

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.

---

Case IPR2024-00364

Patent No. 8,265,096 B2

---

**PETITION FOR *INTER PARTES* REVIEW  
OF U.S. PATENT NO. 8,265,096 B2**

**Claims 8, 44-47 and 49-50**

## TABLE OF CONTENTS

|                                                                                            | Page |
|--------------------------------------------------------------------------------------------|------|
| I. INTRODUCTION .....                                                                      | 1    |
| II. MANDATORY NOTICES .....                                                                | 2    |
| A. Real Parties in Interest.....                                                           | 2    |
| B. Related Matters.....                                                                    | 2    |
| C. Notice of Counsel and Service Information.....                                          | 4    |
| III. REQUIREMENTS FOR <i>INTER PARTES</i> REVIEW .....                                     | 4    |
| A. Standing.....                                                                           | 4    |
| B. Challenge and Relief Requested .....                                                    | 4    |
| IV. BACKGROUND .....                                                                       | 6    |
| A. IEEE-SA Overview .....                                                                  | 7    |
| B. History of the IEEE 802.11 Standard.....                                                | 8    |
| C. TGn and 802.11n.....                                                                    | 8    |
| D. 802.11ac and 802.11ax.....                                                              | 10   |
| E. 802.16m.....                                                                            | 10   |
| V. OVERVIEW OF THE '096 PATENT .....                                                       | 11   |
| A. Brief Description .....                                                                 | 11   |
| B. Prosecution History .....                                                               | 13   |
| C. Overview of Final Written Decision in <i>Inter Partes</i> Review No.<br>2021-00734..... | 15   |
| D. Level of Ordinary Skill in the Art.....                                                 | 16   |
| E. Claim Construction.....                                                                 | 16   |
| VI. OVERVIEW OF THE PRIOR ART RELIED UPON IN THIS<br>PETITION .....                        | 18   |
| A. Joint Proposal .....                                                                    | 18   |
| B. Mujtaba.....                                                                            | 22   |
| C. Trainin .....                                                                           | 23   |
| VII. GROUND 1: JOINT PROPOSAL ANTICIPATES CLAIMS 8, 44-47<br>AND 50.....                   | 24   |

|       |                                                                                         |    |
|-------|-----------------------------------------------------------------------------------------|----|
| A.    | Claim 8 .....                                                                           | 24 |
| B.    | Claim 44 .....                                                                          | 35 |
| C.    | Claim 45 .....                                                                          | 39 |
| D.    | Claim 46 .....                                                                          | 41 |
| E.    | Claim 47 .....                                                                          | 42 |
| F.    | Claim 50 .....                                                                          | 43 |
| VIII. | GROUND 2: JOINT PROPOSAL RENDERS CLAIM 49 OBVIOUS<br>IN VIEW OF TRAININ .....           | 44 |
| A.    | Scope and Content of the Prior Art .....                                                | 44 |
| B.    | Motivation to Combine .....                                                             | 45 |
| IX.   | GROUND 3: MUJTABA ANTICIPATES CLAIM 8 .....                                             | 48 |
| X.    | GROUND 4: MUJTABA IN VIEW OF TRAININ RENDERS<br>CLAIMS 8, 44-47 AND 49-50 OBVIOUS ..... | 56 |
| A.    | Motivation to Combine .....                                                             | 57 |
| B.    | Claim 8 .....                                                                           | 59 |
| C.    | Claim 44 .....                                                                          | 61 |
| D.    | Claim 45 .....                                                                          | 63 |
| E.    | Claim 46 .....                                                                          | 65 |
| F.    | Claim 47 .....                                                                          | 66 |
| G.    | Claim 49 .....                                                                          | 67 |
| H.    | Claim 50 .....                                                                          | 68 |
| XI.   | INSTITUTION SHOULD BE GRANTED .....                                                     | 68 |
| A.    | 35 U.S.C. § 325 (d) .....                                                               | 68 |
| B.    | 35 U.S.C. § 314 (a)— <i>Fintiv</i> .....                                                | 69 |
| XII.  | CONCLUSION .....                                                                        | 74 |
|       | <b>CERTIFICATE OF WORD COUNT</b> .....                                                  | 75 |
|       | <b>CERTIFICATE OF SERVICE</b> .....                                                     | 76 |

## EXHIBITS

| Exhibit  | Description                                                                                                                                                                                                                                       |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ex. 1001 | U.S. Patent No. 8,265,096 (the “’096 patent”)                                                                                                                                                                                                     |
| Ex. 1002 | Declaration of Dr. Christopher J. Hansen, Ph.D.                                                                                                                                                                                                   |
| Ex. 1003 | U.S. Provisional App. No. 60/929                                                                                                                                                                                                                  |
| Ex. 1004 | Excerpt of the ’096 Patent Prosecution History                                                                                                                                                                                                    |
| Ex. 1005 | Claim Construction Order in <i>STC.UNM v. Apple Inc.</i> , No. 1-20-cv-00351 (W.D. Tex. Apr. 9, 2020), ECF No. 69                                                                                                                                 |
| Ex. 1006 | Patent Owner’s Motion to Amend in <i>Inter Partes</i> Review No. 2021-00743                                                                                                                                                                       |
| Ex. 1007 | Final Written Decision in <i>Inter Partes</i> Review No. 2021-00743                                                                                                                                                                               |
| Ex. 1008 | IEEE 802.11-05/1102r4, “Wireless LANs Joint Proposal: High throughput extension to the 802.11 Standard: PHY” to Coffey, et al, uploaded and publicly available on Jan. 14, 2006 (“Joint Proposal”) (Appendix F to Lansford Declaration, Ex. 1015) |
| Ex. 1009 | IEEE 802.11-05/0037r0, “Wireless LANs [Minutes of High Throughput Task Group .11n Session]” to Hillman, uploaded and publicly available on Jan. 16, 2006 (Appendix F to Lansford Declaration, Ex. 1015)                                           |
| Ex. 1010 | U.S. Pub. No. 2006/0072529 A1 (“Mujtaba”)                                                                                                                                                                                                         |
| Ex. 1011 | U.S. Pub. No. 2007/0204052 A1 (“Trainin”)                                                                                                                                                                                                         |
| Ex. 1012 | U.S. Pub. No. 2006/0067415 A1 (“Mujtaba II”)                                                                                                                                                                                                      |
| Ex. 1013 | U.S. Pub. No. 2006/0146867 A1 (“Lee”)                                                                                                                                                                                                             |
| Ex. 1014 | IEEE Std 802.11a-1999 Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, ISO/IEC 8802-11:1999/Amd 1:2000(E)                                                                                               |
| Ex. 1015 | Declaration of Dr. James L. Lansford, Ph.D.                                                                                                                                                                                                       |
| Ex. 1016 | U.S. Pub. No. 2005/0233709A1 (“Gardner”)                                                                                                                                                                                                          |
| Ex. 1017 | U.S. Patent No. 7,274,652 (“Webster”)                                                                                                                                                                                                             |
| Ex. 1018 | U.S. Pub. No. 2007/0104174 (“Nystrom”)                                                                                                                                                                                                            |
| Ex. 1019 | IEEE 802.11-05/786r0, “TGn Sync, WWiSE, and Mitmot Closing Report” to Mujtaba, et al., publicly available on July 21, 2005.                                                                                                                       |
| Ex. 1020 | U.S. Pub. No. 2008/0095195A1 (“Ahmadi”)                                                                                                                                                                                                           |
| Ex. 1021 | U.S. Pub. No. 20070155387A1 (“Li”)                                                                                                                                                                                                                |
| Ex. 1022 | Patent Owner’s Complaint in <i>UNM Rainforest Innovations f/k/a STC.UNM v. Toyota Motor North America, Inc. et al</i> , 2-23-cv-00424 (E.D. Tex.)                                                                                                 |
| Ex. 1023 | Draft IEEE 802.16m Requirements                                                                                                                                                                                                                   |

|          |                                                                                                                                                                                       |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ex. 1024 | Work Plan for Development of IEEE P802.16m Draft Standard & IMT-Advanced Submission                                                                                                   |
| Ex. 1025 | Extract of ITRI's Submissions to TGn                                                                                                                                                  |
| Ex. 1026 | Partial Proposal for 802.11n: ITRI Preamble Specification                                                                                                                             |
| Ex. 1027 | ITRI's complaint in <i>Industrial Technology Research Institute v. LG Electronics, Inc. et al</i> , 2-15-cv-00552 (E.D. Tex.)                                                         |
| Ex. 1028 | Patent Owner's Infringement Contentions in <i>UNM Rainforest Innovations f/k/a STC.UNM v. Toyota Motor North America, Inc. et al</i> , 2-23-cv-00424 (E.D. Tex.)                      |
| Ex. 1029 | Exemplary Exhibit to Patent Owner's Infringement Contentions in <i>UNM Rainforest Innovations f/k/a STC.UNM v. Toyota Motor North America, Inc. et al</i> , 2-23-cv-00424 (E.D. Tex.) |
| Ex. 1030 | Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO Jun. 21, 2022) ("Interim Procedure")             |
| Ex. 1031 | Docket Control Order in <i>UNM Rainforest Innovations f/k/a STC.UNM v. Toyota Motor North America, Inc. et al</i> , 2-23-cv-00424 (E.D. Tex.)                                         |
| Ex. 1032 | U.S. Pub. No. 2005/0159120 ("Kim")                                                                                                                                                    |
| Ex. 1033 | Yang Xiao, IEEE 802.11n: Enhancement for Higher Throughput in Wireless LANs publicly available in December 2005 ("Yang").                                                             |
| Ex. 1034 | Extract of all documents in the Mentor website for Task Group N (TGn) with Document Control Number (DCN) 1102) (Appendix E to Ex. 1015)                                               |
| Ex. 1035 | IEEE 802.11-04/422r4, "New Participant Orientation", presentation submission (July 2004) (Appendix A to Ex. 1015)                                                                     |
| Ex. 1036 | U.S. Patent 7,415,074 (Appendix C to Ex. 1015)                                                                                                                                        |
| Ex. 1037 | Stephens, "802.11 'Decrypted'", ACM SIGCOMM Computer Communication Review, Vol. 35, No. 2 (April 2005) (Appendix D to Ex. 1015)                                                       |
| Ex. 1038 | Official IEEE 802.11 Working Group Project Timelines (Appendix I to Ex. 1015)                                                                                                         |
| Ex. 1039 | IEEE 802.11 Future Session Plans (Appendix J to Ex. 1015)                                                                                                                             |
| Ex. 1040 | Summary Report of the January 2006 Meeting of IEEE 802.11 (Appendix K to Ex. 1015)                                                                                                    |

## LIST OF CHALLENGED CLAIMS

| Limitation | Claim Language                                                                                                                                                                         |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [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                          |
| [8f]       | combining the first section, the second section and the at least one non-data section to form the frame structure.                                                                     |
| [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.                                                                                          |
| [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.                                                            |
| [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. |
| [47]  | The method of claim 46, wherein the second section follows the first section in at least one of time sequence and frequency spectrum.                                                                       |
| [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.                                                                          |
| [50]  | The method of claim 44, wherein the second section carries mapping information for data in the second section.                                                                                              |

## **I. INTRODUCTION**

Petitioner Panasonic Automotive Systems Co., Ltd. (“PAS”) respectfully requests *inter partes* review and cancellation of claims 8, 44-47, and 49-50 of U.S. Patent No. 8,265,096 (the “’096 patent”) under 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq.*

Patent Owner has asserted in a co-pending district court action, *UNM Rainforest Innovations f/k/a STC.UNM v. Toyota Motor North America, Inc. et al*, 2-23-cv-00424 (E.D. Tex) (the “District Court Action”), that the ’096 patent is essential to the IEEE 802.11ac and 802.11ax wireless communications standards. As demonstrated below, the “frame structure” claimed in the ’096 patent was publicly discussed and proposed by the IEEE 802.11 Working Group, Task Group n (“TGn”) for inclusion in the standards well over a year before the ’096 patent’s earliest claimed priority date. The TGn’s published Joint Proposal, which discloses the claimed invention, supports Grounds 1 and 2 of this Petition.

Moreover, the authors of the TGn proposal already had included the claimed “frame structure” in their own patents that were applied for long before the priority date of the ’096 patent. The TGn proposal authors—not the ’096 patent patentees—came up with the “frame structure” claimed in the ’096 patent. The patents obtained by the TGn proposal authors (Mujtaba and Trainin) provide additional invalidating prior art supporting Grounds 3 and 4 of this Petition.

