

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PANASONIC AUTOMOTIVE SYSTEMS CO., LTD.,
Petitioner,

v.

UNM RAINFOREST INNOVATIONS,
Patent Owner.

PTAB Case No. IPR2024-00364
Patent No. 8,265,096 B2

PATENT OWNER'S PRELIMINARY RESPONSE

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TABLE OF ABBREVIATIONS

Patent Owner	UNM Rainforest Innovations (“UNMRI”)
Petitioner	Panasonic Automotive Systems Co., Ltd., (“Panasonic”)
PTAB	Patent Trial and Appeals Board
’096 Patent	U.S. Patent No. 8,265,096 (EX1001)
<i>Joint Proposal</i>	IEEE 802.11-05/1102r4, “Wireless LANs Joint Proposal: High throughput extension to the 802.11 Standard: PHY” (EX1015)
<i>Trainin</i>	U.S. Pub. No. 2007/0204052
<i>Mujtaba</i>	U.S. Pub. No. 2006/0072529

LIST OF EXHIBITS

Exhibit No.	Descriptions
2001	Declaration of Dr. Branimir Vojcic
2002	<i>Talukdar</i> – U.S. Patent Application 2009/0067377 A1 (previously IPR2021-00375, EX1012)
2003	<i>Li</i> – U.S. Patent Application 2007/0155387 A1 (previously IPR2021-00375, EX1016)
2004	<i>Nystrom</i> – U.S. Patent Application 2007/0104174 A1 (previously IPR2021-00375, EX1017)
2005	2018 Economic Impact Report
2006	Dell litigation notice of withdrawn claims
2007	Asus litigation notice of withdrawn claims
2008	Apple litigation joint motion to dismiss with prejudice
2009	Apple litigation order of dismissal

LIST OF CHALLENGED CLAIMS

Limitation	Claim Language
Claim 8	
[8pre]	A method of constructing a frame structure for data transmission, the method comprising:
[8a]	generating a first section comprising data configured in a first format compatible with a first communication system using symbols;
8[b]	generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols,
[8c]	wherein the first communication system's symbols and the second communication system's symbols co-exist in one transmission scheme and
8[d]	wherein the second communication system has pilot symbols that are denser than those in the first communication system;
8[e]	generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section; and
8[f]	combining the first section, the second section and the at least one non-data section to form the frame structure.
Claim 44	
[44pre]	A method of constructing a frame structure for data transmission, the method comprising:
[44a]	generating a first section comprising data configured in a first format compatible with a first communication system using symbols;
[44b]	generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols,
[44c]	wherein the first communication system's symbols and the second communication system's symbols co-exist in one transmission scheme and
[44d]	wherein: the second format is compatible with the second communication system configured to support higher mobility than the first communication system,

[44e]	wherein each symbol in the second communication system has a shorter symbol period than that in the first communication system; and
[44f]	wherein the second communication system has pilot symbols that are denser than those in the first communication system;
[44g]	generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section; and
[44h]	combining the first section, the second section and the at least one non-data section to form the frame structure.
Claim 45	
[45]	The method of claim 44, wherein the non-data section comprises mapping information for at least one of the first section and the second section.
Claim 46	
[46]	The method of claim 44, wherein the non-data section comprises at least one of a preamble, a frame control header 60 (FCH), a burst, and a map of at least one of the first section and the second section.
Claim 47	
[47]	The method of claim 46, wherein the second section follows the first section in at least one of time sequence and frequency spectrum.
Claim 49	
[49]	The method of claim 44, wherein each of the first section and the second section carries at least one of uplink and downlink data.
Claim 50	
[50]	The method of claim 44, wherein the second section carries mapping information for data in the second section.

I. INTRODUCTION

Patent Owner UNMRI respectfully submits this Patent Owner Preliminary Response to the Petition for *Inter Partes* Review dated Jan. 3, 2024 (“Petition”) of U.S. Patent No. 8,265,096 (EX1001, “’096 patent”) filed by Panasonic. Petitioner asserts that claims 8, 44–47, and 49–50 of the ’096 patent are unpatentable on four grounds:

Ground 1: Claims 8, 44–47 and 50 are anticipated by the *Joint Proposal*

Ground 2: Claim 49 is rendered obvious by the *Joint Proposal* and *Trainin*

Ground 3: Claim 8 is anticipated by *Mujtaba*

Ground 4: Claims 8, 44–47, and 49–50 are obvious by *Mujtaba* and *Trainin*

This Preliminary Response is timely filed based on the Board’s Notice Of Filing Date Accorded To Petition And Time For Filing Patent Owner Preliminary Response. *See* Paper 6.

II. RELATED PROCEEDINGS

Related Proceedings are listed in Paper 3 (Patent Owner’s Mandatory Notice) at 2. Additional related proceedings not listed by Petitioner include *inter partes* reviews by *ZyXEL Communications Corporation* (IPR2021-00734 filed Mar. 29, 2021), *Qualcomm Incorporated* (IPR2021-00375 filed Dec. 28, 2020), and *Intel Corporation* (IPR2020-01576 filed Sep. 14, 2020).

III. UNM BACKGROUND

UNM Rainforest Innovations is the economic development and technology transfer organization of The University of New Mexico, the State of New Mexico's flagship university. EX2005 (Economic Impact Report). In that role, UNM protects and licenses technology owned by the University, including those developed by University researchers. It connects the business community to the University and facilitates the University's role in the state's economic development initiatives.¹ As a nonprofit corporation formed and owned entirely by the University of New Mexico Board of Regents, UNM significantly contributes to the mission statement of the University of New Mexico.

Since 1996, UNM university researchers have disclosed 2,222 new inventions to UNM. UNM, in turn, has filed 1,628 patent applications, received 754 issued U.S. patents, executed 733 licensing agreements, and facilitated the formation of nearly 160 new startup companies to take those inventions to market.² These startups have created or stimulated the creation of hundreds of New Mexico jobs and tens of millions of dollars in local economic output.³ UNM has also subsidized college students from the Navajo Nation by housing them at the UNM Lobo Rainforest Building using licensing proceeds.

¹ See <https://innovations.unm.edu/about/>.

² See <https://innovations.unm.edu/unm-rainforest-innovations-celebrates-25-years/>.

³ See <https://innovations.unm.edu/about/metrics/>.

Today, UNM is a core component of New Mexico’s innovation ecosystem and an economic driver of high-tech industry. Among its 18 peer institutions nationwide, UNM ranks first in number of licensing agreements, eighth in number of faculty and staff invention disclosures, and second in number of startup companies formed. Since the COVID-19 pandemic began, UNM has initiated new programs to assist New Mexico small businesses and trained over 225 businesses on how to build and scale an e-commerce platform that is tailored to their business.

UNM is a highly innovative institution involved in the international scientific and technological community. As part of its international involvement and to facilitate and support the mission of the University of New Mexico, UNM acquired a patent portfolio, including the '096 patent, from the Industrial Technology Research Institute of Taiwan and offered a license to its patent portfolio relating to wireless technology to Qualcomm, which Qualcomm eventually accepted.

IV. THE ASSERTED PRIOR ART

A. The *Joint Proposal* (EX1016)

The *Joint Proposal* refers to IEEE 802.11-05/1102r4, “Wireless LANs Joint Proposal: High throughput extension to the 802.11 Standard: PHY” (EX1015).

The *Joint Proposal* discloses a mixed mode frame structure for the 802.11 WiFi standard that allows communication either with legacy devices in a legacy format or with HT (high throughput) devices in an HT format. The mixed mode packets

allow only legacy data or HT data to be transmitted in a frame, but not both. The *Joint Proposal* is a standard proposal and does not identify any problems needing to be addressed or solved beyond the proposed communication standard schemes literally identified in the reference. Both *Trainin* and *Mujtaba* also reference the same mixed mode frame format in passing, but do not vary its operating characteristics (because it is a standard).

B. *Trainin* (EX1010)

Trainin refers to U.S. Pub. No. 2007/0204052. *Trainin* discloses wireless transmissions with frame alignment. EX1010 at Abstract. Specifically, *Trainin* discloses synchronizing between a transmitter using a first modulation scheme, which may have multiple frame formats, and a receiver using a second modulation scheme, by calculating a transmission time that aligns an interframe space start time of the first and second modulation schemes. *Id.* *Trainin* does not address pilot signals or the symbol period beyond use of the mixed-mode frame also discussed in the *Joint Proposal*.

C. *Mujtaba* (EX1011)

Mujtaba refers to U.S. Pub. No. 2006/0072529. *Mujtaba* discloses that “data is transmitted in a multiple antenna communication system by selecting a number of pilot tones to be employed to transmit the data; and transmitting an indication of the selected number of pilot tones in a preamble of a packet

containing the data.” *Id.* Further, *Mujtaba* discloses that “the number of pilot tones can be selected, for example, based on one or more of (i) a delay spread of a channel; (ii) the SNR [Signal to Noise Ratio] at the receiver, or (iii) a number of antennas at a receiver.” *Id.* *Mujtaba* thus seeks to solve the problem of providing an optimal balance between channel estimation and throughput. EX2001¶128.

V. THE PREVIOUSLY ASSERTED PRIOR ART

The ’096 patent has been subjected to three prior *inter partes* reviews by ZyXEL Communications Corporation (IPR2021-00734 filed Mar. 29, 2021), Qualcomm Incorporated (IPR2021-00375 filed Dec. 28, 2020) and Intel Corporation (IPR2020-01576 filed Sep. 14, 2020). In these proceedings, the Board has examined the following references in detail.

A. *Talukdar* (EX2002 (previously IPR2021-00375, EX1012))

Talukdar refers to U.S. Patent Application 2009/0067377 A1 entitled “Medium Access Control Frame Structure In Wireless Communication System.” *Talukdar* concerns a “wireless communication infrastructure entity configured to allocate radio resources, in a radio frame, to a wireless terminal compliant with a first protocol and to a wireless terminal compliant with a second protocol.” EX2002, *Abstract*.

