on which Petitioner relies for satisfaction of Item [1pre].

Contrary to this technical reality, Petitioner asserts here that the Client device 100 of Cromer (*i.e.*, a user device, described as one that “may display a presentation by interfacing to a projector over a WPAN, and request access to the Internet over a WLAN;” Ex. 1003 at 2: 1-4) would be modified to be configured as a Ganu FN. But, the Ganu FN is a 2004-era wireless network router, and not a personal computer like the Cromer client device 100 (which is not even described in Cromer as ever relaying traffic between a WLAN and a WPAN). The hardware configuration of Ganu is shown in FIG. 6 of the reference, reproduced below with an annotation to the FN.



Unlike the Cromer client device 100, the FN of Ganu is “an intermediate radio node without traffic of its own, the FN is only responsible for multi-hop routing of transit packets.” *See* Ex. 1005 at pg. 881. To provide for such multi-hop routing, the Ganu FN operates in, specifically, *ad hoc mode* with all connections to and from the FN to achieve the objective of “introducing discovery *as a separate layer*” in the network such that “routing overhead is significantly reduced.” *See* Ex. 1005 at pgs. 881-882. To assert a modification in which connections to and from a supposed Ganu-like “forwarding node” (as the Client Device 100 of Cromer is purportedly modified to be per Petitioner to satisfy [1pre]) are implemented in infrastructure mode in one direction (*i.e.*, in which all connections flow to/from a single associated AP) without retaining the flexibility to dynamically alter connections with a changing set of other FNs and APs as new “best-cost” paths are calculated is to vitiate the very purpose of the Ganu system configuration (*i.e.*, to continually find and switch to new “best-cost” paths to minimize power drain in MNs).

3. The Cromer Modification – erroneously purported to satisfy limitation [1e.2] – cannot satisfy limitation [1h].

In addressing limitation [1h], Petitioner fails to remind the reader of the details of the [1e.2] Cromer Modification—and for good reason. It would have become immediately apparent that the modification it advanced in its failed effort

to satisfy [1e.2] could not possibly satisfy [1h]. Limitation [1h] recites “implement[ing] data forwarding logic, implemented in a network-enabled hub using hardware and/or software, that forwards data between an originating node and a destination node, wherein the originating node is a node in one of the first and second networks and the destination node is a node in the other of the first and second networks.”

Petitioner states that “the data handling structures of *Cromer*’s client device 100 would have logic for carrying out *Ganu*’s data relaying, which includes data forwarding (*implement data forwarding logic*).” See Petition at pg. 58. However, as explained below, this is simply not achievable given the details disclosed about the [1e.2] Cromer Modification.

Ganu’s data forwarding logic is set forth at Sections III. B and C of the reference. See Ex. 1005 at pgs. 881-882. Ganu teaches a “discovery metric” in which transmission power and received signal strengths for various nodes are exchanged, such that a node with a minimum transmit power (and, if there are two such nodes, a higher received signal strength) is chosen as a next hop neighbor. Ganu further teaches the formation and periodic updating of a Local Neighbor Table to enable this routing function in the FNs and APs. Ganu further teaches that “[a]fter the table exchanges, each FN computes a path that it can use to route data to the AP” and that the “FN maintains a latest best cost path towards the AP at

every instant and whenever it receives data packets...it consults the neighbor table to forward the data.” *See* Ex. 1005 at pgs. 881-882.

The data forwarding logic of Ganu thus relies upon the formation of Local Neighbor Tables for FNs to effect data routing between MNs and APs. In fact, Ganu states that “[i]f an FN is disconnected from the network (***there is no entry for an AP that exists in its neighbor table***), it discards the packet and indicates a routing failure.” Ex. 1005 at pg. 882 (emphasis added).

Thus, assuming, *arguendo*, that only the WPAN connection (*i.e.*, the purported “second network connection”) of Cromer is modified using what Petitioner refers to as “Ganu’s modified-802.11 ad-hoc protocol,” as purported by Petitioner in an effort to satisfy claim limitation [1e.2], there could be no data exchange with APs and other FNs over an ad-hoc Wi-Fi protocol as required by Ganu, since there would be an infrastructure Wi-Fi protocol (which only permits communications with a single associated AP—*see* Background, herein) implemented upstream to higher or equal routing tier devices (other FNs and APs) by the FN, which in turn means there would be no data forwarding logic to implement as the WLAN connection would remain as taught by Cromer and, therefore, Local Neighbor Tables could not be generated and routing functions based on such Local Neighbor Tables could not occur.