## **II. MANDATORY NOTICES**

### **A. Real Parties in Interest**

PAS has sole control over this Petition and is the real party in interest for this Petition.

Patent Owner has sued Toyota Motor North America, Inc., Toyota Motor Sales, U.S.A., Inc., and Toyota Motor Engineering & Manufacturing North America, Inc. (collectively, “Toyota”) in the District Court Action for alleged infringement of the '096 patent based on the sale of vehicles with infotainment units supplied by PAS that support IEEE 802.11ac or 802.11ax. The undersigned counsel represents Toyota as well as the PAS movant-intervenors in the District Court Action. Toyota has not funded, directed or controlled this Petition; PAS is solely responsible for this Petition.

### **B. Related Matters**

Patent Owner has asserted certain claims of the '096 patent in the following district court actions: the District Court Action; *UNM Rainforest Innovations v. Zyxel Commc'ns Corp.*, 6:20-cv-00522 (W.D. Tex.); *UNM Rainforest Innovations v. Dell Techs., Inc.*, 6:20-cv-00468 (W.D. Tex.); *UNM Rainforest Innovations v. ASUSTek Comput., Inc.*, 6:20-cv-00142 (W.D. Tex.); *UNM Rainforest Innovations v. D-Link Corp.*, 6:20-cv-00143 (W.D. Tex.); *UNM Rainforest Innovations v. Apple Inc.*, 1:20-cv-00351 (W.D. Tex.); and *UNM Rainforest Innovations v. TP-Link Techs. Co., Ltd.*, 6:19-cv-00262 (W.D. Tex.).

Third-party, Qualcomm Incorporated, filed an IPR petition challenging claims 1-4 and 6-8 of the '096 patent.<sup>1</sup> *Qualcomm Incorporated v. UNM Rainforest Innovations*, IPR2021-00375, Paper 1 (Dec. 28, 2020). Zyxel Communications Corp. filed an IPR petition challenging claims 1-4 and 6-8 of the '096 patent, *Zyxel Communications Corp. v. UNM Rainforest Innovations*, IPR2021-00743, Paper 1 (Mar. 29, 2021), which was joined to IPR No. 2021-00375. The Board issued its decision on July 22, 2022. IPR2021-00375, Paper 68 (Jul. 22, 2022).

In its Final Written Decision, the Board: 1) found challenged claims 1-4 and 6-7 unpatentable as obvious over the combination of *Talukdar* and *Li*; 2) found challenged claim 8 was not shown to be unpatentable as obvious over the combination of *Talukdar* and *Nystrom*; and 3) granted Patent Owner's Motion to Amend, allowing proposed amended claims 44-47 and 49-50, based on a determination that they were not obvious over the combination of *Talukdar* and *Li*. *Id.*

---

<sup>1</sup> Third-party Intel Corp. also filed an IPR petition challenging the same claims in *Intel Corp. v. UNM Rainforest Innovations*, IPR2020-01576, Paper 2 (Sept. 14, 2020), which was terminated before any institution decision or Patent Owner's preliminary response. *See id.*, Paper 8.

**C. Notice of Counsel and Service Information**

Petitioner designates the following counsel:

| <b>Lead Counsel</b>                                                                                                                                                                                                                                                 | <b>Back-Up Counsel</b>                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Christopher J. Higgins<br>Reg. No. 66,422<br>0CHPTABDocket@orrick.com<br><br>Postal & Hand-Delivery Address:<br>Orrick, Herrington & Sutcliffe LLP<br>1152 15th Street, N.W.<br>Washington, DC 20005-1706<br>Telephone: (202) 339-8400<br>Facsimile: (202) 339-8500 | T. Vann Pearce, Jr.<br>Registration No. 58,945<br>TVPPTABDocket@orrick.com<br><br>Postal & Hand-Delivery Address:<br>Orrick, Herrington & Sutcliffe LLP<br>1152 15th Street, N.W.<br>Washington, DC 20005-1706<br>Telephone: (202) 339-8400<br>Facsimile: (202) 339-8500 |

Petitioner submits Powers of Attorney with this Petition. Please address all correspondence to lead and backup counsel. Petitioner consents to service by email at: 0CHPTABDocket@orrick.com and TVPPTABDocket@orrick.com.

**III. REQUIREMENTS FOR *INTER PARTES* REVIEW**

**A. Standing**

Petitioner certifies that the '096 patent is available for IPR. Petitioner is not barred or estopped from requesting this review. Toyota was served with a complaint of infringement of the '096 patent less than one year ago based on its alleged sale in the United States of vehicles that include infotainment units manufactured and supplied by Petitioner that support IEEE 802.11ac or 802.11ax.

**B. Challenge and Relief Requested**

Petitioner requests *inter partes* review of and challenges claims 8, 44-47, and 49-50 of the '096 patent. Each of these claims should be found unpatentable

and cancelled because they embrace a hybrid frame structure for transmitting data with a short guard interval and denser pilot symbols that is indistinguishable from the prior art. This Petition explains the reasons why the claims are unpatentable, provides details regarding where the various required claim limitations can be found in the prior art, and is accompanied by additional explanation and support set forth in the attached Declaration of Dr. Christopher J. Hansen, Ph.D. (Ex. 1002) and Declaration of Dr. James L. Lansford (Ex. 1015).

Petitioner relies on the following: (1) Joint Proposal, which was published on January 14, 2006 (Ex. 1008); (2) Mujtaba, which was filed on September 9, 2005 and published on April 6, 2006 (Ex. 1010); and (3) Trainin, which was filed on February 24, 2006 and published on August 30, 2007 (Ex. 1011). The Joint Proposal and Mujtaba are available as prior art at least under 35 U.S.C. §102(b). Trainin is available as prior art under at least 35 U.S.C. §102 (a) and (e).

Petitioner requests that claims 8, 44-47 and 49-50 of the '096 patent be determined unpatentable and cancelled on the following grounds:

**Ground 1:** Claims 8, 44-47 and 50 of the '096 patent are unpatentable as being anticipated by the Joint Proposal.

**Ground 2:** Claim 49 is unpatentable as obvious by the Joint Proposal and Trainin.

**Ground 3:** Claim 8 is unpatentable as being anticipated by Mujtaba.

**Ground 4:** Claims 8, 44-47 and 49-50 are unpatentable as obvious by Mujtaba and Trainin.

The Joint Proposal, Mujtaba, Trainin and other references illustrate the state of the art at the time of the alleged invention. *See Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015) (“Art can legitimately serve to document the knowledge that skilled artisans would bring to bear in reading the prior art identified as producing obviousness.”) (citation omitted).

#### **IV. BACKGROUND**

The '096 patent was filed on July 7, 2008 and claimed priority to two provisional applications filed on July 12, 2007 (Ex. 1003) and September 17, 2007. Ex. 1001.

The '096 patent specifically identifies IEEE 802.16e and 802.16m standards as examples of two communication systems and labels them the “legacy” and “new” systems, respectively. *Id.* at 1:27-31. One purpose of this combined system is to support backward compatibility with legacy 802.16m systems and improve channel estimation. *Id.* at 1:31-35, 2:11-14.

As discussed below, the packet frame or structure for a new wireless communication system with backward compatibility with legacy systems was publicly discussed and proposed to the TGn long before the earliest call for proposals by the Task Group m of the IEEE 802.16 Working Group (“TGm”). The

claimed frame structure was also published in patent publications by the authors of the TGn proposal prior to the earliest claimed priority date of the '096 patent.

**A. IEEE-SA Overview**

The IEEE Standards Association (“IEEE-SA”) is part of the Institute of Electrical and Electronics Engineers (“IEEE”) that develops industry standards. Ex. 1002 ¶59. IEEE-SA has procedures in place to ensure that their standards development is an open and fair process. *Id.*

IEEE-SA develops standards, including the family of networking standards from the IEEE 802 LAN/MAN Standards committee. *Id.* ¶64. IEEE 802 includes multiple working groups, which are responsible for developing and writing standards. *Id.* One of the largest of these working groups is IEEE 802.11, which develops wireless local area networking standards that are commonly called Wi-Fi. *Id.* Other groups include IEEE 802.16, which developed standards for Metropolitan Area Networks that is commonly called WiMax. *Id.*

The IEEE 802.11 Working Group has been active since 1990 and holds at least six meetings per year. *Id.* ¶66. Each meeting has sessions for the entire Working Group and individual study groups and task groups. *Id.* Task groups are typically devoted to developing a new amendment to the 802.11 W-Fi standard. *Id.* IEEE 802.16 WiMax standard on other hand became inactive in 2018. *Id.*

In every IEEE 802.11 project, participants in the working group and task groups share contributions through the IEEE-SA's file server. *Id.* ¶72; Ex. 1015 ¶20. This file server is open to the public to review and download documents. *Id.*; Ex. 1015 ¶22.

**B. History of the IEEE 802.11 Standard**

The IEEE Standards development process recognizes standards, amendments, and revisions. A standard, such as IEEE 802.11-2007 is a standalone document. An amendment, such as IEEE 802.11n-2009, modifies a standard and can be read only in the context of the standard it modifies, which is called a baseline. Ex. 1002 ¶76.

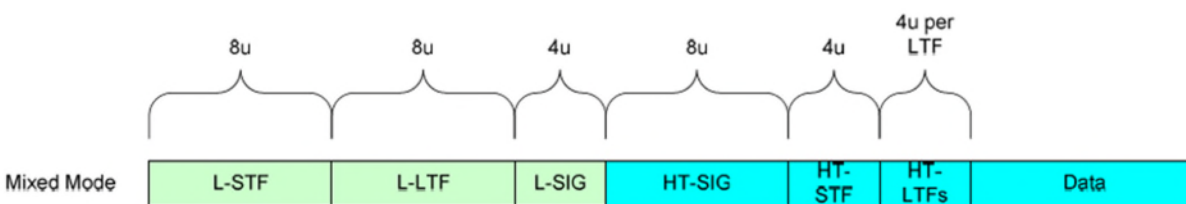
The IEEE 802.11 Standard was created to enable computers that had traditionally used wired networks, such as IEEE 802.3 (Ethernet), to instead communicate over relatively short ranges using radio communication. *Id.* ¶77. The first IEEE 802.11 standard was ratified in 1997. *Id.* Wireless LANs based on 802.11 became popular in the early 2000s. *Id.*

**C. TGn and 802.11n**

IEEE 802.11n was developed in the TGn. *Id.* ¶78. The TGn began conducting meetings in September of 2003. *Id.* Initial proposals made from several competing industry groups were first reviewed in September 2004. *Id.* In July 2005, the TGn held a regular meeting in San Francisco and agreed to merge

the competing proposals to create a joint proposal. *Id.*; Ex 1019 at 14. In the Hawaii meeting from January 16- 20, 2006, the joint proposal was presented to the TGn and was ultimately selected as the baseline specification for the physical layer (PHY) of 802.11n. *Id.* ¶79; Ex. 1008; Ex. 1009.

As illustrated in the following figure, the Joint Proposal specifies a new packet format in physical layer (PHY) for data transmission. Ex. 1008 at 11, Figure 1 (excerpted and annotated); Ex. 1002 ¶80.



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

This new packet format has an 802.11a (legacy system) preamble (*i.e.*, L-STF, L-LTF, L-SIG) in the legacy field and a high throughput (“new” or “HT” system) preamble (*i.e.*, HT-SIG, HT-STF, HT-LTFs) in the HT field following by a data field. *Id.* In this new packet format, the legacy preamble is compatible with legacy 802.11a devices and the HT preamble is compatible with HT devices (*i.e.*, 802.11n devices). Ex. 1008, 11:18-23; Ex. 1002 ¶81. The joint proposal also specifies that both the legacy field transmission and the HT field transmission use

orthogonal frequency division multiplexing (“OFDM”) symbols. Ex. 1008, 21:7-19; Ex. 1002 ¶81.

**D. 802.11ac and 802.11ax**

Both 802.11ac and 802.11ax are amendments to the IEEE 802.11 standard that enable higher-throughput wireless networks by enhancing the multiple-input multiple-output (MIMO) OFDM PHY protocol that was defined in 802.11n. Ex. 1002 ¶84. Like 802.11n, 802.11ac and 802.11ax incorporated packet (PPDU) formats that were backward compatible with older Wi-Fi devices. *Id.* ¶85. 802.11ac and 802.11ax were approved and published as IEEE standards on December 2013 and February 1, 2021, respectively. *Id.* ¶86.