Talukdar recognizes that wireless communication systems may typically implement more than one communication technology. EX2002¶27. “For example,

one or more of the base units 101 may be legacy technology base stations, for example, IEEE 802.16(e) protocol base stations, and other base station may be newer generation technologies, for example, IEEE 802.16(m) protocol base stations.” *Id.* “In these cases, it is generally desirable for the new technologies to be backward compatible with the legacy technology.” *Id.* For example, “[f]or the evolution of IEEE 802.16(e), the backward compatibility constraint implies that the legacy frame structure, for example, the 5 msec duration 802.16(e) frame, must be supported by 802.16(m) base stations. Additionally, in order to efficiently support delay sensitive applications, 802.16(m) base stations should be able to service both 802.16(m) and legacy terminals within the common frame structure.” *Id.*

Talukdar specifically addresses the problem of one-way air-interface latency, which is primarily dependent on the MAC frame duration. *Id.*, ¶2. However, this concern is balanced against the referenced need for backward compatibility. *Id.*, ¶3. The desire to vary the frame structure to improve latency must be balanced against the need of legacy systems to have a compatible frame structure:

Regarding frame structure, it is generally necessary to design frames having a relatively short duration in order to reduce latency. Thus to deliver low latency in 802.16m systems with backward compatibility,

it is necessary to develop a sub-frame structure based on the legacy 802.16(e) frame. In order to address the latency requirements, it is necessary to design frames with shorter than 5 msec duration.

However, to efficiently serve legacy traffic, it is also necessary that 802.16(m) systems have 5 msec legacy frames. Thus two broad classes of frames would be required for an 802.16(m) system having reduced latency and support for legacy 802.16(e) devices.

EX2002¶28.

In summary, *Talukdar* discloses frames with the 1st and 2nd communication systems sections, where the 2nd section *could have* different symbol duration—but does not specifically disclose a shorter duration. *Talukdar* further discloses that the 2nd section *could have* a different pilot structure—but does not specifically disclose a denser structure. Regarding symbol duration, *Talukdar* discloses only that “in the 802.16(m) downlink and uplink zones (second protocol regions on downlink and uplink) the . . . symbol duration, may be *the same as or different from* those defined in 802.16(e).” EX2002¶64 (emphasis added). Similarly, regarding pilot structures, *Talukdar* discloses only that “the structures of the 802.16(m) region (sub-channel and pilot structures) *can be different* from those of the 802.16(e) regions.” EX1012¶29 (emphasis added); “The m-D L and m-UL regions in these frames may have different sub-channel/pilot structures than the

legacy systems.” EX2002¶64 (emphasis added). It also includes at least one non-data section.

B. *Li* (EX2003 (previously IPR2021-00375, EX1016))

Li refers to U.S. Patent Application 2007/0155387 A1 entitled “Techniques For Scheduling And Adaptation To Combat Fast Fading.” *Li* concerns “techniques to perform scheduling and adaptation to combat fast fading,” which specifically refers to a “scheduling/adaptation scheme for a communications system for which different Orthogonal Frequency Division Multiplexing (OFDM) symbol durations and subcarrier spacing are employed for slow and fast subscribers, respectively.”

EX2003 at abstract

Li recognizes that “[t]he grouping of subscribers according to their speed and apportionment of subcarrier spacing accordingly may reduce inter-subcarrier interference (“ICI”) in OFDM and the corresponding OFDMA systems that support the subscribers.” EX2003¶10.

Li discloses “slow subscribers with ... longer OFDM symbol durations” and “fast subscribers with ... shorter OFDM symbol durations.” EX2003¶22; Fig. 8. However, in *Li* all subscribers belong to 802.16e (a single system). Further, in *Li*, separate scheduling for slow and fast users occurs in separate frames, not in the same frame. So *Li* does not disclose one frame format with the 1st and 2nd

sections corresponding to the 1st and 2nd communication systems as disclosed in the '096 patent.

C. *Nystrom* (EX2004 (previously IPR2021-00375, EX1017))

Nystrom refers to U.S. Patent Application 2007/0104174 A1 entitled “Method And Apparatus For Allocating A Pilot Signal Adapted To The Channel Characteristics.” *Nystrom* concerns a “set of different pilot structures[,] designed for use in different environments and/or different user behaviors that are expected to occur in a cell.” EX2004, *Abstract*. *Nystrom* thus attempts to adapt pilot structure to the particular radio conditions for a given user. *Id.* *Nystrom* teaches two embodiments to accomplish this, one in which “the entire resource space is provided with different pilot structures in different parts (110A-D) in advance and allocation of resources to the users are then performed in order to match estimated radio conditions to the provided pilot structure.” *Id.* In the second, “allocation is performed first, and then the actual pilot structure is adapted within the allocated resource space area to suit the environmental conditions.” *Id.*

Nystrom addresses the problem of adapting a multi-carrier system to the “difficult, ever changing, hard-to-predict multi-user environments that are envisioned for future wireless systems.” EX2004¶5. It teaches a balanced design of its pilot structure to accommodate the worst-case scenario so that detection becomes possible even under the worst possible conditions, as well as when the

situation is better than the worst case, which typically is the case most of the time. In the first situation, “such a [worst-case] pilot structure gives rise to a substantial pilot overhead and is indeed necessary in these worst-case scenarios.” EX2004¶6. In the second, the normal case, “the pilot structure is unnecessarily extensive, giving an unnecessary pilot overhead for most users.” *Id.* “This reduces data capacity in the own cell and furthermore increases the interference to the neighboring cells (so called 'pilot pollution').” *Id.*

In summary, *Nystrom* thus discloses the use of denser pilots for high mobility users: Users with “radio conditions demanding a high density of pilots”—such as fast-moving users—could be allocated resource space with increased pilot density in the time dimension, frequency dimension, or both.” EX2004¶43; Fig. 5A (showing portions of the radio resource space 110A, 110C, and 110D with higher pilot density). But *Nystrom* also does not disclose one frame format with the 1st and 2nd sections.

VI. THE BOARD SHOULD DENY INSTITUTION UNDER § 325(d)

The Board should exercise its discretion to deny Panasonic’s Petition under 35 U.S.C. § 325(d) (“In determining whether to institute or order a proceeding ... the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.”) In *Advanced Bionics* (precedential), the PTAB established

a two-part framework: (1) whether the same or substantially the same art or argument was previously presented to the Office; and, if so, (2) whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR Case No. IPR2019-01469, Paper 6, 8 (PTAB Feb. 13, 2020) (precedential). Here, Panasonic sets forth substantially similar art and arguments as those previously presented by Intel (IPR2020-01576), Qualcomm (IPR2021-00375), and/or ZyXEL (IPR2021-00734).

A. *Mujtaba* is cumulative of *Nystrom*

This Board has already considered *Nystrom* (EX2004 (previously IPR2021-00375, EX1017)) against the '096 patent. *Nystrom* refers to U.S. Patent Application 2007/0104174 A1 entitled “Method And Apparatus For Allocating A Pilot Signal Adapted To The Channel Characteristics.” The disclosures in *Mujtaba* which Petitioner identifies are cumulative of *Nystrom*. Both references disclose various pilot structures that can be changed, but both also stress that the number of pilot symbols should be as small as possible to avoid unnecessary overhead. EX2001¶132. Both references, *Mujtaba* and *Nystrom*, therefore teach away from increasing the number of pilot symbols. *Id.* The below table from Dr. Vojcic cross references the relevant disclosures:

<i>Mujtaba</i>	<i>Nystrom</i>
<i>Mujtaba and Nystrom both teach varying pilot structures</i>	
“Data is transmitted in a multiple antenna communication system by <u>selecting a number of pilot tones to be employed to transmit the data</u> ; and transmitting an indication of the selected number of pilot tones in a preamble of a packet containing the data.” <i>Mujtaba</i> at abstract.	<i>Nystrom</i> concerns a “ <u>set of different pilot structures[,] designed for use in different environments</u> and/or different user behaviors that are expected to occur in a cell.” EX2004, <i>Abstract</i> . <i>Nystrom</i> thus attempts to adapt pilot structure to the particular radio conditions for a given user. <i>Id.</i>
<i>Mujtaba and Nystrom address the same problem of pilot overhead</i>	
[0021] A greater number of pilots, however, reduces the effective data rate, since actual data is now replaced by the pilots (which are known at both the transmitter and the receiver).	[006] The pilot overhead can indeed be substantial. This reduces data capacity in the own cell and furthermore increases the interference to the neighboring cells (so called 'pilot pollution').
<i>Mujtaba and Nystrom teach different pilot configurations for different channel parameters</i>	
<i>Mujtaba</i> discloses that “the number of pilot tones can be selected, for example, based on one or more of (i) a delay spread of a channel; (ii) the SNR at the receiver, or (iii) a number of antennas at a receiver.” <i>Mujtaba</i> at abstract. <i>Mujtaba</i> thus seeks to solve the problem of providing an <u>optimal balance between channel estimation and throughput</u> .	<i>Nystrom</i> teaches two embodiments to accomplish this, one in which “the entire resource space is provided with different pilot structures in different parts (110A-D) in advance and allocation of resources to the users are then performed in order to match estimated radio conditions to the provided pilot structure.” <i>Nystrom</i> at abstract and [0011]. In the second, “allocation is performed first, and then the actual pilot structure is adapted within the allocated resource space area <u>to suit the environmental conditions</u> .” <i>Id.</i>

<i>Mujtaba</i> and <i>Nystrom</i> both teach away from denser pilot symbols	
[0006] <u>A greater number of pilots, however, reduces the effective data rate</u>, since actual data is now replaced by pilots (which are known at both the transmitter and the receiver). [0021] A greater number of pilots, however, reduces the effective data rate, since actual data is now replaced by the pilots (which are known at both the transmitter and the receiver). [0022] From an efficiency perspective, the lowest number of pilots to achieve the desired robustness is desirable. In other words, from an efficiency perspective, data should be transmitted on as many tones as possible.	[006] Such systems must design their pilot structure according to the worst-case scenario so that detection becomes possible even under the worst possible conditions. Such a pilot structure gives rise to a substantial pilot overhead and is indeed necessary in these worst-case scenarios. However, whenever the situation is better than the worst case, which typically is the case most of the time, the pilot structure is unnecessarily extensive, giving an unnecessary pilot overhead for most users. <u>The pilot overhead can indeed be substantial. This reduces data capacity in the own cell and furthermore increases the interference to the neighboring cells (so called 'pilot pollution').</u> “[009] The main problems with existing solutions are that pilot structures are either not at all suitable for considerably changing radio conditions or that they are designed for worst cases which in turn results in vast pilot overhead and ‘pilot pollution’.”

EX2001¶132.

Therefore, *Mujtaba* is cumulative of *Nystrom*’s relevant disclosures.