Thus, a WLAN infrastructure-mode connection between the client device 100 and the access point 160 of Cromer, as set forth by Petitioner for Item [1e.2], could not exist while simultaneously implementing the data forwarding logic of Ganu on which Petitioner relies for satisfaction of Item [1h].

4. Petitioner cannot make a showing that all of Items [1pre], [1e.2], and [1h] are met by the combination.

Ganu specifically teaches that each node's neighbor tables are continuously updated (*see* Ex. 1005 at pg. 882, 883), and that if there is no entry for an AP that exists in an FN's neighbor table, packets are discarded and a routing failure occurs. *See* Ex. 1005, pg. 882. Thus, a combination in which:

- an infrastructure-mode WLAN connection is maintained between a client device 100 and an access point 160, as taught by Cromer (which connection only allows communication between a single associated AP, and not another AP or FN), and
- the purported, Ganu-modified ad-hoc-mode WPAN connection is adopted only between the client device 100 and a peer-to-peer device 180, as purported by Petitioner for Item [1e.2],

is entirely inconsistent and incompatible with the positions adopted by Petitioner for Items [1pre] and [1h]. This is because there would be no way for the former connection to dynamically alter the nodes with client device 100 is directly

communicating (*i.e.*, the only AP or FN with which that client device 100 can communicate would be the single AP with which the client device 100 is associated under the 802.11 infrastructure mode protocol).

It is inconceivable that an implementation in which data forwarding tables could not be generated and acted upon, and in which routing failures would occur, as would be the case with Petitioner's purported combination at Item [1e.2], could satisfy either of the limitations of [1pre] and [1h], where the client device would be required to provide data relay functions and implement data forwarding logic.

5. Dependent Claims 3-4, 6-7, 14 and 16-17: the Petition fails to establish that Cromer and Ganu teach all recited claim limitations of any dependent claim.

Dependent Claims 3-4, 6-7, 14 and 16-17 depend from and include all elements of independent Claim 1. Petitioner relies entirely on the arguments presented for Claim 1 in substantiating its position as to the unpatentability of dependent Claims 3-4, 6-7, 14 and 16-17. Thus, for at least the reasons described above with respect to Claim 1, Petitioner has failed to meet its burden in demonstrating that any of Claims 3-4, 6-7, 14 and 16-17 are rendered unpatentable based on the teachings of Cromer and Ganu.

B. Ground 2 should be denied for failure to establish a reasonable likelihood that Cromer, Ganu, and Sinivaara render Claims 1, 3-4, 6-7, 14, and 16-17 unpatentable.

1. Claims 1, 3-4, 6-7, 14, and 16-17; Petitioner's Ground 2 argument does not rely on Sinivaara to remedy the above-noted deficiencies in the Ground 1 argument.

With respect to independent Claim 1, Petitioner relies entirely on the arguments presented for Ground 1 of the Petition, except for Items [1e] and [1f]. See Petition at pgs. 71-76. Petitioner does not rely on Sinivaara in support for its arguments as to any of elements [1pre], [1e.2], and [1h]. Claims 3-4, 6-7, 14 and 16-17 depend from and include all elements of independent Claim 1.

Thus, for at least the reasons described above with respect to Ground 1, Petitioner has failed to meet its burden in demonstrating that any of Claims 1, 3-4, 6-7, 14 and 16-17 are rendered unpatentable based on the teachings of Cromer, Ganu, and Sinivaara.

C. Ground 3 should be denied for failure to establish a reasonable likelihood that Cromer, Ganu, and Judd render Claims 15 and 18 unpatentable.

1. Claims 15 and 18; Petitioner's Ground 3 argument does not rely on Judd to remedy the above-noted deficiencies of Ground 1.

Claims 15 and 18 depend from and include all elements of independent Claim 1. Petitioner does not rely on Judd in support for its arguments as to any elements of Claim 1 and relies on Judd solely for its arguments as to features of

dependent Claims 15 and 18. In particular, Petitioner relies on Judd as purportedly disclosing “an integrated wall plug.” *See* Petition at pgs. 78-80.

Thus, for at least the reasons described above with respect to Ground 1, Petitioner has failed to meet its burden in demonstrating that Claims 15 and 18 are rendered unpatentable based on the teachings of Cromer, Ganu, and Judd.