**E. 802.16m**

IEEE 802.16 is a series of wireless broadband standards. *Id.* ¶89. The IEEE Standards Board established the 802.16 Working Group in 1999—two years later than the ratification of the first 802.11 standard developed by the 802.11 Working Group in 1997—to develop standards for the 802.16 WiMax standard. *Id.* ¶¶77, 89.

In July 2007, the TGm started calling for technical proposals for development of 802.11m, at which the '096 patent seemingly is directed. *Id.* ¶90; Ex. 1024 at 3. In other words, TGm first started development for 802.16m almost 18 months after the TGN had openly presented and selected the Joint Proposal

specifying the new packet format with backward compatibility at its Hawaii meeting in January 2006.

The original assignee of the '096 patent, Industrial Technology Research Institute ("ITRI"), sued LG Electronics in the Eastern District of Texas in April 2015, accusing of infringement LG's accused products that practiced the 802.11n and later 802.11 standards. Ex. 1027 at 10.

And in September 2023, Patent Owner initiated the District Court Action, *UNM Rainforest Innovations f/k/a STC.UNM v. Toyota Motor North America, Inc. et al*, 2-23-cv-00424 (E.D. Tex), accusing certain Toyota vehicles include components supplied by Petitioner that support 802.11ac or 802.11ax. Ex. 1022; Ex. 1028; Ex. 1029; *see also* Ex. 1002, ¶¶124-140.

## **V. OVERVIEW OF THE '096 PATENT**

### **A. Brief Description**

The '096 patent is titled "Method For Constructing Frame Structures" and relates to frame structures for transmitting data. Ex. 1001 at Abstract.

According to the patent, the second system "has pilot symbols that are denser than those in the first communication system" (Claim 8) and is further "configured to support higher mobility than the first communication system" and uses "a shorter symbol period than that in the first communication system" (Claim 44). *Id.*; Ex. 1006 at 15-16.

The patent refers to OFDM access (“OFDMA”) systems that allow “simultaneous transmission of data from different users without interference from one another.” Ex. 1001, 1:24-27; Ex. 1002 ¶113. The ’096 patent specifically identifies 802.16e and 802.16m as examples of two communication systems and labels them the “legacy” and “new” systems, respectively. Ex. 1001, 1:27- 31; Ex. 1002 ¶113. One purpose of this combined system is to support backward compatibility with legacy 802.16m systems. Ex. 1001 at 1:31-35; Ex. 1002 ¶113. Specifically, the ’096 patent explains that the legacy system 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.” Ex. 1001 at 2:6-11; Ex. 1002 ¶113.

The ’096 patent explains that “the limitation on pilot symbol placement may cause channel estimation error at a receiving end because of insufficient information provided for channel estimation.” Ex. 1001, 2:11-14; Ex. 1002 ¶114. To improve channel estimation in a high-mobility environment, the ’096 patent proposes a frame structure for the “new system” under high mobility that has “a shorter symbol period or more pilot symbols” than the “legacy system.” Ex. 1001, 5:1-16; Ex. 1002 ¶114. The ’096 patent explains that “[g]enerally, a shorter symbol period may be more robust to inter-symbol interference, while denser pilot

symbols may achieve better channel estimation accuracy.” Ex. 1001, 5:16-18; Ex. 1002 ¶114.

**B. Prosecution History**

During prosecution, the applicants amended claim 1 to recite “the second communication system configured to support higher mobility than the first communication system, wherein each symbol in the second communication system has a shorter symbol period than that in the first communication system.” Excerpt of the ’096 Patent Prosecution History (Ex. 1004) at 80.

To distinguish prior art from the amended claims, the applicants argued in response to a Non-Final Rejection that “[h]owever, the pre-designated legacy system transmission period would be susceptible to a Doppler effect in a high mobility scenario, because the placement is designed with a relatively large symbol period, which in turn induces relatively short carrier spacing and less dense pilot symbol placement.” *Id.* at 92. To overcome the subsequent Final Rejection, the applicants underscored the limitation that “symbols in the second communication system have a shorter symbol period than those in the first communication system[,]” and further argued that “[n]owhere does Ahmadi appear to disclose that a shorter frame size necessarily equates to a shorter symbol period.” *Id.* at 49.

A person of ordinary skill in the art (“POSA”) would understand the arguments by the applicants to indicate that the “first communication system” is

susceptible to a problem, referred to as “Doppler effect” attributed to a high mobility system, because the “first communication system” has a larger symbol period with less dense pilot symbols, but the “second communication system” mitigates the “Doppler effect” because it has a shorter symbol period with denser pilot symbols. Ex. 1002 ¶121.

The applicants further amended independent claims to recite “wherein the first communication system and the second communication system co-exist in one transmission scheme.” Ex. 1004 at 2-13. The applicants directed the Examiner to “paragraph [0025]” of the specification for the filed application (corresponding to ’096 patent at 4:21-41) as the support for this amendment. *Id.* at 15. The indicated passage states in relevant part: “Examples of the present invention may allow data of an old [OFDMA] system ... and data of a new OFDMA system to co-exist in an OFDMA frame by changing a frame structure of the OFDMA frame.” Ex. 1001 at 4:21-41.

A POSA would understand this statement by the applicants to indicate that one example of communication systems that “co-exist in one transmission scheme” is when data from two communication systems co-exists in a frame. Ex. 1002 ¶122.

**C. Overview of Final Written Decision in *Inter Partes* Review No. 2021-00734**

In its Final Written Decision in *Inter Partes* Review No. 2021-00734, the Board 1) found challenged claims 1-4 and 6-7 unpatentable as obvious over *Talukdar* and *Li*; 2) found challenged claim 8 was not shown to be unpatentable as obvious over *Talukdar* and *Li*; and 3) granted Patent Owner's Motion to Amend, allowing proposed amended claims 44-47 and 49-50, based on determination that they were not obvious over *Talukdar* and *Li*. Ex. 1007 at 83.

Specifically, the Board found claim 8 patentable because Petitioner Qualcomm's Reply arguments provided new reasons why a POSA would have been motivated to combine the teachings of *Talukdar* and *Li* and these new arguments were not supported by the expert report in the Petition. *Id.* at 60-61. As a result, the Board declined to consider Petitioner Qualcomm's belated argument.

The Board also found substitute claims 44-47 and 49-50 patentable because (1) the number of substitute claims for claim 1-4, 6-7 is reasonable, (2) the independent substitute claim 44 for claim 1 is narrower than claim 1, and the substitute claims 45-47 and 49-50 do not enlarge the scope of the claims of the '096 patent, (3) the substitute claims are supported in the written description of the '096 patent, (4) the substitute claims responds to the ground of unpatentability, and (5) the substitute claims are patentable over *Talukdar* and *Li*. Specifically, the Board declined Petitioner Qualcomm's argument that an increased density of pilot

symbols is a natural result of a reduced symbol period because the Board found that such argument makes sense “*only when the same number of pilot symbols or pilot symbol distribution are used for both the first and second communication system time period ( $T$  and  $T/2$ ).*” *Id.* at 77-78 (emphasis added). The Board did not find that any prior art reference warrants such “natural result” and therefore found the substitute claim 44 patentable. *Id.* at 81.

The Board did not consider any of the Joint Proposal, Mujtaba and Trainin relied upon in this Petition. The teachings of these previously unconsidered prior art references anticipate or render the challenged claims obvious.

**D. Level of Ordinary Skill in the Art**

As of 2007, a person of ordinary skill in the art (“POSA”) in the field of the ’096 patent would have had a Bachelor’s degree in electrical engineering, computer engineering, or a related field, and around two years of experience in the design or development of wireless communication systems, or the equivalent. Ex. 1002 ¶57.

**E. Claim Construction**

Pursuant to 37 C.F.R. § 42.100(b), the Board construes claims in an IPR in accordance with the standard under which the “words of a claim are generally given their ordinary and customary meaning.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005). The following terms were construed in *STC.UNM*

*v. Apple Inc.*, No. 1-20-cv-00351 (W.D. Tex. Apr. 9, 2020). Ex. 1005. For purposes of this Petition, the following claim constructions do not make any material difference as to the Challenged Claims or references relied upon. All other terms have been given their plain and ordinary meaning.

- “frame structure” (claims 1, 8): “a single structure comprising one or more frames, wherein each frame may have one or more subframes”;
- “symbol” (claims 1, 8): Plain-and-ordinary meaning, wherein the plain-and-ordinary meaning means “a transmissible unit of information”;
- “at least one of [...] and [...]” (claims 1, 2, 3, 4, 6, 8): “[...] and/or [...]”;
- “symbol period” (claim 1): “the time it takes to transmit one symbol”; “pilot symbols that are denser than” (claim 8): “more pilot symbols per unit time than, wherein a unit time is the symbol period of the first communication system”;
- “communication system” (claims 1, 8): 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” (claims 1, 8): 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” (claims 1, 2, 3, 6, 7, 8): Plain-and-ordinary meaning (both); and
- “support higher mobility than” (claim 1): “support higher relative velocity between a transmitter and a receiver than.”

## **VI. OVERVIEW OF THE PRIOR ART RELIED UPON IN THIS PETITION**

The Joint Proposal disclosed a frame structure for 802.11n that provides backward compatibility with legacy 802.11 systems by shortening symbol duration and increasing pilot symbol density, respectively— just as later claimed in the ’096 patent. Mujtaba and Trainin also disclosed a system similar to the Joint Proposal with a shortened symbol duration and increased pilot symbol density for improving channel estimation. None of these references was considered by the Patent Office during prosecution of the ’096 patent and by the Board in any other IPR proceedings.

### **A. Joint Proposal**

Joint Proposal is prior art under 35 U.S.C. pre-AIA §102(b) because the document was available and accessible to the public on January 14, 2006.

The Joint Proposal submitted to the TGn via the IEEE 802 Wireless World website, <http://802wirelessworld.com> on January 14, 2006. Ex. 1015 ¶28; Ex. 1034; Ex. 1008. During the 2004-2006 timeframe, all such submissions were accessible to the public after free registration through the Wireless World website. Ex. 1015 ¶22; Ex. 1035 at 25-30. Submissions to the TGn were also publicly available via FTP at <ftp.wirelessworld.com>. Ex. 1015 ¶23. After creating an account, an individual could view and download submissions that had been uploaded. Ex. 1015 ¶23; Ex. 1035 at 35. The FTP server's address and login credentials were also publicly available elsewhere. Ex. 1015 ¶23, 24; Ex. 1036 at col. 1, ll. 20-39; Ex. 1037.

After it was submitted to the TGn on January 14, 2006, the Joint Proposal was publicly presented to the TGn in Hawaii during January 16- 20, 2006. Ex. 1015 ¶30; Ex. 1009. Like all other TGn meetings, the Hawaii meeting was advertised and open to the public. Ex. 1015 ¶30; Ex. 1038; Ex. 1039; Ex. 1040. Meeting minutes subsequently submitted to the TGn also were publicly accessible. Ex. 1015 ¶29; Ex. 1009.

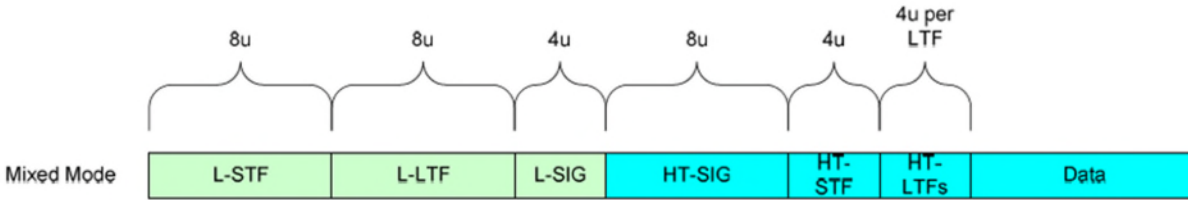
In mid-2007, the IEEE's current Mentor website ("Mentor"), <https://mentor.ieee.org/802.11/documents> replaced the Wireless World website. Ex. 1015 ¶26. Prior submissions uploaded to the Wireless World server were added to Mentor shortly after its creation. *Id.* The uploaded documents retained

their original submission upload dates and have been publicly available. *Id.*

Entries in Mentor were and remain searchable by year, task group, title, or other parameters. *Id.* ¶27.