B. *Trainin* is cumulative of *Talukdar*

This Board has already considered *Talukdar* (EX2002 (previously IPR2021-00375, EX1012)) against the ’096 patent. *Talukdar* refers to U.S. Patent Application 2009/0067377 A1 entitled “Medium Access Control Frame Structure In Wireless

Communication System.” *Talukdar* concerns a “wireless communication infrastructure entity configured to allocate radio resources, in a radio frame, to a wireless terminal compliant with a first protocol and to a wireless terminal compliant with a second protocol.” The disclosures in *Trainin* which Petitioner identifies are cumulative of *Talukdar*. Both references disclose wireless communications using downlink and uplink structures. The below table from Dr. Vojcic cross references the relevant disclosures:

<i>Trainin</i>	<i>Talukdar</i>
<i>Trainin</i> discloses that wireless communication in the mixed mode packet between a transmitter and a receiver can be carried out via wireless links such as a downlink and an uplink. <i>Trainin</i> at [0020], [0034]. The teachings of <i>Trainin</i> using a downlink and an uplink for data transmission between a transmitter and a receiver could be used to transmit data in the packet format with a legacy field for the legacy transmission and an HT field for the HT transmission specified by the <i>Joint Proposal</i>. Petitioner’s claim that <i>Trainin</i>’s downlink and uplink constitutes the claimed “first section” carrying the claimed “at least one of uplink and downlink data.”	<i>Talukdar</i> disclosed an “16e-UL / 16m-DL/UL” sub-block. <i>Talukdar</i>’s hybrid frame included an “16e-UL / 16m-DL/UL” section containing uplink or downlink traffic that was configured for an 802.16(m) unit. <i>Talukdar</i> disclosed that the sub-blocks following the e-DL section in the hybrid frame could be “a combination of 802.16(e) and 802.16(m) regions (DL or UL).” <i>Talukdar</i>, [0051]. Prior Petitioner claimed that in Figure 7, the sub-block following the e-DL section could be a “16m-DL” block, carrying downlink data for an 802.16(m) remote unit, or a “16m-UL” block, carrying uplink data from an 802.16(m) unit. <i>Talukdar</i>, Fig. 7. <i>Talukdar</i> described the “e-DL” traffic resource region 708 as carrying downlink data and the “16e-UL / 16m-

	DL/UL” traffic section as carrying either uplink or downlink data.
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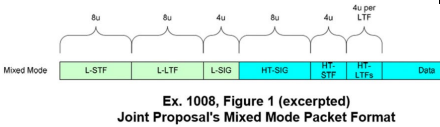
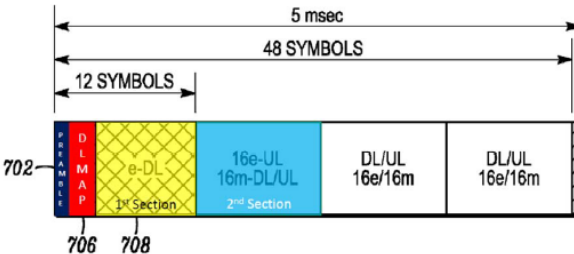
EX2001¶134.

Therefore, the relevant uplink/downlink aspects of *Trainin* are cumulative of *Talukdar*’s relevant uplink / downlink disclosures.

C. The Joint Proposal Is Cumulative of *Talukdar*

Similar to *Trainin*, the disclosures in *the Joint Proposal* which Petitioner identifies are cumulative of *Talukdar*. However, the relevant disclosures in the *Joint Proposal* are further removed from the ’096 patent than the disclosures of *Talukdar*, which the Board already considered. In relevant part, these disclosures are cumulative of *Talukdar*’s disclosures. The below table from Dr. Vojcic cross references the relevant disclosures:

<i>The Joint Proposal – current allegations</i>	<i>Talukdar – prior allegations</i>
Both disclose a hybrid frame format	
In Figure 1, the <i>Joint Proposal</i> discloses a Mixed Mode packet format by combining the legacy field consisting of the L-STF, L-LTF and L-SIG fields with the HT field consisting of the HT-SIG, HT-STF and HT-LTFs fields and the Data field that could be used for data transmission.	<i>Talukdar</i> disclosed a hybrid frame (or h-frame) for data transmission that supported both 802.16(e) and 802.16(m) remote units. “FIG. 7 is a hybrid frame 700, also referred to as a HEM-I frame, having equal size sub-blocks designed to serve both 802.16(e) and 802.16(m) data traffic in the same 5 msec interval.” <i>Talukdar</i> , [0051].

 Ex. 1008, Figure 1 (excerpted) Joint Proposal's Mixed Mode Packet Format <i>Joint Proposal</i> Fig. 1	 FIG. 7 <i>Talukdar</i> Fig. 7.
Both are alleged to have a first communication system	
The <i>Joint Proposal</i> teaches that the Mixed Mode packet format includes a legacy field (the claimed first section) consisting of a legacy short training field (LSTF), a legacy long training field (L-LTF) and a legacy signal field (L-SIG) (the claimed data configured a first format). Paper 1 at 25.	<i>Talukdar</i> disclosed that “the first communication system’s symbols and the second communication system’s symbols co-exist[ed] in one transmission scheme” because symbols for the 802.16(e) and 802.16(m) remote units—contained within the “e-DL” and “16e-UL / 16m-DL/UL” sections, respectively—co-existed in hybrid frame 700. IPR2021-00375, Paper 1 at 39.
Both are alleged to have a second communication system	
The <i>Joint Proposal</i> teaches that the packet format further includes an HT field (the claimed second section), which follows the legacy field (the claimed first section) and consists of a signal field (HT-SIG), an HT short training field (HTSTF), an HT long training field (HT-LTFs) and a data field (data) (the claimed data configured in a second format). Paper 1 at 26.	<i>Talukdar</i> disclosed a “second communication system configured to support higher mobility than the first communication system” because wireless system 100 included an 802.16(m) mobile remote unit. IPR2021-00375, Paper 1 at 40.

Both disclose two sections in a packet	
Figure 1 shows that the legacy field for the legacy transmission (the claimed first communication system) and the HT field for the HT transmission (the claimed second communication system) co-exist in one packet frame. Paper 1 at 28.	<i>Talukdar</i> disclosed symbols for the 802.16(e) and 802.16(m) remote units—contained within the “e-DL” and “16e-UL / 16m-DL/UL” sections, respectively—co-existed in hybrid frame 700. IPR2021-00375, Paper 1 at 61.

EX2001¶136.

Therefore, the arguments made by Panasonic regarding the *Joint Proposal* are cumulative of the arguments considered by the Board in the prior IPR regarding *Talukdar*.

VII. THE '096 PATENT

A. Technical Background

Dr. Vojcic provides a short explanation of the technical background of the '096 patent in paragraphs 47–52 of his declaration, reproduced in full here:

47. The invention of the '096 patent relates to methods for constructing frame structures in orthogonal frequency-division multiple access (OFDMA) systems. EX1001, 1:16-19. “Orthogonal Frequency Division Multiple Access (OFDMA) is a multiple access scheme for transmitting data in different subcarriers in a channel, wherein the data may come from different users and may be transmitted in disjoint subsets of sub-channels in a transmission bandwidth.” *Id.*, 1:22-24.

48. The '096 patent first describes the prior art. *Id.*, Figs 1 (illustrating an OFDMA frame structure under the IEEE 802.16 standard) and 2 (illustrating a placement of guiding signals (or pilot symbols) 24-1 for time-domain and frequency -domain OFDMA signals under the IEEE 802.16 standard).

49. “Referring to FIG. 2, upper and lower frequency bands may serve as guard bands 22-1 and 22-2, respectively, which may not be used to carry information.” *Id.* 1:61-63. “The placement of information may include a first part and a second part. For example, the first part of the placement includes a preamble 10'-1 having a fixed length, and the second part of the placement includes data and guard intervals between an upper row and a lower row of the data interlaced with the pilot symbols 24-1, represented by blocks marked with ‘X’.” *Id.*, 1:63-2:2.

50. Then, '096 patent illustrates problems faced by the prior art, including that: “[i]n some applications such placement of information may be inflexible to bandwidth scaling due to the fixed-length preambles 10'-1 and/or 10'-2 and the often unusable guard bands 22-1 and 22-2. Moreover, the placement may be susceptible to a Doppler effect in a high mobility scenario because the placement may be usually designed with a relatively large symbol period, which in turn may induce relatively short carrier spacing and less dense pilot symbol placement. Moreover, the limitation on pilot symbol placement may cause channel estimation error at a receiving end because of insufficient information provided for channel estimation.” *Id.*, 2:2-14.

51. The invention of the '096 patent directly addresses these problems. For example, the '096 patent discloses “a method for constructing a frame structure for data transmission, the method comprising generating a first section comprising data configured in a first format compatible with a first communication system, generating a second section following the first section comprising data configured in a second format compatible with a second communication system, wherein the second format is different from the first format, generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section, and combining the first section, the second section and the at least one non-data section to form the frame structure.” *Id.*, at 2:18-30. The patent further details other examples of its invention. *Id.*, 2:31-54, 2:55-67, 3:1-13, and 3:14-32.

52. The invention of the '096 patent enables “data of an old orthogonal frequency-division multiple access (OFDMA) system (hereinafter a legacy system) and data of a new OFDMA system to co-exist in an OFDMA frame by changing a frame structure of the OFDMA frame.” *Id.*, 4:21-25. The new system has the advantages of allowing larger bandwidth, higher mobility, and may use updated transmission technology while maintaining backward compatibility. *Id.*, 4:26-30.

B. The Challenged Claims

1. Claim 8

8. A method of constructing a frame structure for data transmission, the method comprising:
- a. generating a first section comprising data configured in a first format compatible with a first communication system using symbols;
 - b. generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols,
 - c. wherein the first communication system's symbols and the second communication system's symbols co-exist in one transmission scheme and
 - d. wherein the second communication system has pilot symbols that are denser than those in the first communication system;
 - e. generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section; and
 - f. combining the first section, the second section and the at least one non-data section to form the frame structure.

2. Claim 44

1. A method of constructing a frame structure for data transmission, the method comprising:
- a. generating a first section comprising data configured in a first format compatible with a first communication system using symbols;
 - b. generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols,

- c. wherein the first communication system's symbols and the second communication system's symbols co-exist in one transmission scheme and wherein:
- d. the second format is compatible with the second communication system configured to support higher mobility than the first communication system,
- e. wherein each symbol in the second communication system has a shorter symbol period than that in the first communication system;
- f. wherein the second communication system has pilot symbols that are denser than those in the first communication system; and
- g. generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section; and
- h. combining the first section, the second section and the at least one non-data section to form the frame structure.

3. Claim 45

- 2. The method of claim 44, wherein the non-data section comprises mapping information for at least one of the first section and the second section.

4. Claim 46

- 3. The method of claim 44, wherein the non-data section comprises at least one of a preamble, a frame control header 60 (FCH), a burst, and a map of at least one of the first section and the second section.

5. Claim 47

- 4. The method of claim 46, wherein the second section follows the first section in at least one of time sequence and frequency spectrum.

6. Claim 49

- 6. The method of claim 44, wherein each of the first section and the second section carries at least one of uplink and downlink data.