D. Ground 4 should be denied for failure to establish a reasonable likelihood that Cromer, Ganu, Sinivaara, and Judd render Claims 15 and 18 unpatentable.

1. Claims 15 and 18; Petitioner’s Ground 4 argument does not rely on Judd to remedy the above-noted deficiencies of Ground 2.

Claims 15 and 18 depend from and include all elements of independent Claim 1. Petitioner does not rely on Judd in support for its arguments as to any elements of Claim 1 and relies on Judd solely for its arguments as to features of dependent Claims 15 and 18. In particular, Petitioner relies on Judd as purportedly disclosing “an integrated wall plug.” *See* Petition at pg. 80.

Thus, for at least the reasons described above with respect to Ground 2, Petitioner has failed to meet its burden in demonstrating that Claims 15 and 18 are rendered unpatentable based on the teachings of Cromer, Ganu, Sinivaara, and Judd.

VI. CONCLUSION

The Board should not institute *Inter Partes* Review on any of the grounds set forth in the Petition.

Respectfully submitted this 23rd day of March 2023,

/Lawrence P. Cogswell III, Ph.D. 71,441/
Lawrence P. Cogswell III, Ph.D.
Lead Counsel, Reg. No. 71,441
Hamilton, Brook, Smith & Reynolds, P.C.
155 Seaport Blvd.
Boston, Massachusetts 02210
Phone: (617) 607-5900
Fax: (978) 341-0136

First Back-up Counsel
Timothy J. Meagher, Reg. No. 39,302
Hamilton, Brook, Smith & Reynolds, P.C.
155 Seaport Boulevard
Boston, Massachusetts 02210
Phone: (617) 607-5900
Fax: (978) 341-0136

Second Back-up Counsel:
Ronald R. Demsher, Reg. No. 42,478
Hamilton, Brook, Smith & Reynolds, P.C.
155 Seaport Boulevard
Boston, Massachusetts 02210
Phone: (617) 607-5900
Fax: (978) 341-0136

Third Back-up Counsel:
Keith J. Wood, Reg. No. 45,235
Hamilton, Brook, Smith & Reynolds, P.C.
155 Seaport Boulevard
Boston, Massachusetts 02210
Phone: (617) 607-5900
Fax: (978) 341-0136

Fourth Back-up Counsel:
Kristen K. Salvaggio, Reg No. 74,739
Hamilton, Brook, Smith & Reynolds, P.C.
155 Seaport Boulevard

Case No. IPR2023-00193
U.S. Patent No. 9,264,991

Boston, Massachusetts 02210
Phone: (617) 607-5900
Fax: (978) 341-0136

***Attorneys for Patent Owner,
Ozmo Licensing LLC***

PATENT OWNER LIST OF EXHIBITS

Exhibit	Description
Ex. 2001	Excerpts from: Gast, Matthew, S., “802.11® Wireless Networks: The Definitive Guide,” O’Reilly®, April 2002, ISBN: 0-596-00183-5, 2nd Edition.

CERTIFICATE OF COMPLIANCE

I hereby certify that this Patent Owner Preliminary Response complies with the type- volume limitations of 37 C.F.R. § 42.24(b)(1), because it contains 7,085 words, as calculated by the Microsoft Word program excluding the parts of the brief exempted by 37 C.F.R. § 42.24.

/Lawrence P. Cogswell III, Ph.D. 71,441/
Lawrence P. Cogswell III, Ph.D.
Reg. No. 71,441
Hamilton, Brook, Smith & Reynolds, P.C.
155 Seaport Blvd.
Boston, Massachusetts 02210
Phone: (617) 607-5900
Fax: (978) 341-0136

***Lead Counsel for Patent Owner,
Ozmo Licensing LLC***

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I hereby certify that on March 23, 2023 the foregoing *Patent Owner Preliminary Response, List of Exhibits, and Exhibits referred to herein* are being served electronically by agreement of the parties at the following email addresses.

JMBaird@duanemorris.com
ellyar@unifiedpatents.com
michelle@unifiedpatents.com
PHBelnap@duanemorris.com

/Lawrence P. Cogswell III, Ph.D. 71,441/
Lawrence P. Cogswell III, Ph.D.
Reg. No. 71,441
Hamilton, Brook, Smith & Reynolds, P.C.
155 Seaport Blvd.
Boston, Massachusetts 02210
Phone: (617) 607-5900
Fax: (978) 341-0136

***Lead Counsel for Patent Owner,
Ozmo Licensing LLC***