Because the Joint Proposal was uploaded to the IEEE database on January 14, 2006, at which time it would have been available to interested members of the public through the Wireless World website or by FTP, and was presented in the January 2006 Hawaii meeting which was affirmatively advertised and open to the public, the Joint Proposal was publicly accessible prior to the earliest possible priority date of the '096 patent to a POSA exercising reasonable diligence. *See Samsung Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1369 (Fed. Cir. 2019).

The Joint Proposal specifies the physical layer of a wireless communication high throughput packet format (*i.e.*, 802.11n) that is compatible with legacy 802.11a/g devices. Ex. 1008, at 11:18-23; Ex. 1002 ¶147. The Joint Proposal specifies a mixed mode packet consisting of a legacy field (L-STF, L-LTF, L-SIG) and an HT field (HT-SIG, HT-STF, HT-LTFs and Data). Ex. 1008, at 11:18-23; Ex. 1002 ¶148. The Joint Proposal illustrates the mixed mode packet structure in the following figure. Ex. 1008, Figure 1 (excerpted); Ex. 1002 ¶149.



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

The Joint Proposal discloses that both the legacy transmission and the HT transmission use OFDM symbols. Ex. 1008, at 21:7-19; Ex. 1002 ¶150. The Joint Proposal further teaches that there are four pilot subcarriers carrying pilot symbols for legacy transmission and four pilot subcarriers for carrying pilot symbols for HT transmission. Ex. 1008, at 16, Table 1; Ex. 1002 ¶151. The Joint Proposal further specifies a guard interval (GI), referred to as  $T_{GI}$ , which is 0.8 microseconds, and a short guard interval (Short GI), referred to as  $T_{GIS}$ , which is 0.4 microseconds. Ex. 1008, at 17, Table 1; Ex. 1002 ¶152.

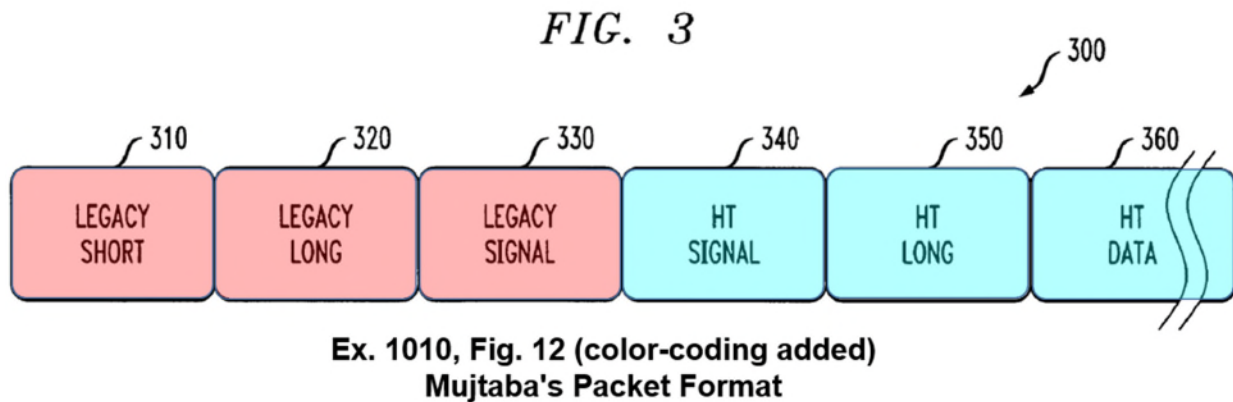
When using the regular guard interval in data transmission, the symbol period, referred to as  $T_{SYM}$ , is 4 microseconds and when using the short guard interval, the symbol interval, referred to as  $T_{SYMS}$ , is 3.2 microseconds. Ex. 1008, at 16-17; Table 1; Ex. 1002 ¶152. The Joint Proposal also specifies that the short guard interval is only available to HT transmission. Ex. 1008, 56:1-6; Ex. 1002 ¶153. The legacy field is designed to be understood by the legacy 802.11a/g

devices which will only understand the 0.8 microsecond guard interval. Ex. 1008, at 56:7-13; Ex. 1002 ¶154.

## **B. Mujtaba**

Mujtaba, assigned to Agere Systems, is prior art under 35 U.S.C. pre-AIA §102(b) because Mujtaba was published on April 6, 2006. Ex. 1010.

Mujtaba discloses a multiple antenna communication system in the 802.11n mixed mode packet format consisting of a legacy field including a legacy signal field and an HT field also including an HT signal field. Ex. 1010, Fig.3 (color-coding added), [0019]; Ex. 1002 ¶¶160, 161.



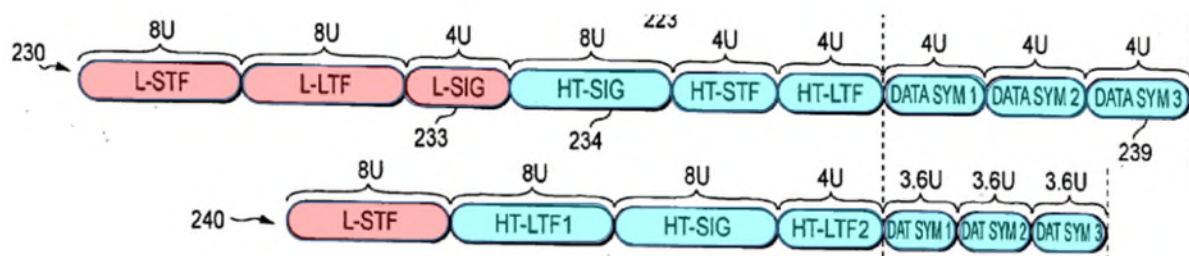
Mujtaba also teaches that the indication of the selected number of pilot tones can be transmitted, for example, in a SIGNAL field of an exemplary IEEE 802.11 preamble. Ex. 1010, [0008]; Ex. 1002 ¶156. Mujtaba further teaches that the number of pilot tones can be selected based on a delay spread of a channel, the SNR at the receiver, or a number of antennas at a receiver. Ex. 1010, [0021]; Ex. 1002 ¶162. Mujtaba further explains that a greater number of pilots increases the

accuracy of common phase error (CPE) estimation, thereby reducing the packet error rate, and increasing the reliability of the transmission. Ex. 1010, [0005] [0021]; Ex. 1002 ¶¶105, 163.

### C. Trainin

Trainin, assigned to Intel, is prior art under 35 U.S.C. pre-AIA §102(a) or §102(e) because Trainin was filed on February 24, 2006 and published on August 30, 2007. Ex. 1011.

Trainin similarly discloses a mixed mode packet format including a legacy field and an HT field coexisting in the packet format (Ex. 1011, [0020]; Ex. 1002 ¶167), and such packet format is an 802.11n format. Ex. 1011, [0030]; Fig.2 (excerpted and color-coding added); Ex. 1002 ¶168.



**Ex. 1011, Fig. 2 (excerpted and color-coding added)  
Trainin's Mixed Mode Frame Format**

Trainin further discloses a shortened guard interval (GI) in the data symbols. Ex. 1011, [0032]; Ex. 1002 ¶170. Specifically, Trainin teaches that a data symbol in a regular GI format, may have a length of 4 microseconds, whereas a data

symbol in a short GI format, may have a length of 3.6, microseconds. Ex. 1011, [0032]; Ex. 1002 ¶170.

## **VII. GROUND 1: JOINT PROPOSAL ANTICIPATES CLAIMS 8, 44-47 AND 50**

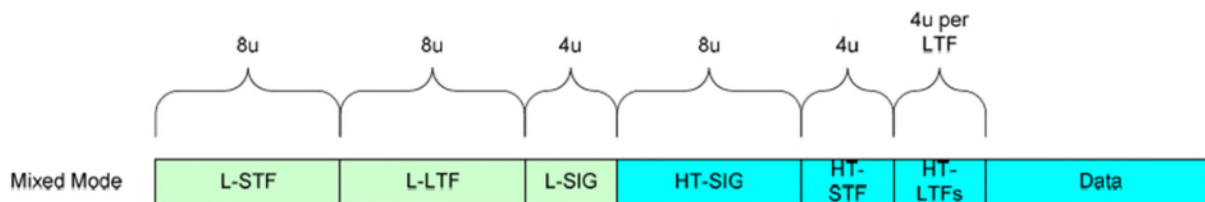
Claim 8, 44-47 and 50 are unpatentable as being anticipated by the Joint Proposal.

### **A. Claim 8**

#### **1. 8 [pre]: A method of constructing a frame structure for data transmission, the method comprising**

To the extent the preamble is limiting, the Joint Proposal discloses a Mixed Mode packet format, which constitutes a frame structure, for data transmission.

Ex. 1008, 11:15-12:7. Figure 1; Ex. 1002 ¶173.



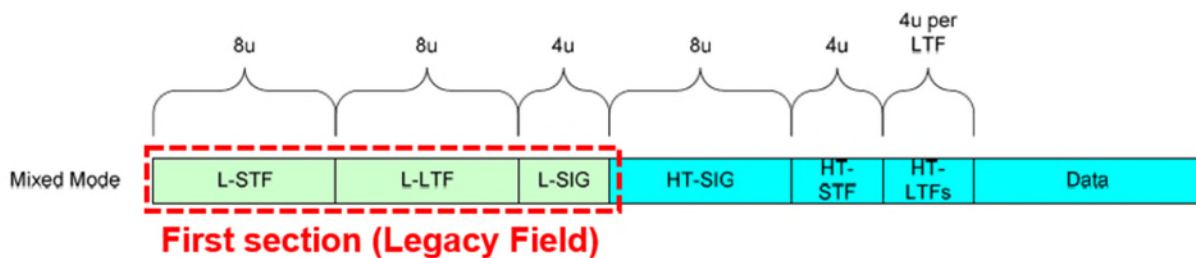
**Ex. 1008, Figure 1 (excerpted)  
Joint Proposal's Mixed Mode Packet Format**

As illustrated in Figure 1, the Joint Proposal discloses “constructing” the 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. Ex. 1008, Figure 1 (excerpted); Ex. 1002 ¶174.

Thus, the Joint Proposal discloses the preamble because the Joint Proposal's Mixed Mode packet format is a frame structure for data transmission. Ex. 1002 ¶175.

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

The Joint Proposal's Mixed Mode packet format, which meets claim 8[a], is illustrated in the following figure. Ex. 1008, Figure 1 (excerpted and annotated); Ex. 1002 ¶176.



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

The Joint Proposal teaches that the Mixed Mode packet format includes a legacy field (the claimed first section) consisting of a legacy short training field (L-STF), a legacy long training field (L-LTF) and a legacy signal field (L-SIG) (the claimed data configured a first format). Ex. 1008, at 11:4-6, 18-23; Ex. 1002 ¶177. The legacy field can be used to decode data by legacy 802.11a/g devices (the claimed first communication system), and therefore, enables data transmission in

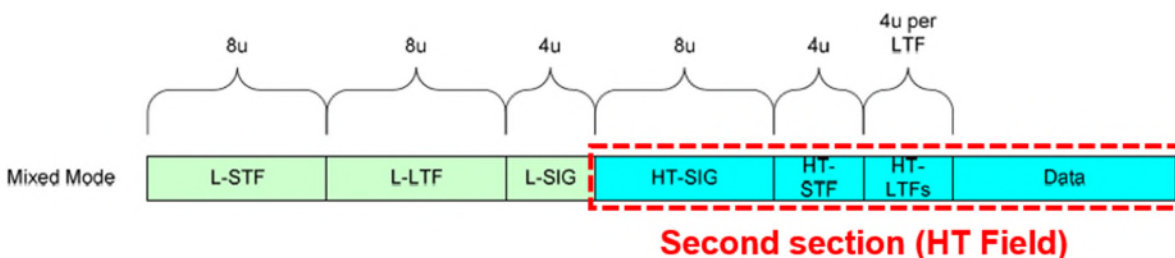
the Mixed Mode packet format to be compatible with legacy devices (*e.g.*, 802.11a devices). *Id.*

The Joint Proposal also discloses that the legacy field transmission uses OFDM symbols. Ex. 1008, at 21:15-19; 22:4-5; 42:2-5; Ex. 1002 ¶177.