7. Claim 50

7. The method of claim 44, wherein the second section carries mapping information for data in the second section.

8. Prosecution History

The application that resulted in the '096 patent was filed on July 7, 2008.

EX1001. An office action issued on Apr. 13, 2010, included a preliminary rejection of claims 1–50. Patent Owner responded on Apr. 17, 2010, and amended its claims. A final rejection issued on Aug. 31, 2010. Patent Owner responded on Nov. 30, 2010, and noted that “the claimed invention is patentably distinct from *Ahmadi, Terabe, Seki, and Adams*; but nonetheless amended claim 23 and added new claim 51. Another office action issued on Nov. 23, 2011, which allowed claims 23-29 and 51 and rejected the remaining claims. Patent Owner submitted a response on Apr. 23, 2011, further amending its claims. Patent Owner conducted an interview with the examiner, and a notice of allowance issued on May 11, 2012.

C. Priority Date

The '096 patent identifies its parent applications; provisional application No. 60/929,798, filed on Jul. 12, 2007, and provisional application No. 60/973,157, filed on Sep. 17, 2007. Both provisional applications properly support the subject matter claimed in the '96 patent. However, the prior art asserted by Panasonic predates even the earliest of these. UNMRI reserves its right to provide support

that either of the provisional applications properly support the claims of the '096 patent should that issue become relevant to these proceedings.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

At the relevant time, a person of ordinary skill in the art in the technical field of the '096 patent would have had at least a master's degree in computer engineering or electrical engineering, or equivalent work experience, along with at least 1 year of experience related specifically to wireless communications, including knowledge of MIMO and OFDM. EX2001¶18.

IX. PATENT OWNER'S CLAIM CONSTRUCTIONS

Patent claims are construed using the framework set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–15 (Fed. Cir. 2005) (*en banc*).

A. Claim Construction Order in UNM Rainforest Innovations v. Apple Inc., No. 1-20-cv-00351 (W.D. Tex.)

The Court in *UNM Rainforest Innovations v. Apple Inc.*, No. 1-20-cv-00351 (W.D. Tex.) addressed a number of claim terms in the '096 patent. The following table represents these claim constructions, which Patent Owner agrees with and adopts for the purpose of this proceeding. EX1005 (Apple Claim Construction Order).

Term	Construction
Whether the preambles for all asserted claims are limiting	<u>Court's Construction:</u> Each preamble is limiting.

“frame structure”	<u>Court’s Construction:</u> “a single structure comprising one or more frames, wherein each frame may have one or more subframes”
“symbol”	<u>Court’s Construction:</u> Plain-and-ordinary meaning, wherein the plain-and-ordinary meaning means “a transmissible unit of information”
“pilot symbols that are denser than”	<u>Court’s Construction:</u> “more pilot symbols per unit time than, wherein a unit time is the symbol period of the first communication system”
“[first & second] communication system”	<u>Court’s Construction:</u> Construction for “communication system”: Plain-and ordinary meaning, where the plain-and-ordinary meaning is “a combination of hardware and software that transmits and receives data according to one or more communications standards”
“wherein the first communication system’s symbols and the second communication system’s symbols co-exist in one transmission scheme”	<u>Court’s Construction:</u> Plain-and-ordinary meaning where the plain-and-ordinary meaning is “wherein symbols of the first communication system and symbols of the second communication system exist together in one transmission scheme”
“data” / “non-data”	<u>Court’s Construction:</u> Data: Plain-and-ordinary meaning Non-data: Plain-and-ordinary meaning
“support higher mobility than”	<u>Court’s Construction:</u> Not indefinite. “support higher relative velocity between a transmitter and a receiver than”
“at least one of [...] and [...]”	<u>Agreed Construction:</u> “[...] and/or [...]”
“symbol period”	<u>Agreed Construction:</u> “the time it takes to transmit one symbol”

X. PETITIONER HAS FAILED TO DEMONSTRATE A REASONABLE LIKELIHOOD OF PREVAILING AS TO ANY CHALLENGED CLAIM.

As a threshold matter, Panasonic’s petition seeks to invalidate original claim 8, and also amended claims 44–47, 49, and 50 that were allowed in the final

written decision in IPR2021-00375 by Qualcomm. Separately, ZyXEL filed IPR2021-00734 and the Board granted joinder. Although Qualcomm has since settled, ZyXEL has appealed these final written decisions to the Federal Circuit, and as a result no certificate “incorporating in the patent any new or amended claim determined to be patentable” has yet issued pursuant to 37 C.F.R. § 42.80. Thus, these claims are not yet “incorporat[ed] in the patent” and should therefore not be subject to the next serial challenge pursuant to 35 U.S.C. § 311(b) (“A petitioner in an *inter partes* review may request to cancel as unpatentable 1 or more claims of a patent only on a ground that could be raised under section 102 or 103 and only on the basis of prior art consisting of patents or printed publications.”). A petitioner can file a petition only for what is authorized by statute. The authorizing statute (311(b)) only allows petitions to “cancel” issued claims. Furthermore, the statute requires the IPR be filed later than “the date that is 9 months *after the grant of a patent.*” *See* 35 USC 311(c)(1). Therefore, the amended claims are not yet ripe for yet another serial *inter partes* review.

A. Ground 1: Claims 8, 44-47, And 50 Are Not Anticipated By The *Joint Proposal*.

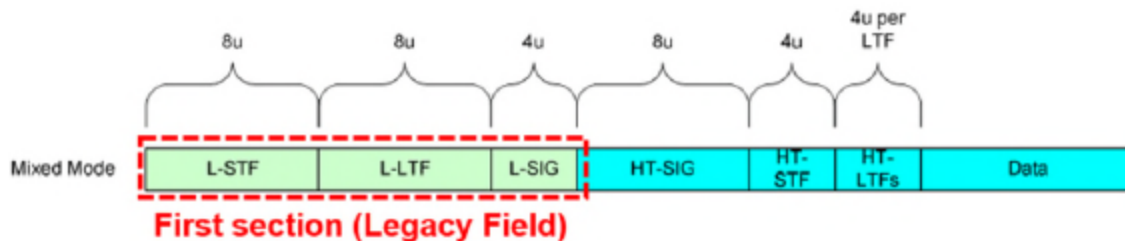
The *Joint Proposal* does not disclose all elements of claims 8, 44–47, and 50 for multiple reasons.

1. Claim 8: A method of constructing a frame structure for data transmission

a) Claim 8[a]: generating a first section comprising data configured in a first format compatible with a first communication system using symbols

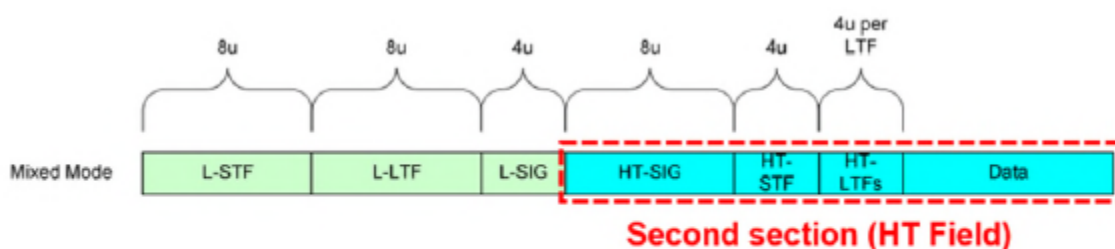
First, Petitioner identifies the “legacy field (the claimed first section) consisting of . . . a legacy signal field (L-SIG) (the claimed data configured a first format),” as meeting this claim element. Paper 1 at 25. However, the legacy signal field (L-SIG) is not “data” as claimed above. EX2001¶60. “A POSITA would understand that the L-SIG field contains control information used to decode packets in legacy format.” *Id.* The only “data”—as claimed—is sent in the “Data” section of the mixed mode packet. *Id.* This is corroborated by Petitioner’s identification of the corresponding HT-SIG field as “non-data” in the HT section (Paper 1 at 77) and the “Data” field as the claimed data (Paper 1 at 68). Notably, Petitioner cites the same mixed mode format in *Mujtaba* as disclosed in the *Joint Proposal*, but this time Petitioner identifies the payload as the claimed data. (*see* analysis regarding claim element 8[a] in ground 3 below); *see also* Paper 1 at 55 (regarding *Mujtaba* “the legacy signal field (the claimed non-data section) . . . and the HT signal field (the claimed non-data section)”).

Second, as shown in Petitioner’s annotated illustrations, the mixed mode packet has only one data section but two header sections (legacy and HT).



**Ex. 1008, Figure 1 (excerpted and annotated)
Joint Proposal's Mixed Mode Packet Format**

Petition at 67.



**Ex. 1008, Figure 1 (excerpted and annotated)
Joint Proposal's Mixed Mode Packet Format**

Petition at 68. As shown, the *Joint Proposal's* mixed mode packet transmits data either in “legacy” format or in “HT” format, but not both, *i.e.*, in a single packet, either all data packets are in legacy format or all data packets are in HT format. EX2001¶61. “It does not send data in both legacy format and HT format at the same time, in a single frame structure.” *Id.*

b) Claim 8[b]: “generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols,

First, Petitioner identifies the “Data” field in the HT section as the claimed data. Paper 1 at 68 (“a data field (data) (the claimed data configured in a second

format).”) However, as explained regarding element 8[a] above, the HT data is not always present because the mixed mode packet transmits data only in one format at a time—either legacy or HT. Thus, when legacy data is being transmitted, no HT data is being transmitted, and vice versa.

Second, Petitioner identifies the “second communication system” as 802.11n (Paper 1 at 26–27 (*citing* EX1002¶180)). This communication system was not even released at the time of the *Joint Proposal*. “The HT version of the 802.11 standard was not released until approximately 2009.” EX2001¶65 (*citing* <https://standards.ieee.org/beyond-standards/the-evolution-of-wi-fi-technology-and-standards/> (“IEEE 802.11n™, or Wi-Fi 4, was introduced in 2009 to support the 2.4 GHz and 5GHz frequency bands)). Further, the *Joint Proposal* does not reference 802.11n and Petitioner provides no supporting citation. Instead, the *Joint Proposal* is labelled “pre 11n product specification.” Petitioner does not allege or support that the referenced “pre 11n product specification” is a second communications system” or that it is the same as the later released 802.11n standard. Therefore, the *Joint Proposal* does not disclose version 802.11n of the WiFi standard which Petitioner identifies as the second (HT) communications system.

c) **Claim 8[d]: “wherein the second communication system has pilot symbols that are denser than those in the first communication system”**

First, Petitioner provides no support that the *Joint Proposal* uses short guard interval (T_{GIS}) only in the HT transmission. Petition at 30 (*citing* EX1016 at 56:1–6). The cited section states that the “short guard interval is used in the data field of the packet, when the Short GI field in the HT-SIG is set to 1” and that “short GI shall not be used in GF 5 mode when the MCS indicates a single spatial stream.” EX1016 at 56:1–6.