Thus, the Joint Proposal discloses claim 8[a].

3. **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**

The Joint Proposal discloses the Mixed Mode packet format, which meets claim 8[b], in the following figure. Ex. 1008, Figure 1 (excerpted and annotated); Ex. 1002 ¶179.



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

The Joint Proposal 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 (HT-STF), an HT long training field (HT-LTFs) and a data field (data) (the claimed data

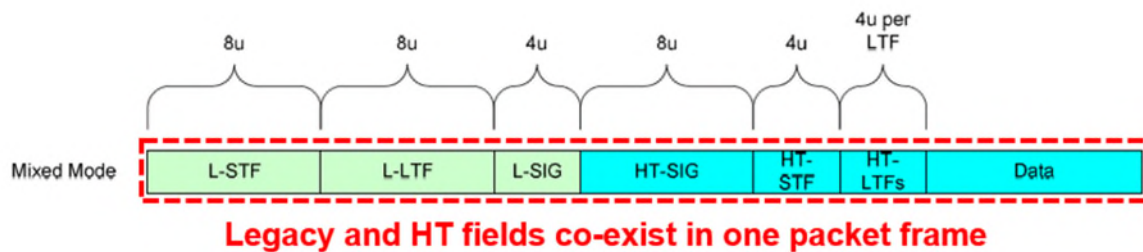
configured in a second format). Ex. 1008, at 11:7-13; Ex. 1002 ¶180. The receiver in the Mixed Mode can decode both the Mixed Mode packets and legacy packets.” Ex. 1008, at 11:22-23; Ex. 1002 ¶180. This means that the legacy field (the claimed first section) and the HT field (the claimed second section) enable data transmission in the Mixed Mode packet format to be compatible with legacy devices (*e.g.*, 802.11a devices) (the claimed first communication system) and the new or HT devices (*i.e.*, HT devices or 802.11n devices) (the claimed second communication system), respectively. *Id.*

The Joint proposal also discloses that the HT field transmission uses OFDM symbols. Ex. 1008, at 21:15-19; 42:2-5; Ex. 1002 ¶181.

Thus, the Joint Proposal discloses claim 8[b].

4. **Claim 8[c]: wherein the first communication system’s symbols and the second communication system’s symbols co-exist in one transmission scheme**

The Joint Proposal discloses the Mixed Mode packet format, which discloses claim 8[c], in the following figure. Ex. 1008, Figure 1 (excerpted and annotated); Ex. 1002 ¶183.



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

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. *Id.* The Joint Proposal teaches that the legacy transmission in the legacy field (the claimed first communication system) and the HT transmission in the HT field (the claimed second communication system) are transmitted in OFDM symbols (the claimed one transmission scheme). Ex. 1008, at 21:15-19; 42:2-5; Ex. 1002 ¶184.

The Joint Proposal further specifies that both the legacy and HT transmissions should follow the steps of encoding, interleaving, mapping and inserting pilot symbols specified in the IEEE 802.11a standard. Ex. 1008, at 24:4, 25:3-5, 28:7-9; Ex. 1002 ¶¶185, 186.

The Joint Proposal discloses claim 8[b].

5. **Claim 8[d]: wherein the second communication system has pilot symbols that are denser than those in the first communication system**

The Joint Proposal discloses this limitation because the second communication system includes more pilot symbols per time period than the first communication system. This is disclosed in the Joint Proposal and explained by Dr. Hansen. Ex. 1002 at ¶¶189-196.

First, both the legacy transmission and the HT transmission in the 20MHz channel have the same number of pilot symbols. Ex. 1008, at 16, Table 1 (excepted); Ex. 1002 ¶189.

| Parameter                                     | Value in legacy 20MHz channel | Value in 20MHz HT channel |
|-----------------------------------------------|-------------------------------|---------------------------|
| ⋮                                             |                               |                           |
| N <sub>SP</sub> : Number of pilot subcarriers | 4                             | 4                         |
| ⋮                                             |                               |                           |

**Ex. 1008, Table 1 (excerpted)**

Second, the Joint Proposal discloses a guard interval ( $T_{GI}$ ), which is 0.8 microseconds, and a *short* guard interval ( $T_{GIS}$ ), which is 0.4 microseconds. Ex. 1008, at 17, Table 1(emphasis added); Ex. 1002 ¶190.

|                                                          |                                |
|----------------------------------------------------------|--------------------------------|
| <b><math>T_{GI}</math>: Guard Interval length</b>        | $0.8\mu\text{sec} = T_{FFT}/4$ |
| ⋮                                                        |                                |
| <b><math>T_{GIS}</math>: Short Guard Interval length</b> | $0.4\mu\text{sec} = T_{FFT}/8$ |

**Ex. 1008, Table 1 (excerpted)**

When the 0.8 microsecond guard interval (*i.e.*,  $T_{GI}$ ) is used in data transmission, the symbol interval ( $T_{SYM}$ ), is 4 microseconds. Ex. 1008, at 17; Ex. 1002 ¶191. When the 0.4 microsecond short guard interval (*i.e.*,  $T_{GIS}$ ) is used, the symbol interval ( $T_{SYMS}$ ), is 3.6 microseconds. Ex. 1008, at 17, Table 1 (excerpted and annotated); Ex. 1002 ¶191.

|                                                        |                                                |
|--------------------------------------------------------|------------------------------------------------|
| <b><math>T_{SYM}</math>: Symbol</b>                    | $4\mu\text{sec} = T_{FFT} + \boxed{T_{GI}}$    |
| ⋮                                                      |                                                |
| <b><math>T_{SYMS}</math>: Short GI Symbol Interval</b> | $3.6\mu\text{sec} = T_{FFT} + \boxed{T_{GIS}}$ |

**Ex. 1008, Table 1 (excerpted and annotated)**

The Joint Proposal specifies that the short guard interval (*i.e.*,  $T_{GIS}$ ) is only employed in the HT transmission. Ex. 1008, at 56:1-13; Ex. 1002 ¶192. In the following equation for data transmission in the legacy format to the legacy 802.11a

devices, only  $T_{GI}$  and  $T_{SYM}$  are used. Ex. 1008 at 56: 7-13 (annotated); Ex. 1002 ¶192.

$$r_{LEG-DUP}^{i_{TX}}(t - nT_{SYM}) = \frac{1}{\sqrt{N_{Duplicate}^{Tones}}} w_{TSYM}(t - nT_{SYM})$$

$$\left( \sum_{k=0}^{47} [Q_{M(k)-32}]_{i_{TX},1} d_{k,n} \exp(j2\pi(M(k)-32)(\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}}))) + \right.$$

$$j \sum_{k=0}^{47} [Q_{M(k)+32}]_{i_{TX},1} d_k \exp(j2\pi(M(k)+32)(\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}}))) +$$

$$p_n \sum_{k=-N_{SR}}^{N_{SR}} [Q_{k-32}]_{i_{TX},1} P_k \exp(j2\pi(k-32)\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}}))) +$$

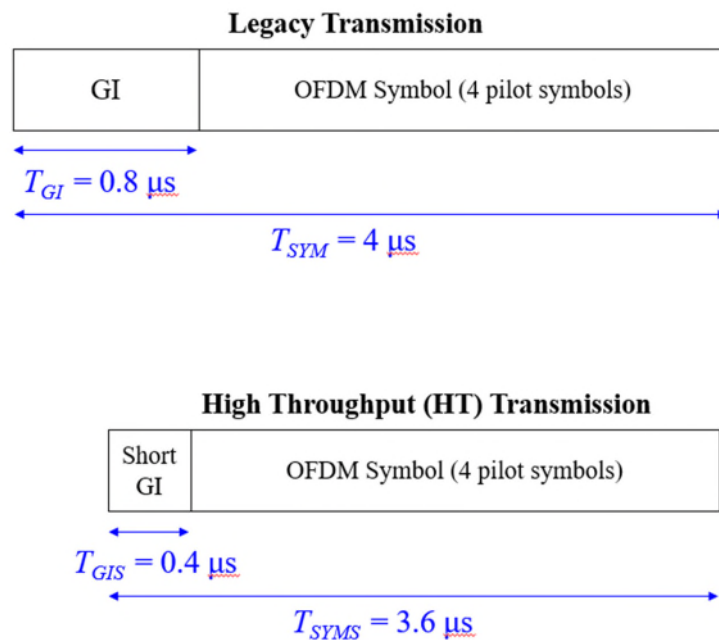
$$\left. jp_n \sum_{k=-N_{SR}}^{N_{SR}} [Q_{k+32}]_{i_{TX},1} P_k \exp(j2\pi(k+32)\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}}))) \right)$$

### Ex. 1008, Legacy 802.11a Transmission Equation

The legacy field is designed to be understood by the legacy 802.11a devices, which will only understand the 0.8 microsecond guard interval. Ex. 1002 ¶193. Thus, when the short guard interval is used in the HT transmission (the claimed second communication system), the short symbol period is shorter than the symbol period in the legacy transmission (the claimed first communication system). Ex. 1002 ¶194. As a result, the pilot symbols (*i.e.*, four pilot symbols) in the HT transmission (the claimed second communication system) are denser than the pilot symbols (*i.e.*, four pilot symbols) in the legacy transmission with a regular symbol period. Ex. 1002 ¶¶195, 196; Ex. 1005.

As shown in the figure below, 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) because both the legacy and HT transmissions carry the same number of pilot symbols in two different length symbol periods. Ex. 1002 ¶195. The Legacy Transmission has 1 pilot symbol per microsecond whereas the HT Transmission has 1 pilot symbol per 0.9 microsecond.

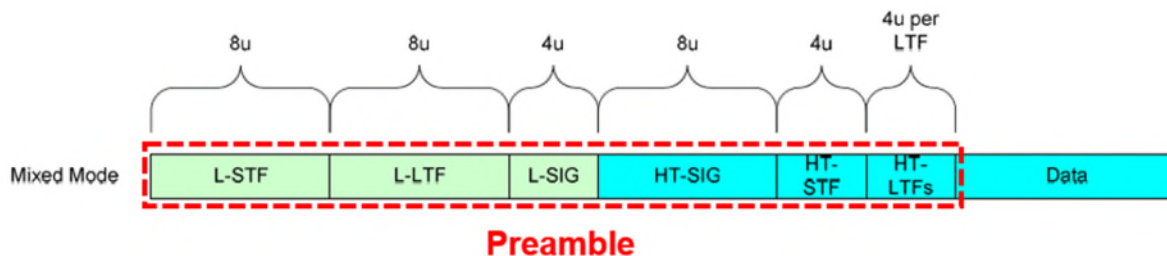


Thus, the Joint Proposal discloses claim [d].

6. **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**

The Joint Proposal discloses this limitation. The Joint Proposal specifies a preamble portion in the packet format including a legacy signal field in the legacy field and an HT signal field in the HT field (the claimed non-data section) that

carry information (the claimed information) for legacy and HT transmissions. Ex. 1008, at 11:18-21, Figure 1 (excerpted and annotated); Ex. 1002 ¶199.



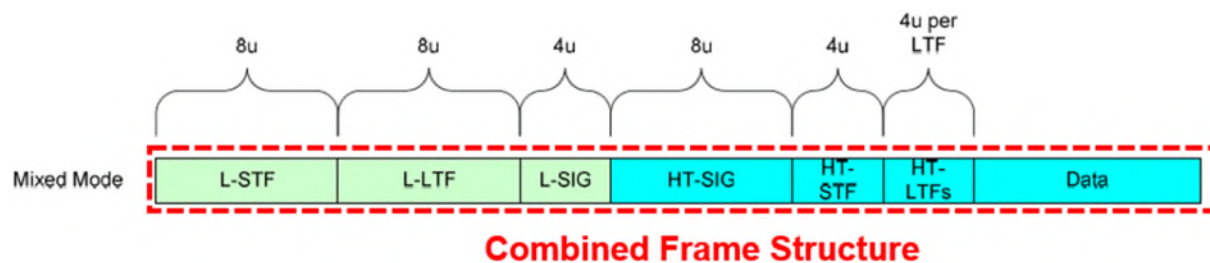
**Ex. 1008, Figure 1 (excerpted and annotated)  
Joint Proposal's Mixed Mode Packet Format**

The Joint Proposal further specifies that the HT signal field in the HT field (the claimed section section) carries information indicating a number of aspects of the data in the HT transmission including, for example, modulation and coding scheme, bandwidth, the number of data bytes in the data field (Ex. 1008, at 26:13-16, Table 7; Ex. 1002 ¶200), and the length of symbol period (the claimed information describing an aspect of data). Ex. 1008, at 56:1-6, Table 7; Ex. 1002 ¶201. If the “Short GI” field is set to “1,” it means that the OFDM symbols in the data field are transmitted with a short guard interval resulting in a short symbol period. Ex. 1008, at 56:1-6, Table 7; Ex. 1002 ¶202. A POSA would understand that the information carried in the HT SIG field (the claimed no-data section) for the HT field (the claimed second section) describes various aspects of data in the HT transmission such as modulation and coding scheme, length of data field, and symbol period. Ex. 1002 ¶203.

Thus, the Joint Proposal discloses claim 8[e].

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

35. The Joint Proposal teaches this limitation. The Joint Proposal's Mixed Mode packet format combines the legacy field (the claimed first section), the HT field (the claimed section section) including the "HT-SIG" field (the claimed non-data section) to form a single data packet or frame (the claimed frame structure) in the Mixed Mode. Ex. 1008, at 11, Figure 1 (excerpted and annotated); Ex. 1002 ¶204.



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

The Joint Proposal specifies that both the legacy and HT transmissions should follow the steps of encoding, interleaving, mapping and inserting pilot symbols specified in the IEEE 802.11a standard. Ex. 1008, at 24:4, 25:3-5; Ex. 1002 ¶205.

Thus, the Joint Proposal discloses claim 8[f]. As the Joint Proposal discloses all elements of claim 8, claim 8 is unpatentable as being anticipated by the Joint Proposal.

**B. Claim 44**

Claim 44 has the same limitation as claim 8, except for the following limitations. Because of these similarities, limitations 44[pre]-44[c] and 44[f]-44[h] are unpatentable for the same reasons given regarding the unpatentability of limitations 8[pre]-8[f]. *Supra* § VII (A); Ex. 1002 ¶207.

**1. Claim 44[d]: wherein: the second format is compatible with the second communication system configured to support higher mobility than the first communication system**

The Joint Proposal teaches this limitation. The '096 patent explains that the legacy system may be susceptible to a Doppler effect, thereby encountering channel estimation error in a high mobility environment because data is transmitted in the legacy system with larger symbol period and less dense pilot symbol placement. Ex. 1001, at 2:6-14; Ex. 1002 ¶209. To improve channel estimation in a high-mobility environment, the '096 patent proposed a frame structure for the “new system” under high mobility that has “a shorter symbol period or more pilot symbols” than the “legacy system.” Ex. 1001, 5:1-18; Ex. 1002 ¶209.

During prosecution the applicants amended the claims to limit that “the second communication system configured to support higher mobility than the first

communication system, wherein each symbol in the second communication system has a shorter symbol period than that in the first communication system.” Ex. 1004 at 80; Ex. 1002 ¶210. To distinguish prior art, the applicants argued that “the pre-designated legacy system transmission period would be susceptible to a Doppler effect in a high mobility scenario, because the placement is designed with a relatively large symbol period, which in turn induces relatively short carrier spacing and less dense pilot symbol placement.” Ex. 1004, at 49, 92; Ex. 1002 ¶210.

In its Motion to Amend in *Inter Partes* Review No. 2021-00743, Patent Owner argued that “the second format...is designed to support higher mobility *i.e.*, speed at which the mobile unit is moving, and uses symbols that are shorter (*i.e.*, the bandwidth is larger) than the symbols in 802.11e.” Ex. 1006, at 5; Ex. 1002 ¶211.

In view of the intrinsic record, a POSA would have understood 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. Ex. 1002 ¶212.

Because the Joint Proposal discloses a short guard interval resulting in a shorter symbol period in the HT transmission (the claimed second communication

system) carrying 4 pilot symbols and a regular guard interval resulting in a regular (longer) symbol period in the legacy transmission (the claimed first communication system) carrying 4 pilot symbols, the Joint Proposal teaches this limitation. *Supra* § VII(A)(5); Ex. 1002 ¶213.

To the extent Patent Owner argues that the Joint Proposal does not explicitly disclose this limitation, a POSA would understand from the teachings of the '096 patent 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[.]” Ex. 1002 ¶214.

It was known in the art that that a wireless communication system in accordance with 802.11 standards may assign shorter OFDM symbol period to users moving at faster speed and assign longer OFDM symbol period to users moving at slower speed. Li (Ex.1021) at [0016], [0035], [0037], [0042]; Ex. 1002 ¶¶99, 101. It further was known in the art that the number of pilot symbols can be adaptively assigned to subcarriers in a MIMO-OFDM system according to each user’s moving speed. Lee (Ex. 1013) at [0014]-[0019], Fig. 12; Ex. 1002 ¶111.

Because the Joint Proposal discloses the HT transmission (the claimed second communication system) with a shorter symbol period and denser pilot symbols than the legacy transmission (the claimed first communication system), a

POSA would understand from the teachings of the Joint Proposal that the HT transmission (the claimed second communication system) necessarily contains the characteristic of supporting the claimed higher mobility. Ex. 1002 ¶215; *see Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268–69, 20 USPQ2d 1746, 1749–50 (Fed. Cir. 1991) (citation omitted) (holding that “[t]o serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence[,]” and “[s]uch evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.”).

Thus, the Joint Proposal discloses 44[d].

2. **Claim 44[e] wherein each symbol in the second communication system has a shorter symbol period than that in the first communication system**

The Joint Proposal’s Mixed Mode packet format specifies a short guard interval in the HT transmission (the claimed second communication system) and such short guard interval results in a shorter symbol period (the claimed shorter symbol period) than the regular symbol period with a regular guard interval in the legacy transmission (the claimed first communication system). *Supra* § VII (A)(5).

Thus, The Joint Proposal discloses this claim 44[e].

As the Joint Proposal discloses all elements of claim 44, claim 44 is unpatentable as being anticipated by the Joint Proposal.

### C. Claim 45

The Joint Proposal discloses claim 45. Claim 45 depends on independent claim 44 and recites that “[t]he method of claim 44, wherein the non-data section comprises mapping information for at least one of the first section and the second section.”

The '096 patent discloses a frame structure including a preamble 10-1, a frame control header (FCH) 11, a downlink map (DL-MAP) 12, a downlink burst (DL burst#1) 13 and a data region (DATA) 14-1. Ex. 1001, at 1:46-57, Fig.1; Ex. 1002 ¶223.

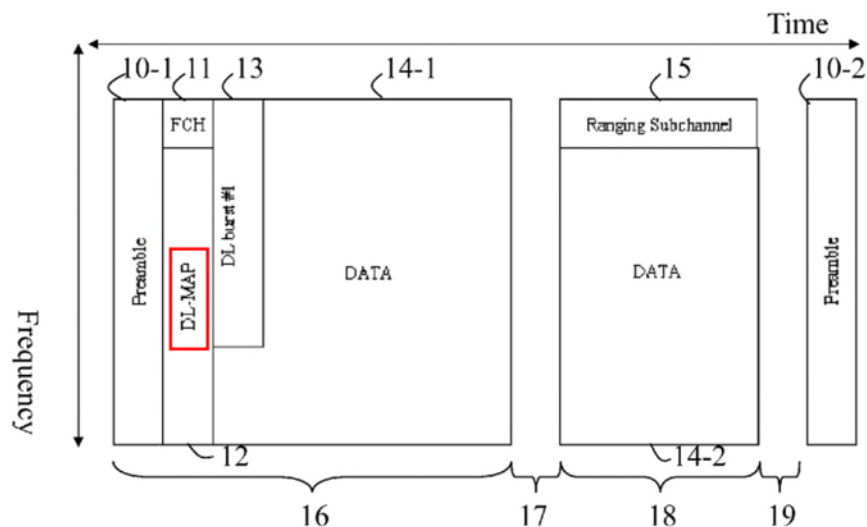
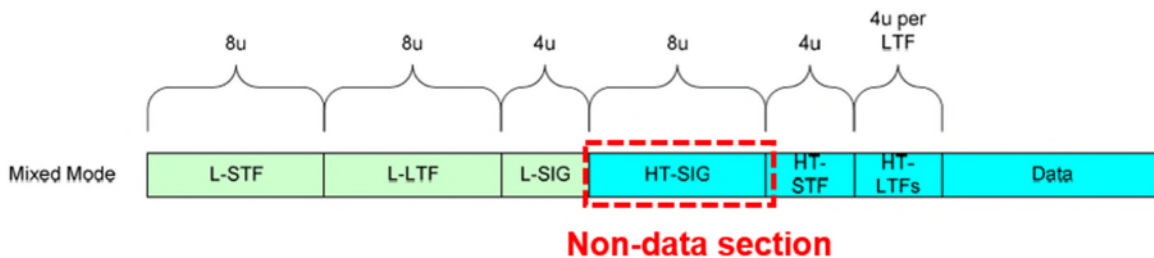


FIG. 1 (Prior Art)

**Ex. 1001, Fig. 1 (annotated)**

A POSA would understand that the frame control header 11, the downlink map 12 and the downlink burst 13 are non-data region (the claimed non-data section), and the claimed “mapping information” is a certain type of information carried in the “DL-MAP12” field for the receiver to understand the “division” or “structure” of data in the “DATA” field. Ex. 1001, at 1:46-57; Ex. 1002 ¶224.

As disclosed in the Joint Proposal (shown below), the preamble of the Mixed Mode packet format carries information in the HT signal (HT-SIG) field (the claimed non-data section) for the receiver to interpret and understand the HT transmission in the HT field (the claimed second section). Ex. 1008, at 26:14-15, Figure 1 (excerpted and annotated); Ex. 1002 ¶225.



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

In this transmission, the HT-SIG field (the claimed non-data section) may carry information indicating, for example, modulation and coding scheme, bandwidth, the number of data bytes in data field (Ex. 1008, Table 7, 26:1-6; 47, 69-74, Table A-1-Table A-11; Ex. 1002 ¶¶226, 227), and the length of symbol period. Ex. 1008, Table 7, 27; Table 7; Ex. 1002 ¶¶228, 229. A POSA would

understand that the information carried in the HT-SIG field specified in the Joint Proposal's Mixed Mode packet format describes the structure and division of data in the HT transmission, and therefore constitutes the claimed "mapping information." *Supra* § V(E); Ex. 1002 ¶230

As the Joint Proposal discloses claim 45, claim 45 is unpatentable as being anticipated by the Joint Proposal.

**D. Claim 46**

The Joint Proposal discloses claim 46. Claim 46 depends on independent claim 44 and recites that "[t]he 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.

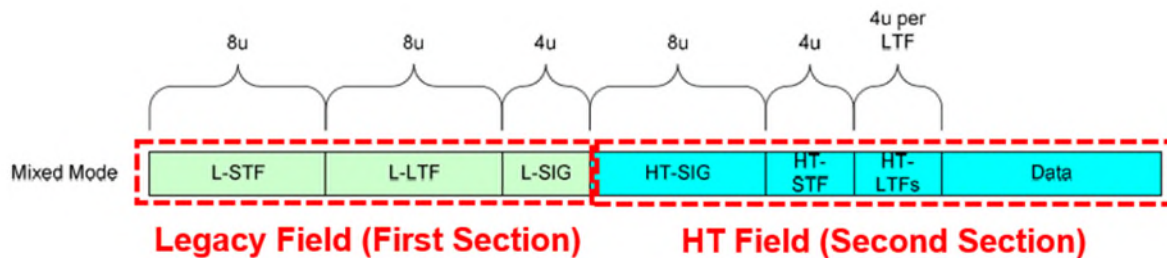
Similar to the claimed "mapping information" in claim 45, a POSA would understand from the teachings of the '096 patent that the "map" recited in claim 46 refers to the "DL-MAP12" field (the claimed non-data section) carrying a certain type of information for the receiver to understand the "division" or "structure" of data in the "DATA" field. *Supra* § VII (C). Accordingly, claim 46 is disclosed by the Joint Proposal for the same reasons given regarding the unpatentability of claim 45. *Supra* § V(E); Ex. 1002 ¶238.

As the Joint Proposal discloses claim 46, claim 46 is unpatentable as being anticipated by the Joint Proposal.