1 **4.7.5 Transmission with a short guard interval**

2 Short guard interval is used in the data field of the packet, when the Short GI field
3 in the HT-SIG is set to 1. When it is used, the same formula for the formation of
4 the signal is used as in sections 14.7.2 and 4.7.3 with the exception of T_{GI}
5 replaced by T_{GIS} and T_{SYM} is replaced with T_{SYM} . Short GI shall not be used in GF
6 mode when the MCS indicates a single spatial stream.

Id. This does not support that the *Joint Proposal* affirmatively does not use the short guard interval in the Legacy mode. Dr. Vojcic confirms that since the *Joint Proposal* explicitly states when the short guard interval shall not be used, “the *Joint Proposal* does not disclose that short guard interval is affirmatively not used in the Legacy system.” EX2001¶67. Further, Petitioner does not support that the *Joint Proposal* reflects any official version of the 802.11 standard.

Dr. Hansen’s cite to section 4.8 of the *Joint Proposal*, titled “Legacy Duplicate Transmission” does not support Petitioner’s point. EX1002¶192 (*citing* *Joint Proposal* 56:7–13). This section is used “to transmit to legacy 802.11a

devices that may be present in either the upper and lower channels of the 40MHz channel.” *Joint Proposal* 56:8–9. “It does not address whether or not the *Joint Proposal* contemplates using the short guard interval in the regular legacy mode.” EX2001¶68. Unlike the statement that the “short GI shall not be used in GF mode . . .” (EX1016 at 56:5–6) the *Joint Proposal* does not affirmatively disclose that a short GI is affirmatively not used in the legacy system.

Second, the Petitioner does not support, and the *Joint Proposal* does not affirmatively indicate, which legacy system is referenced. “Guard intervals can differ in the various 802.11 versions, and it is not necessarily true that legacy systems have longer guard intervals.” EX2001¶69 (“For example, the newer version 802.11ax supports longer guard intervals up to 3.2μs.”).

Petitioner therefore does not adequately support its position that the *Joint Proposal* discloses that the combination of the guard interval period and the OFDM symbol period together would be shorter in the HT format than in the legacy format. Since the *Joint Proposal* does not foreclose use of the short guard interval in the Legacy system as well as the HT system, the pilot symbol density would be the same even by Petitioner’s theory. EX2001¶70. If only the legacy transmission format uses the short guard interval, but not the HT transmission format, then the pilot symbol density in the second communications system disclosed by the *Joint Proposal* would be less dense by Petitioner’s theory.

For these reasons, Petitioner is not reasonably likely to show that the *Joint Proposal* anticipates Claim 8 of the '096 patent.

2. Claim 44

Since claim 44 has several of the same limitations as claim 8, Petitioner incorporates its discussion of limitations 8[pre]-8[f] regarding limitations 44[pre]-44[c] and 44[f]-44[h]. Patent Owner therefore incorporate its response to these limitations as well. Petitioner only separately addresses limitations 44[d] and 44[e] which are addressed below.

a) Claim 44[d]: “wherein the second format is compatible with the second communication system configured to support higher mobility than the first communication system”

Petitioner argues that “the characteristic of supporting ‘higher mobility’ in the ‘second communication system’ necessarily flows from the claimed ‘shorter symbol period than that in the first communication system’ and the claimed ‘pilot symbols that are denser than those in the first communication system.’” Petition at 47. However, the *Joint Proposal* does not address “higher mobility,” as in fast moving users/mobile units, but only to “high throughput.” Petitioner does not identify any support in the *Joint Proposal* for the proposition that “high throughput” necessarily equates to “higher mobility.” To the contrary, “a POSITA would understand that ‘higher throughput’ can be attained in any number of ways, which would not necessarily support ‘higher mobility.’” EX2001¶73.

Indeed, in many instances, these are competing objectives and increasing throughput would not facilitate higher mobility. For example, increasing pilot density decreases the data rate and therefore reduces throughput. Since the *Joint Proposal* focuses on ‘higher throughput,’ it teaches away from modifications that decrease throughput, such as increasing pilot density for example.

Id. Therefore, Petitioner’s implication that references to “higher throughput” in *Joint Proposal* inherently mean “higher mobility” is completely unsupported.

b) Claim 44[e]: “wherein each symbol in the second communication system has a shorter symbol period than that in the first communication system”

Petitioner refers only to its discussion of claim element 8[d]. Patent Owner therefore incorporates its arguments regarding that claim element.

3. Claim 45

Claim 45 depends on Claim 44 and is not disclosed by *the Joint Proposal* for the same reasons as stated in regard to Claim 44.

4. Claim 46

Claim 46 depends on Claim 44 and is not disclosed by *the Joint Proposal* for the same reasons as stated in regard to Claim 44.

5. Claim 47

Claim 47 depends on Claim 46 which depends on Claim 44 and is not disclosed by *the Joint Proposal* for the same reasons as stated in regard to Claim 44.

6. Claim 50

Claim 50 depends on Claim 44 and is not disclosed by *the Joint Proposal* for the same reasons as stated in regard to Claim 44.

B. Ground 2: The Combination Of The *Joint Proposal* And *Trainin* Does Not Disclose Or Suggest All Elements Of Claim 49

1. Claim 49: The method of claim 44, wherein each of the first section and the second section carries at least one of uplink and downlink data.

Claim 50 depends on Claim 44 and is not disclosed by *the Joint Proposal* for the same reasons as stated in regard to Claim 44.

2. Motivation To Combine

Motivation to combine requires more than just the existence of competing alternatives. *Virtek Vision Int'l ULC v. Assembly Guidance Sys., Inc.*, 2024 U.S. App. LEXIS 7185 (Fed. Cir. 2024). “It does not suffice to simply be known. A reason for combining must exist.” *Id.*

Petitioner does not identify any problem in the *Joint Proposal* or any other reason that would have motivated a POSITA to incorporate the teachings of *Trainin*. Similarly, Petitioner does not identify any desirable solution or aspect

offered by *Trainin* which a POSITA would have been motivated to use. Indeed, there are no problems identified in the *Joint Proposal* that need to be addressed. EX2001¶82. “Further, since the *Joint Proposal* was presumably a preliminary standard proposal, a POSITA would understand that it cannot simply be modified.” EX2001¶83.

Trainin is focused on wireless transmission with frame alignment by calculating a transmission time that aligns an interframe space start time of the first and second modulation schemes. EX1010 at Abstract. Petitioner does not identify any indication in the *Joint Proposal* or in the knowledge of a POSITA that shows concern or even awareness of such a problem. Therefore, Petitioner has not presented any evidence that a POSITA in possession of both references would have been motivated to combine them to arrive at the claims of the '096 patent. The only motivation now is Petitioner's impermissible hindsight of using the claims of the '096 patent as a roadmap. *In re Gorman*, 933 F.2d 982, 987 (Fed. Cir. 1991).

The fact that both named inventors of *Trainin* were co-authors of the *Joint Proposal* is not relevant to this analysis. Paper 1 at 45. Petitioner's argument that because the two prior art references were “known” does not satisfy the motivation to combine analysis as a matter of law. *Virtek Vision* at *7.

Petitioner’s argument that “a POSITA would have been motivated to use *Trainin*’s uplink and downlink to transmit data in the packet format specified in the *Joint Proposal*” is founded on two insufficient premises. First, Petitioner argues that the *Joint Proposal* and *Trainin* used the same mixed mode packet structure. Paper 1 at 46–47. Second, Petitioner argues that “*Trainin* expressly teaches that the data transmission via wireless links may include packets or frames such as physical layer (PHY) protocol data units (PPDUs), which is the same packet specified in the *Joint Proposal*.” Paper 1 at 47. Even if true, this shows only certain similarities between the *Joint Proposal* and *Trainin*. It is similarly irrelevant—even if true—that “it was well-known in the art to use downlink and uplink for wireless data transmission.” Paper 1 at 47. This does not provide a reason for a POSITA to incorporate the other aspects of *Trainin* in the *Joint Proposal*, absent a clear motivation to do so. See *Virtek Vision* at *7. Just because downlink and uplink *could be* used as wireless data transmission, does not support that a POSITA would have been motivated to combine the *Joint Proposal* with *Trainin*. Indeed, the fact that the inventors of *Trainin*—who were co-authors of the *Joint Proposal*—did not combine the two tends to show that they were not motivated to do so.

Finally, even if the *Joint Proposal* and *Trainin* were combined, *Trainin* uses the same disclosures of the mixed mode packet from the *Joint Proposal*.

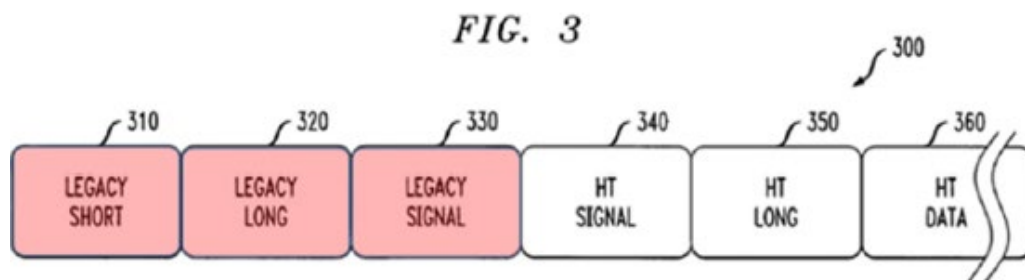
Therefore, neither reference would invalidate claim 44 for the reasons indicated with respect to claims 8 and 44. Therefore, Petitioner has not shown a reasonable likelihood that the combination of the *Joint Proposal* and *Trainin* would invalidate Claim 49.

C. Ground 3: *Mujtaba* Does Not Disclose All Elements Of Claim 8

1. Claim 8: A method of constructing a frame structure for data transmission

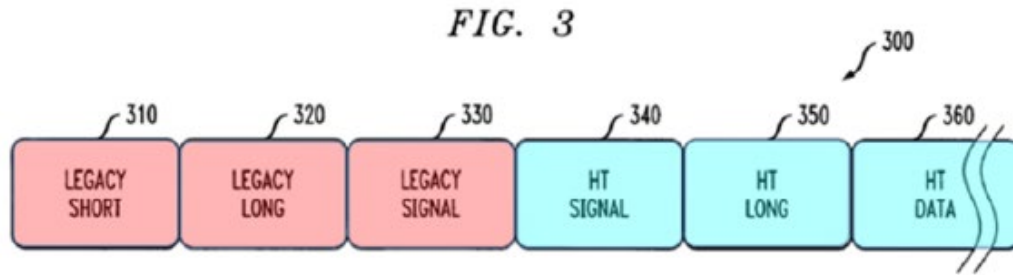
a) Claim 8[a]: generating a first section comprising data configured in a first format compatible with a first communication system using symbols

First, Petitioner cites the same mixed mode format in *Mujtaba* as disclosed in the *Joint Proposal*, but this time Petitioner identifies the payload data as the claimed data of the first section. Paper 1 at 49 (“payload (*i.e.*, data)”). However, Petitioner also identifies the same payload data (360) as the data of the second section. Paper 1 at 51.



**Ex. 1010, Fig. 3 (color-coding added)
Mujtaba's Packet Format**

Paper 1 at 49 (annotating *Mujtaba* Fig. 3).



Paper 1 at 51 (same). As shown in these illustrations, *Mujtaba* does not disclose two data payloads in a frame, all embodiments have only a single data payload.

EX2001¶86. “In reference to FIG.3, *Mujtaba* teaches that preamble 300 includes fields 310, 320, 330, 340, and 350, and that the packet includes the preamble and [a single] ‘HT data field (payload).’” EX2001¶86 (*citing* EX1010 at [0019]).

Given that in Fig. 3, the data is indicated as HT format, Fig.3 relates to the HT transmission that includes only HT data 360. EX2001¶87.

In reference to Fig. 3, Petitioner maps “a first section comprising data ...” to the legacy field (310, 320, and 330). Paper 1 at 49 (“A POSA would understand from *Mujtaba* that the legacy field (the claimed first section) carries information in the legacy format (the claimed first format) that enables payload (*i.e.*, data) to be compatible with legacy devices (the claimed first communication system”). “This is incorrect as *Mujtaba* does not disclose the transmission of legacy data, only HT data” in Fig. 3. EX2001¶88.

Second, even when the mixed mode packet structure is used to transmit legacy data, it is only legacy data that is transmitted. As confirmed by Dr. Vojcic, “the same payload data field cannot be both, the data of the first section in a first format and the data of the second section in a second format.” EX2001¶89 (emphasis added). Dr. Vojcic explains that although there are two headers (legacy and HT), there is only one data section. EX2001¶90. “That is because the mixed mode packet transmits data only in one format at a time—either ‘legacy’ or ‘HT.’” *Id.* “It does not send data in both legacy format and HT format at the same time, in a single frame structure, as claimed in the ’096 patent. Therefore, in my opinion, the mixed mode packet does not disclose this claim element.” *Id.*

b) Claim 8[b]: generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols

First, Petitioner also identifies the “Data” field in the HT section as the claimed data. Paper 1 at 68 (“a data field (data) (the claimed data configured in a second format).”) However, as explained regarding element 8[a] above, “the HT data is not always present because the mixed mode packet transmits data only in one format at a time—either legacy or HT.” EX2001¶90. The mixed mode frame structure only transmits in either the legacy data format or the HT data format but does not employ both formats in a single frame as claimed. “The same payload

data field cannot be both, the data of the first section in a first format and the data of the second section in a second format.” *Id.*

Second, Petitioner further states that “*Mujtaba* discloses ‘constructing’ a packet format for 802.11n by combining the legacy field (310, 320, 330) with the HT field (340, 350), in one packet format.” Paper 1 at 48. But Petitioner refers only to the 802.11n communication system, which it identifies as being used in both instances, the legacy format and the HT format. Petitioner further identifies “legacy devices” as the claimed first communication system (Paper 1 at 49–50), and “HT devices” as the claimed second communication system. (Paper 1 at 49–50). Thus, in Petitioner’s analysis, both “legacy devices” and “HT devices” are using the same communication system, 802.11n. In short, Petitioner provides no support that there are two different communications systems with two different formats.

As Dr. Vojcic explains, “the ’096 patent, on the other hand, considers a single version of a wireless protocol standard one communication system.” EX2001¶94. The ’096 patent provides the example of the “IEEE standard 802.16e (‘legacy system’ hereafter) and IEEE standard 802.16m (‘new system’ hereafter)”. These are two different versions of the WiMAX standard. EX2001¶94. “The ’096 patent would therefore consider the 802.11n version of the WiFi standard a single communication system, and a POSITA would understand that the legacy devices

and HT devices identified by Petitioner are both using the same communications system (802.11n).” *Id.*

c) Claim 8[d]: “wherein the second communication system has pilot symbols that are denser than those in the first communication system”

Mujtaba has only two embodiments, illustrated in Figs. 2 and 3. “The FIG.2 embodiment can only carry data of one non-HT system, and the FIG. 3 embodiment explicitly carries only HT-data.” EX2001¶96. *Mujtaba* does not disclose a frame structure that supports the transmission of data of a first and a second communication in a single frame structure. *Id.* “In *Mujtaba*, pilots are embedded in data and there is data/payload for only one communication system.” *Id.*

Petitioner’s statement that “a POSA would understand from *Mujtaba*’s teachings that if four pilot symbols are used in the legacy transmission and six pilot symbols are used in the HT transmission with a guard interval, the pilot symbols in the HT transmission (the claimed second communication system) are denser than the pilot symbols in the legacy transmission (the claimed first communication system).” Paper 1 at 54. This is wrong for multiple reasons.

First, Petitioner identifies no disclosure in *Mujtaba* that enables transmissions of legacy data/pilots and HT data/pilots in a single frame structure,

and a “POSITA would not understand that both the legacy data/pilot and HT data/pilot transmissions can occur in a single frame structure.” EX2001¶102.

A POSITA would understand from *Mujtaba* that information about the selected number of pilot tones can be carried in the signal field of the preamble in prior art 802.11 systems of the embodiment of FIG. 2 (see e.g. *Mujtaba* at [0008] and [0018]), or in the signal field of the HT preamble in the HT system of FIG.3 embodiment (see e.g. *Mujtaba* at [0015] and [0019]), but in both cases, prior art and HT, there would be only one payload transmission that includes data with embedded pilots.

EX2001¶99.

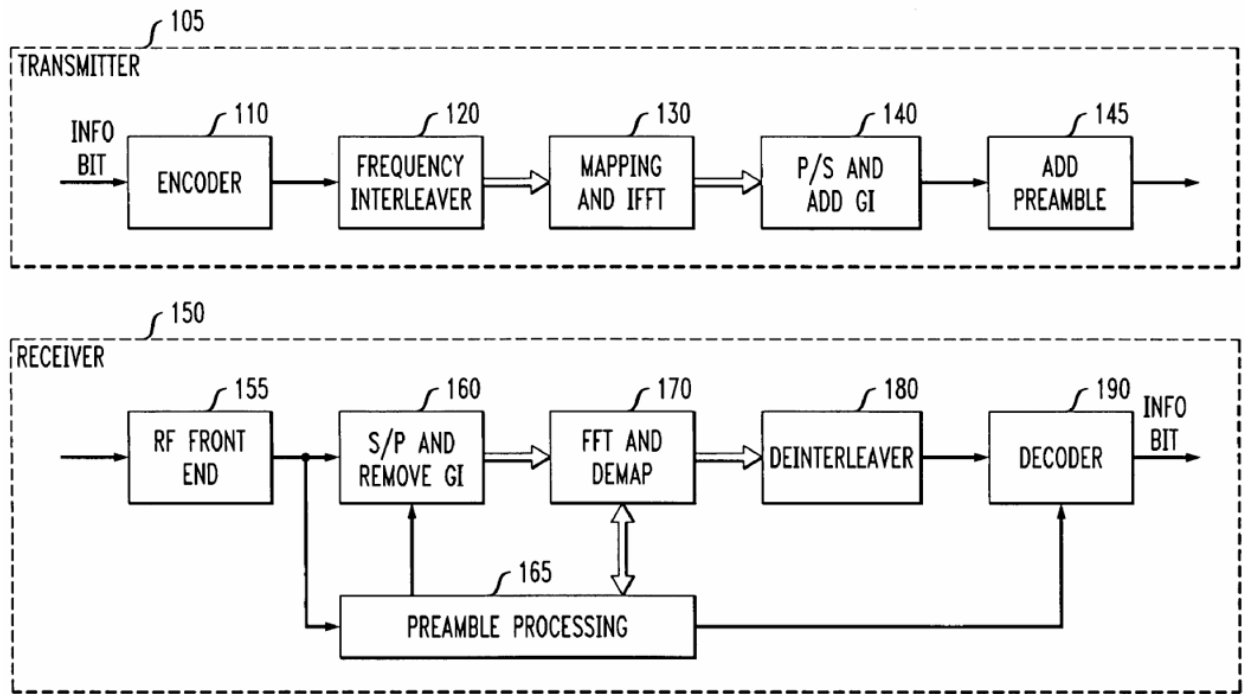
Second, Petitioner states that “*Mujtaba* discloses (1) OFDM symbols are transmitted in a guard interval.” Paper 1 at 54. Contrary to this misinterpretation, *Mujtaba* explicitly discloses that the “frequency domain OFDM signal is translated to the time domain by an inverse Fourier transform (IFFT) during stage 130. At stage 140, the data is serialized and a guard interval is added to each OFDM symbol.” EX1011 at [0016]. Dr. Vojcic explains that in the time domain “a guard interval is added to each OFDM symbol.” EX2001¶101. Therefore, “*Mujtaba* does not disclose that OFDM symbols are transmitted in a guard interval.” *Id.* A POSITA would therefore understand that “OFDM symbols are not transmitted in

guard intervals because guard intervals are removed prior to demodulating OFDM symbols.” *Id.*

[0017] At the receiver side 150, the received signal is initially processed by the RF front end 155, and then *the serial data is parallelized and the guard interval is removed at stage 160*. The time domain signal is translated to the frequency domain using an FFT 170 and the subcarriers are demapped to encoded and interleaved bits. Meanwhile, the preamble is processed at stage 165. The interleaved bits are deinterleaved at stage 180 and decoded at stage 190 to provide the transmitted information bits.

EX2001¶101 (*citing* EX1011 at [0017] (emphasis added)).

FIG. 1
PRIOR ART



Id. (citing EX1011 at [0017] and FIG. 1.)