### E. Claim 47

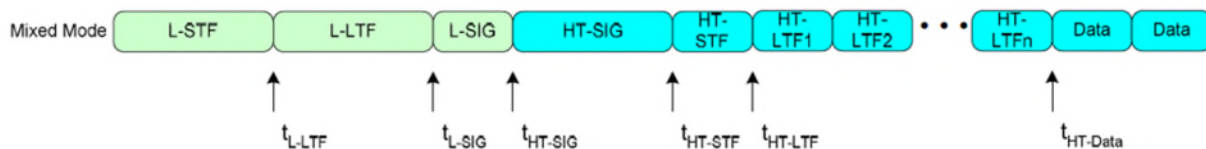
The Joint Proposal discloses claim 47. Claim 47 depends on dependent claim 46 and recites that “[t]he method of claim 46, wherein the second section follows the first section in at least one of time sequence and frequency spectrum.”

The Joint Proposal discloses a Mixed Mode packet format in the following figure. Ex. 1008, at 11, Figure 1 (excerpted and annotated); Ex. 1002 ¶241.



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

The Joint Proposal further illustrates the starting time of each field of the Mixed Mode packet format in the following figure. Ex. 1008 at 18:9-14, Figure 3: Timing boundaries for PPDU Fields; Ex. 1002 ¶242.



**Ex. 1008, Figure 3 (excerpted)  
Timing Boundaries for PPDU Fields**

As shown in Figure 3, a POSA would understand that  $t_{L-LTF}$ ,  $t_{L-SIG}$ , are the starting times for the L-LTF and L-SIG fields in the legacy field (the claimed first

section), respectively, and  $t_{\text{HT-SIG}}$ ,  $t_{\text{HT-STF}}$ ,  $t_{\text{HT-LTF}}$  and  $t_{\text{HT-Data}}$  are the starting times for the HT-SIG, HT-STF, HT-LTF and Data fields in the HT field (the claimed second section), respectively. Ex. 1002 ¶243.

A POSA would understand from the teachings of the Joint Proposal that the HT field (the claimed second section) follows the legacy field (the claimed first section) in time sequence according to the starting times for each field specified in the Joint Proposal. Ex. 1008 at 18:9-14, Figure 3; Ex. 1002 ¶243. Thus, claim 47 is disclosed by the Joint Proposal.

As the Joint Proposal discloses claim 47, claim 47 is unpatentable as being anticipated by the Joint Proposal.

#### **F. Claim 50**

The Joint Proposal discloses this limitation. Claim 50 depends on independent claim 44 and recites that “[t]he method of claim 44, wherein the second section carries mapping information for data in the second section.”

Because the “mapping information” recited in claim 50 is the same limitation as the “mapping information” recited in claim 45, claim 50 is disclosed by the Joint Proposal for the same reasons given regarding the unpatentability of claim 45. *Supra* § VII (C); Ex. 1002 ¶245.

As the Joint Proposal discloses claim 50, claim 50 is unpatentable as being anticipated by the Joint Proposal.

## **VIII. GROUND 2: JOINT PROPOSAL RENDERS CLAIM 49 OBVIOUS IN VIEW OF TRAININ**

Claim 49 is unpatentable as obvious by the Joint Proposal and Trainin.

Claim 49 depends on independent claim 44 and recites that “wherein each of the first section and the second section carries at least one of uplink and downlink data.”

### **A. Scope and Content of the Prior Art**

Joint Proposal teaches all elements of claim 44. To the extent Patent Owner argues that the Joint Proposal does not expressly teach the limitation of claim 49, then this is taught by Trainin.

Trainin discloses an 802.11n mixed mode packet format for wireless communication. *Supra* § VI (C). Trainin further 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. Ex. 1011 at [0020], [0034]; Ex. 1002 ¶¶252, 253.

The teachings of Trainin 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 Joint Proposal. Ex. 1002 ¶254. To combine Trainin with the Joint Proposal, a POSA would understand that the Joint Proposal’s legacy field (the claimed first section) for the legacy transmission via

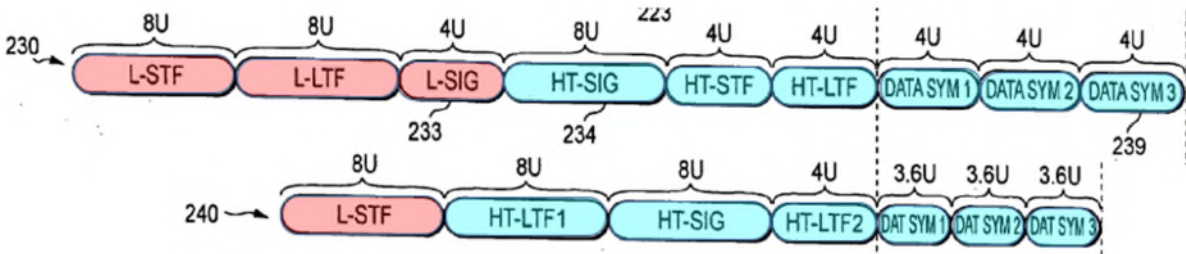
Trainin's downlink and uplink constitutes the claimed "first section" carrying the claimed "at least one of uplink and downlink data." *Id.* In addition, to combine Trainin with the Joint Proposal, a POSA would understand that the Joint Proposal's HT field (the claimed second section) for the HT transmission via Trainin's downlink and uplink constitutes the claimed "second section" carrying the claimed "at least one of uplink and downlink data." *Id.*

Thus, the combination of the Joint Proposal and Trainin discloses claim 49.

**B. Motivation to Combine**

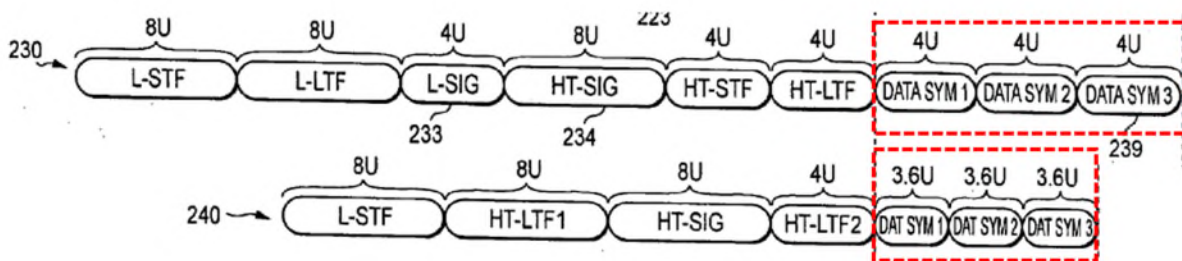
A POSA would have been motivated to combine Trainin with the Joint Proposal.

Both Solomon B. Trainin and Assaf Kasher, the named inventors of Trainin, are listed as co-authors of the Joint Proposal. *Compare* Ex. 1008 at 1, 4 and 6 *with* Ex. 1011; Ex. 1002 ¶256. Trainin references the Joint Proposal: and discloses a "mixed-mode format 230," which is substantially identical to the Mixed Mode packet format specified in the Joint Proposal, in the following figure. Ex. 1011, Fig. 2 (excerpted and color-coding added); Ex. 1002 ¶257.



**Ex. 1011, Fig. 2 (excerpted and color-coding added)  
Trainin's Mixed Mode Frame Format**

Trainin also discloses that the mixed mode format could be selected from a short GI format and a regular GI format. Ex. 1011, at [0032], Fig.2 (excerpted and annotated); Ex. 1002 ¶258.



**Ex. 1011, Figure 2 (excerpted and annotated)  
Training's Mixed Mode Frame Format**

Trainin further discloses that a short GI format provides a data symbol having a length of 3.6 microseconds and that a regular GI format provides a data symbol having a length of 4.0 microseconds. Ex. 1011, at [0032]; Ex. 1002 ¶259. A POSA would understand that the packet structure of Trainin and the packet structure of the Joint Proposal are substantially identical. Ex. 1002 ¶260.

Thus, a POSA would have been motivated to use Trainin's uplink and downlink to transmit data in the packet format specified in the Joint Proposal because 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. Ex. 1011, at [0020]; Ex. 1008, at 10 n.1; Ex. 1002 ¶261.

Furthermore, Trainin expressly teaches that wireless communication using wireless links is known in the art and a combination of wireless links and the PPDUs simply "make[s] up a transmission of wireless signals." Ex. 1011, at [0020], [0034]; Ex. 1002 ¶262.

And as explained by Dr. Hansen, it was well-known in the art to use downlink and uplink for wireless data transmission. Ex. 1002 ¶263; Kim (Ex. 1032), at [0005], [0020] (teaching that RF (radio frequency) channels used by a transmitter to communicate with a receiver are downlink channels, RF (radio frequency) channels used by a receiver to communicate with a transmitter are uplink channels in an MIMO system in accordance with 802.11n.); Yang (Ex. 1033) at 6 (teaching that uplink (UL) transmissions are those from stations to the AP, and downlink (DL) transmissions are those from the AP to stations in the IEEE 802.11n wireless network.).

Thus, a POSA would understand that the combination of the Joint Proposal and Trainin would have been predictable and there would be a reasonable expectation of success of the combination. *Id.* Ex. 1002 ¶263

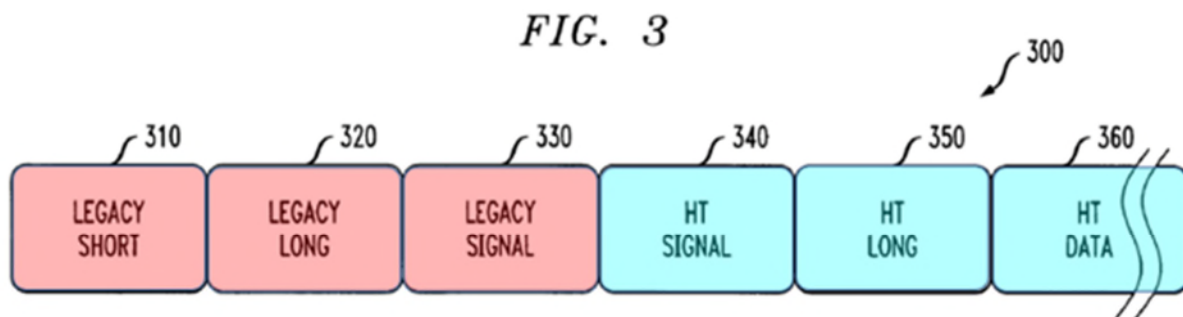
As the combination of the Joint Proposal and Trainin discloses claim 49, and a POSA would have been motivated to combine the references, claim 49 is unpatentable as obvious by the Joint Proposal and Trainin.

#### **IX. GROUND 3: MUJTABA ANTICIPATES CLAIM 8**

Claim 8 is unpatentable as being anticipated by Mujtaba.

1. **Claim 8[pre]: A method of constructing a frame structure for data transmission, the method comprising**

To the extent that the preamble is limiting, Mujtaba discloses it. As illustrated in Figure 3, Mujtaba discloses “constructing” a packet format for 802.11n by combining the legacy field (310, 320, 330) with the HT field (340, 350, 360) in one packet format. Ex. 1010, at [0019], Figure 3 (color-coding added); Ex. 1002 ¶¶266, 267.

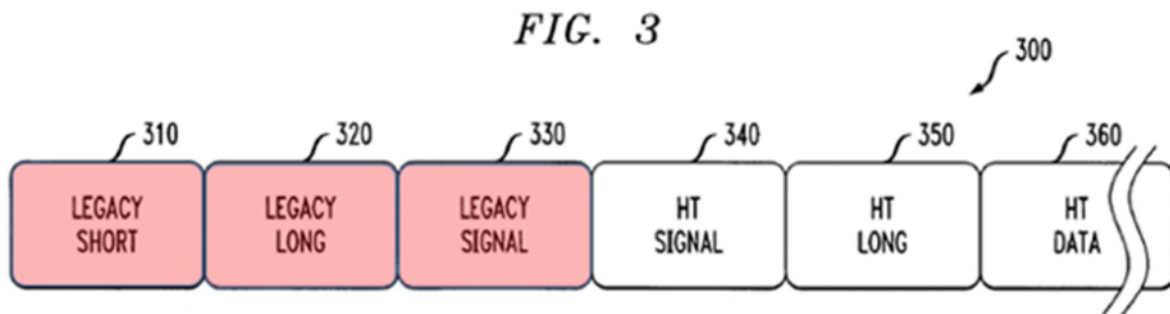


**Ex. 1010, Fig. 3 (color-coding added)  
Mujtaba's Packet Format**

Thus, Mujtaba discloses this preamble.