Third, Petitioner states that “legacy transmission and HT transmission can be carried out with the same or different numbers of pilot, respectively, and (3) the HT transmission can have two, four, or six pilot symbols.” Paper 1 at 54. This is an incorrect characterization of *Mujtaba*. EX2001¶102. As explained above, *Mujtaba* does not allow for legacy data/pilot and HT data/pilot transmissions to occur in a single frame structure. *Id.*

Fourth, Petitioner’s identification of *Mujtaba* does not foreclose that the number of pilot symbols can be adjusted in both the legacy field (using the LEGACY SIGNAL field 330) and the HT field (using the HT SIGNAL field 340). This is supported by *Mujtaba* [008] (“The indication of the selected number of

pilot tones can be transmitted, for example, in a SIGNAL field of an exemplary IEEE 802.11 preamble.”) and [015] (“the number of pilots is signaled to the receiver in the SIGNAL field, or any such field that indicates to the receiver the parameters that are required to successfully decode the payload.”).

Fifth, “the purpose of the HT (High Throughput) field is to facilitate high throughput transmissions.” EX2001¶103. But *Mujtaba* teaches throughout that increasing the number of pilot symbols decreases the data rate:

[0006] A greater number of pilots, however, reduces the effective data rate, since actual data is now replaced by pilots (which are known at both the transmitter and the receiver).

[0021] The present invention allows the increased accuracy provided by a greater number of pilots to be balanced against the resulting reduction in data rate. As previously indicated, a greater number of pilots increases the accuracy of the CPE estimation, thereby reducing the packet error rate, and increasing the reliability of the transmission.

A greater number of pilots, however, reduces the effective data rate, since actual data is now replaced by the pilots (which are known at both the transmitter and the receiver).

[0022] From an efficiency perspective, the lowest number of pilots to achieve the desired robustness is desirable. In other words, from an

efficiency perspective, data should be transmitted on as many tones as possible.

EX2001¶103 (*citing* EX1011 at [0006], [0021], and [0022]). Therefore, *Mujtaba* does not teach that the number of pilot symbols in the high throughput (HT) section should be increased. *Id.* Instead, employing *Mujtaba*'s teaching, since increasing the number of pilot signals decreases data rate, the number of pilot signals in the high throughput section should be as small as possible. *Id.*

This is further corroborated because a high throughput transmission requires better channel conditions, which also allows the use of less pilot symbols.

EX2001¶104. Indeed, *Mujtaba* explicitly teaches that the optimal number of pilot symbols depends on the channel characteristics:

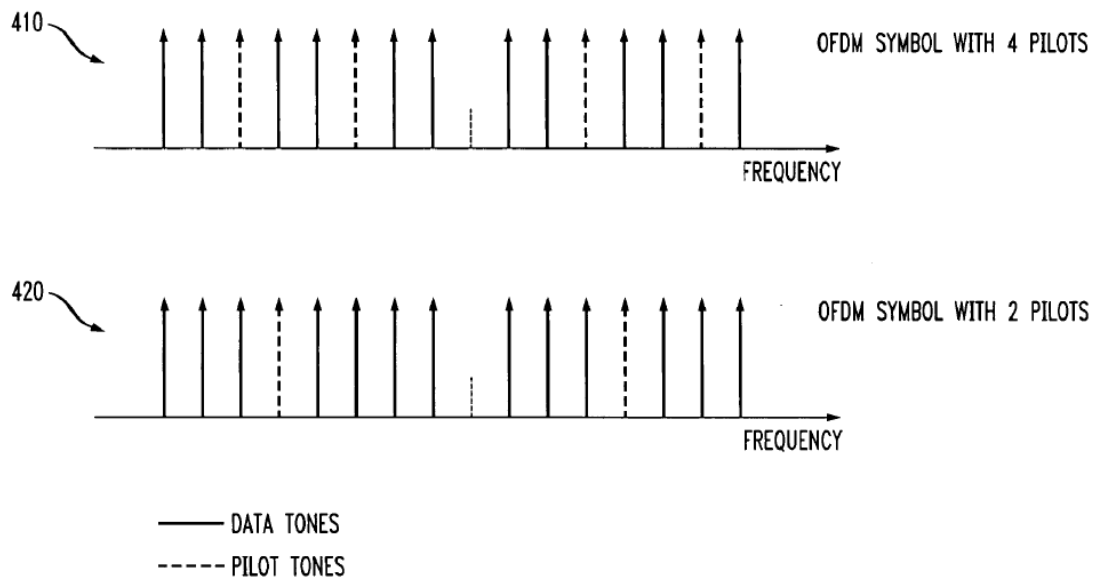
[0006] The number of pilots needed to meet a certain packet error rate (PER) at the receiver is a function of several parameters, such as the delay spread of the channel, the signal to noise ratio (SNR) at the receiver, and the number of antennas at the receiver. If the channel has a low delay spread, then the frequency selectivity of the channel is low as well, and thus a fewer number of pilots are required. On the other hand, a larger number of pilots would be required for a channel exhibiting a larger delay spread. If the SNR at the receiver is low, larger number of pilots are needed to get an accurate estimate of the

CPE. Likewise, if there are diversity antennas present at the receiver, and the RF chains are fed from a single LO source, then Maximal Ratio combining (MRC) can be used at the receiver to improve the accuracy of the estimate of the CPE. Thus, the accuracy of the CPE estimate can be improved with diversity antennas and fewer pilots are needed to achieve the same level of performance.

EX1011 at [006]; *see also* EX1011 at [0021] (“The present invention recognizes that the optimum number of pilots varies with operating parameters.”)).

Therefore, if channel conditions are good enough for the use of the HT format, *Mujtaba* teaches the use of less, not more, pilot symbols, to increase the data rate under such favorable conditions. EX2001¶104 (*citing* EX1011 [0006] and [0021]). The use of less pilot symbols in the HT field would have resulted in less dense pilot symbols in the second portion of the frame—contrary to the claims of the ’096 patent.” *Id.* Instead, the ’096 patent addresses the competing consideration of higher throughput versus higher mobility. “Denser pilot symbols decrease data throughput but improve higher mobility.” *Id.* This can also be seen in reference to Fig. 4 of *Mujtaba*:

FIG. 4



EX2001¶104 (*citing Mujtaba* Fig. 4 (showing an OFDM symbol with 4 pilots having only 11 data symbols, while an OFDM symbol with only 2 pilots has 13 data symbols)). The symbol with higher throughput (13 data tones) has less pilot symbols (only two) than the symbol with 11 data tones (four pilot tones). *Id.*

d) Claim 8[e]: generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section

Notably, Petitioner identifies both the legacy signal field and the HT signal field as non-data. Paper 1 at 55 (“the legacy signal field (the claimed non-data section) . . . and the HT signal field (the claimed non-data section)”). This is directly in contrast to Petitioner’s identification of the legacy signal field as data when discussing *Joint Proposal*.

e) Claim 8[f]: combining the first section, the second section and the at least one non-data section to form the frame structure

Petitioner identifies *Mujtaba*'s Fig. 3 as disclosing this claim element. Paper 1 at 55. However, *Mujtaba* does not teach transmitting the first and second sections both comprising a data section in a first/second format in a single packet as required by 8. Data is transmitted only in legacy format or in HT format, but not in both formats in a single packet, as required by claim 8.

For these reasons, Petitioner is not reasonably likely to show that *Mujtaba* anticipates claim 8 of the '096 patent.

D. Ground 4: The Combination Of *Mujtaba* and *Trainin* Does Not Disclose Or Suggest All Elements Of Claims 8, 44-47, and 49-50

1. Claim 8: A method of constructing a frame structure for data transmission

To the extent Petitioner relies primarily on *Mujtaba* (Paper 1 at 59-61), Patent Owner incorporates its corresponding response regarding Ground 3 above.

Petitioner cites to the mixed mode packet format with a shortened guard interval which it alleges “is only available in the HT transmission” in *Trainin*. Paper 1 at 60. However, Petitioner does not identify any support in *Trainin* that the shortened guard interval is not available in the legacy packet format. See related discussion in section X.A.1.c (second argument) regarding the *Joint Proposal* above. Additionally, the guard interval does not contain pilot symbols

and should therefore not be considered in the measurement of pilot density. *Id* (second argument). “The ’096 patent confirms that the guard bands are typically unusable, and should therefore not be considered.” EX2001¶111 (*citing* ’096 patent, 2:3–6).

Petitioner further identifies the legacy transmission as the claimed first communication system and the HT transmission as the claimed second communication system. For the reasons stated regarding *Mujtaba* (X.C.1.b (second argument)), a POSITA would not consider the legacy and HT transmission of the same wireless protocol version two different communications systems.

Finally, Petitioner fails to establish a *prima facie* case of obviousness by failing to identify where in the combination of *Mujtaba* and *Trainin* the remaining elements of claim 8 are disclosed. Paper 1 at 59–61. To the extent Petitioner relies only on the arguments it raised regarding *Mujtaba* alone, Patent Owner incorporates its response thereto.

2. Claim 44

To the extent Petitioner incorporates its discussion of claim 8, Patent Owner incorporates its responses thereto. Petitioner only separately addresses limitation 44[d] and limitation 44[e], addressed below.

a) Claim 44[d]: “wherein the second format is compatible with the second communication system configured to support higher mobility than the first communication system”

Petitioner states that a POSITA would understand that “the claimed ‘second communication system configured to support higher mobility than the first communication system’ means the claimed second communication system having a ‘shorter symbol period’ and ‘denser pilot symbols’ than the claimed first communication system.” Paper 1 at 61. Petitioner does not support this statement, and Dr. Vojcic disagrees with it. “While it is true that a higher mobility system may have ‘shorter symbol period’ and ‘denser pilot symbols,’ this is not an absolute requirement.” EX2001¶116. “These two concepts only represent two of many possible options to achieve and support higher mobility.” *Id.* It is therefore possible that a system that supports higher mobility does not utilize a ‘shorter symbol period’ or ‘denser pilot symbols’.

Petitioner’s argument that supporting ‘higher mobility’ in the ‘second communication system’ necessarily flows from the claimed ‘shorter symbol period than that in the first communication system’ and the claimed ‘pilot symbols that are denser than those in the first communication system’ is not supported. Neither *Mujtaba* nor *Trainin* directly address “higher mobility.” EX1010, EX1011. The references refer only to “high throughput,” and do not support that “high throughput” necessarily equates to “higher mobility.” “A POSITA would

understand that “higher throughput” can be attained in any number of ways, which would not necessarily support ‘higher mobility.’” EX2001¶117.

Indeed, in many instances, these are competing objectives and increasing throughput would not facilitate higher mobility. For example, increasing pilot density decreases the data rate and therefore reduces throughput. Since the *Mujtaba* and *Trainin* focuses on “higher throughput,” it teaches away from modifications that decrease throughput, such as increasing pilot density for example.

Id. Therefore, as Dr. Vojcic explains, the sole fact that *Mujtaba* and *Trainin* refer to “higher throughput” does not inherently result in a disclosure of “higher mobility.”

3. Claim 45

Claim 45 depends on Claim 44 and is not disclosed by the combination of *Mujtaba* and *Trainin* for the same reasons as stated in regard to Claim 44.

4. Claim 46

Claim 46 depends on Claim 44 and is not disclosed by the combination of *Mujtaba* and *Trainin* for the same reasons as stated in regard to Claim 44.

5. Claim 47

Claim 47 depends on Claim 46 which depends on Claim 44 and is not disclosed by the combination of *Mujtaba* and *Trainin* for the same reasons as stated in regard to Claim 44.

6. Claim 49

Claim 49 depends on Claim 44 and is not disclosed by the combination of *Mujtaba* and *Trainin* for the same reasons as stated in regard to Claim 44.

7. Claim 50

Claim 50 depends on Claim 44 and is not disclosed by the combination of *Mujtaba* and *Trainin* for the same reasons as stated in regard to Claim 44.

8. Motivation to Combine

Motivation to combine requires more than just the existence of competing alternatives. *Virtek Vision Int'l ULC v. Assembly Guidance Sys., Inc.*, 2024 U.S. App. LEXIS 7185 (Fed. Cir. 2024). “It does not suffice to simply be known. A reason for combining must exist.” *Id.*

Petitioner does not identify a problem identified by *Mujtaba* or that *Mujtaba* was facing that was solved or even addressed by *Trainin*. Petitioner identifies to reason that would have motivated a POSITA to incorporate the teachings of *Trainin* and *Mujtaba*. While Petitioner states that “*Mujtaba* explicitly teaches that increasing the number of pilot symbols improves channel estimation” (Paper 1 at

58), Petitioner does not claim or support that *Trainin* provides any benefit to channel estimation, and Petitioner does not identify any other problem in *Mujtaba* that would have motivated a POSITA to incorporate the teachings of *Trainin*.

Mujtaba teaches varying the number of pilot tones in a multiple antenna communication system. EX1011 at abstract. *Mujtaba* further teaches that “data is transmitted in a multiple antenna communication system by selecting a number of pilot tones to be employed to transmit the data; and transmitting an indication of the selected number of pilot tones in a preamble of a packet containing the data.” *Id.* Further, *Mujtaba* teaches that “the number of pilot tones can be selected, for example, based on one or more of (i) a delay spread of a channel; (ii) the SNR at the receiver, or (iii) a number of antennas at a receiver.” *Id.* “*Mujtaba* thus seeks to solve the problem of providing an optimal balance between channel estimation and throughput.” EX2001¶128.

Trainin does not address this problem. Instead, *Trainin* teaches calculating a transmission time that aligns an interframe space start time of the first and second modulation schemes. EX1010 at Abstract. Petitioner does not identify any portion of *Mujtaba* that addresses that problem. Therefore, Petitioner has not supported that a POSITA would have been motivated to combine *Mujtaba* and *Trainin* to arrive at the claims of the '096 patent.

Additionally, *Mujtaba* explicitly teaches away from increasing pilot signal density, or the number of pilot symbols in the HT (high throughput) transmission. “The purpose of the HT field is to facilitate high throughput.” EX2001¶129. Contrary to that goal, *Mujtaba* teaches that increasing the number of pilot symbols decreases throughput:

[0006] A greater number of pilots, however, reduces the effective data rate, since actual data is now replaced by pilots (which are known at both the transmitter and the receiver).

[0021] The present invention allows the increased accuracy provided by a greater number of pilots to be balanced against the resulting reduction in data rate. As previously indicated, a greater number of pilots increases the accuracy of the CPE estimation, thereby reducing the packet error rate, and increasing the reliability of the transmission. A greater number of pilots, however, reduces the effective data rate, since actual data is now replaced by the pilots (which are known at both the transmitter and the receiver).

[0022] From an efficiency perspective, the lowest number of pilots to achieve the desired robustness is desirable. In other words, from an efficiency perspective, data should be transmitted on as many tones as possible.

Id. (citing EX1011 at [0006], [0021], and [0022]). “A POSITA would understand that more pilot signals would inherently decrease throughput and would therefore not be motivated to combine *Mujtaba*’s teaching of the possibility of more pilot symbols in the HT scenario.” EX2001¶130.

Similarly, Petitioner does not identify any desirable solution or aspect offered by *Trainin* which a POSITA would have been motivated to use. *Trainin* is focused on wireless transmission with frame alignment by calculating a transmission time that aligns an interframe space start time of the first and second modulation schemes. EX1010 at Abstract. Petitioner does not identify any indication in *Mujtaba* or in the knowledge of a POSITA that shows concern or even awareness of such a problem. Therefore, Petitioner has not presented any evidence that a POSITA in possession of both references would have been motivated to combine them to arrive at the claims of the ’096 patent. The only motivation now is Petitioner’s impermissible hindsight of using the claims of the ’096 patent as a roadmap. *In re Gorman*, 933 F.2d 982, 987 (Fed. Cir. 1991).

The fact that a named inventor or *Mujtaba* and the named inventors of *Trainin* were also co-authors of the *Joint Proposal* (and therefore may have known each other) is not relevant to this analysis. Paper 1 at 45. Petitioner’s argument that because the two prior art references were “known” does not satisfy the motivation to combine analysis as a matter of law. *Virtek Vision* at *7. In any

event, there is no indication that inventor *Mujtaba* knew of *Trainin*. Indeed, if *Mujtaba* and the inventors of *Trainin* knew of each other but still did not combine the two tends, shows that they were not motivated to do so.

Petitioner's argument that *Mujtaba* and *Trainin* are in the same field of endeavor is similarly legally insufficient by itself to support motivation to combine. *Virtek Vision* at *7.

Petitioner also argues that “a POSA would understand from *Trainin*'s teachings to use an uplink and a downlink to transmit data in packets or frames of physical layer (PHY) protocol data units (PPDUs)” and that *Mujtaba*'s “legacy field (the claimed first section) and the HT field (the claimed section section) are nothing more than a PPDU packet or frame.” Paper 1 at 58. None of these statements, even if true, identify any reason to combine these two references as required to support a motivation to combine. The mere fact that they *could be* combined is insufficient to support that a POSITA *would be* motivated to combine them. *Virtek Vision* at *7. Similarly, Petitioner's conclusory statement that “the combination is simply the combination of prior art elements (*Mujtaba*'s packet format in 802.11n and *Trainin*'s short guard interval in 802.1n) according to known methods to yield predictable results” fails to identify a reason or motivation to even try to make such a combination. Paper 1 at 58.

Petitioner further states that “*Mujtaba* explicitly teaches that increasing the number of pilot symbols improves channel estimation” and that that is “exactly the same problem that the ’096 patent intended to solve.” Paper 1 at 58. This does not establish a motivation to combine *Mujtaba* with *Trainin*.

Similarly, Petitioner’s statement that “*Trainin* explicitly explains that ‘[l]inks 128, 138, and 148 may each include a downlink and an uplink, **as are known in the art[,]**’ and such combination simply ‘**make[s] up a transmission of wireless signals**’” only identifies what was allegedly known, but provides no reason to combine that knowledge with that of *Mujtaba*. Petitioner does not identify a problem identified by *Trainin* or that *Trainin* was facing that was solved or even addressed by *Mujtaba*. Petitioner does not claim or support that *Mujtaba* provides any benefit to downlink or uplink transmissions, and Petitioner does not identify any other problem in *Trainin* that would have motivated a POSITA to incorporate the teachings of *Mujtaba*.

But even if the *Mujtaba* and *Trainin* are combined, *Trainin* uses substantively same disclosures as in *Mujtaba* and neither reference would invalidate the challenged claims as I discussed above. Therefore, a combination of the *Mujtaba* and *Trainin* cannot invalidate the challenged claims.

XI. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

There is substantial evidence of commercial success and significant licensing of the '096 patent to industry leaders in the wireless chip industry. UNM Rainforest Innovations asserted the '096 patent against Defendants Dell Technologies Inc. *et al.*, AsusTek Computer Inc., and Apple Inc. After significant litigation in District Court, Intel Corp. and Broadcom Corp., the entities that supplied the infringing products to Dell and Apple respectively, reached favorable settlements with UNM for the same '096 patent that is at issue in this IPR filed by Panasonic. *See* EX2007, EX2008; *see, e.g.*, IPR2021-01576, Exhibit 1028 (confidential patent license agreement – filed under seal). Another favorable settlement agreement was reached with Qualcomm after its three IPRs (including against the '096 patent) were generally unsuccessful. A license has also been offered to ZyXEL which is currently appealing its own two unsuccessful IPRs. Separately, Apple Inc. reached a satisfactory settlement with UNM for the same '096 patent. EX2009, EX2010. These attractive licenses, negotiated by wireless industry leaders, provide strong evidence of secondary considerations supporting a finding of non-obviousness of the patent-at-issue in this IPR. After its settlement with UNM, Intel dismissed its IPR Petition filed against the '096 patents. IPR2021-01576, Exhibit 1028 (confidential patent license agreement - filed under seal).

XII. CONCLUSION

The Board should deny institution pursuant to §325(d) because the art and arguments presented by Panasonic are substantially cumulative of and coextensive with the prior art and arguments previously considered, and Petitioner has not articulated any fact that the Board missed or misapprehended. Further and independently, the Board should deny institution because Panasonic has failed to demonstrate a reasonable likelihood of prevailing as to any challenged claim.

Dated: May 13, 2024

Respectfully submitted,

/s/ Jay P. Kesan

Jay P. Kesan, Reg. No. 37,488
Cecil E. Key
KEY IP LAW GROUP, PLLC
Old Gallows Rd, Ste. 350
Vienna, VA, 22182
jay@keyiplaw.com
cecil@keyiplaw.com
Telephone: (703) 752-6276

*Attorneys for Patent Owner UNM
RAINFOREST INNOVATIONS*

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4) and 42.25(b), the undersigned certifies that on May 13, 2024, a complete copy of Patent Owner UNM Rainforest Innovations' Preliminary Response to the Petition for *Inter Partes* Review dated May 13, 2024, of U.S. Patent No. 8,265,096 was filed electronically through the Patent Trial and Appeal Board's PTABE2E System and provided, via electronic service, to the Petitioner by serving the correspondence address of record.

Dated: May 13, 2024

/s/ Jay P. Kesan
Jay P. Kesan

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24, the undersigned certifies that the foregoing Patent Owner's Preliminary Response contains less than 14,000 words excluding the table of contents, table of authorities, certificate of service, certificate of word count, and appendix of exhibits. Patent Owner has relied on the word count feature of the word processing software used to create this paper in making this certification.

Dated: May 13, 2024

/s/ Jay P. Kesan
Jay P. Kesan