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

Mujtaba discloses this limitation. Mujtaba discloses a packet format for 802.11n in the following figure. Ex. 1010, Figure 3 (color-coding added); Ex. 1002 ¶270.



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

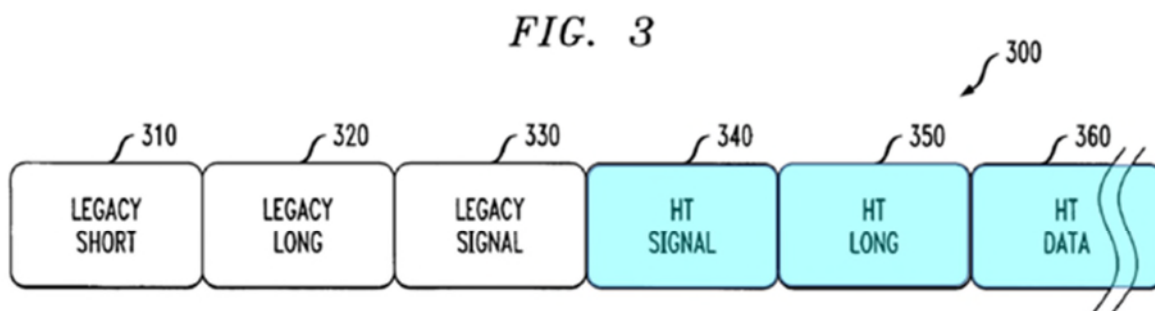
Mujtaba teaches that the packet format with a preamble (300) including a legacy field (the claimed first section) consisting of a legacy short training field (310), a legacy long training field (320) and a legacy signal field (330). Ex. 1010, [0019]; Ex. 1002 ¶271. Mujtaba explains that each preamble can be used to decode payload. Ex. 1010, [0018]; Ex. 1002 ¶271. 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). Ex. 1002 ¶271. Mujtaba also discloses that the legacy field transmission uses OFDM symbol. Ex. 1010, [0016]; Ex. 1002 ¶272.

Thus, Mujtaba discloses claim 8[a].

3. **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**

Mujtaba discloses this limitation. Specifically, Mujtaba discloses a packet format for 802.11n in the following figure. Ex. 1010, Figure 3 (color-coding added); Ex. 1002 ¶274.



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

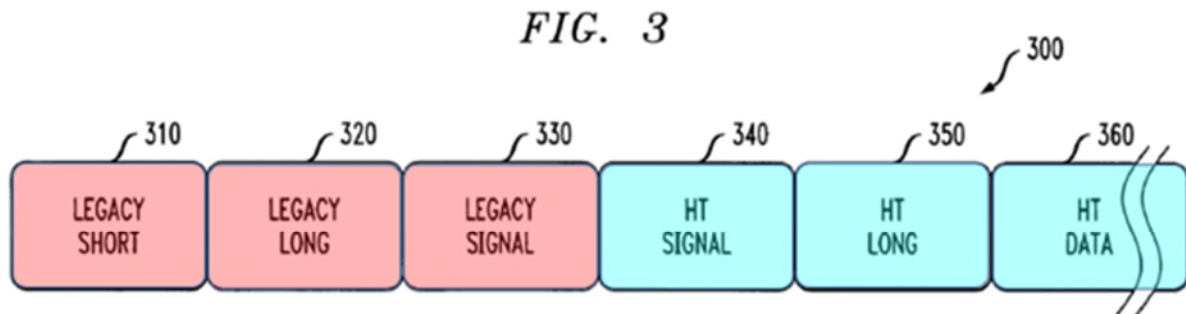
Mujtaba teaches that preamble (300) includes an HT field (the claimed second section) following the legacy field (the claimed first section). Ex. 1010, [0019]; Ex. 1002 ¶275. A POSA would have understood from Mujtaba that the HT field (the claimed first section) carries information in the HT format (the

claimed second format) that enables payload (*i.e.*, data) to be compatible with HT devices (the claimed second communication system). Ex. 1002 ¶276. Mujtaba also discloses that the HT field transmission uses OFDM symbol. Ex. 1010, [0016]; Ex. 1002 ¶276.

Thus, Mujtaba discloses claim 8[b].

4. **Claim 8[c]: wherein the first communication system's symbols and the second communication system's symbols co-exist in one transmission scheme**

Mujtaba discloses this limitation. Mujtaba discloses a packet format for 802.11n in the following figure. Ex. 1010, [0019], Figure 3 (color-coding added); Ex. 1002 ¶278.



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

A POSA would understand from Mujtaba that the packet format disclosed in Figure 3 shows that the symbols in the legacy field for the legacy transmission (the claimed first communication's symbols) and the symbols in the HT field for the HT transmission (the claimed second communication's symbols) co-exist in one

packet frame. Ex. 1002 ¶279. This is further supported by Mujtaba's recognition that the transmission scheme is compatible with legacy systems. *Id.*

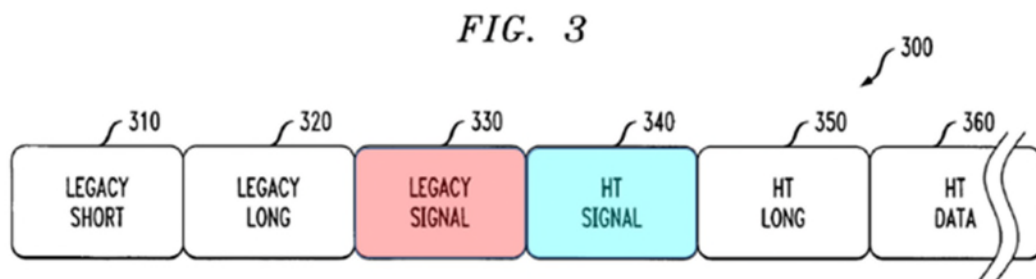
Thus, Mujtaba discloses claim 8[c].

5. **Claim 8[d]: wherein the second communication system has pilot symbols that are denser than those in the first communication system**

Mujtaba discloses this limitation. Mujtaba discloses a system where data is transmitted in a multiple antenna communication system by selecting a number of pilot tones to be employed to transmit the data. Ex. 1010, [0008], [0009]; Ex. 1002 ¶282.

Mujtaba explains that 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. Ex. 1010, [0008]; Ex. 1002 ¶283.

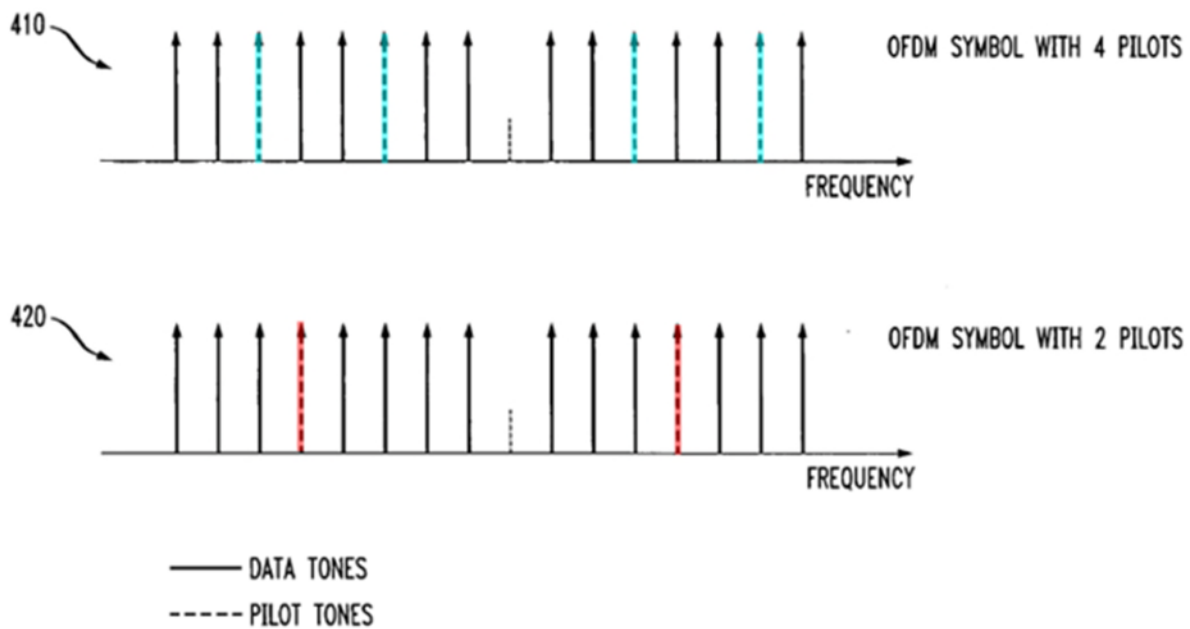
Mujtaba goes on to disclose a packet format in Figure 3 showing a legacy signal field (330) in the legacy field and an HT signal field (340) in the HT field. Ex. 1010, [0019], Fig. 3 (color-coding added); Ex. 1002 ¶284.



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

Mujtaba also provides two exemplary OFDM symbols carrying two pilot symbols and four pilot symbols, respectively. Ex. 1010, [0024], Fig. 4 (color-coding added); Ex. 1002 ¶285.

*FIG. 4*



**Ex. 1010, Fig. 4 (color-coding added)**

Mujtaba further states that the HT signal field, as an example, can carry the number of two, four or six pilot symbols to the receiver. Ex. 1010, [0019]; Ex. 1002 ¶286. Mujtaba further teaches a guard interval added to each OFDM symbol. Ex. 1010, [0016], [0017]; Ex. 1002 ¶287.

Thus, 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). Ex. 1002 ¶289. As Dr. Hansen confirms, Mujtaba discloses (1) OFDM symbols are transmitted in a guard interval and (2) 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. Ex. 1002 ¶288. And it was also known that the 802.11a legacy transmission (as referred to in Mujtaba) uses four pilot symbols. *Id.* ¶289; *see also* Mujtaba II (Ex. 1012), at [0004], [0015], [0017], [0020]. These teachings demonstrate to a POSA that the pilot symbols in the HT transmission are denser than the pilot symbols in the legacy transmission. *Id.*

Thus, Mujtaba discloses claim 8[d].

**6. 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**

Mujtaba discloses this limitation. Mujtaba discloses that the signal field (the claimed non-data section) may include not only the number of pilot symbols, but also other parameters such as data rate, coding rate and modulation (the claimed

information describing an aspect of data) for the receiver to decode payload.

*Supra* § V(E); Ex. 1010, [0015]; Ex. 1002 ¶293.

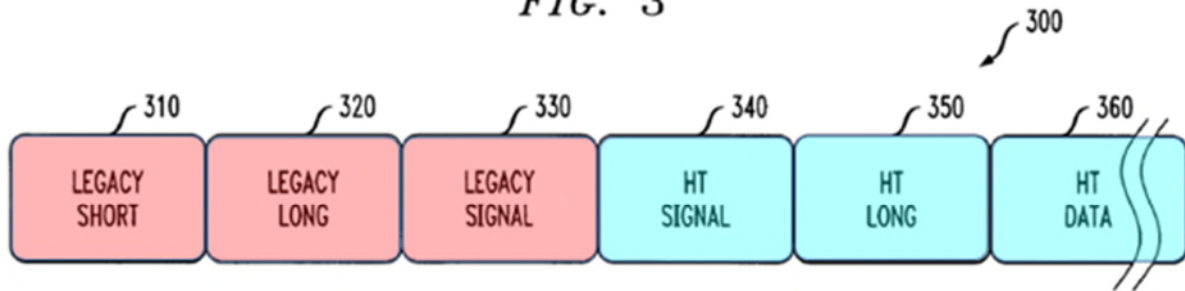
A POSA would understand from the teachings of Mujtaba that both the legacy signal field (the claimed non-data section) in the legacy field (the claimed first section) and the HT signal field (the claimed non-data section) in the HT field (the claimed section section) may contain information describing a number of aspects of the payload such as the number of pilot symbols, data rate, coding rate and modulation rate. *Id.*; *Supra* § V(E).

Thus, claim 8[e] is disclosed by Mujtaba.

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

Mujtaba discloses this limitation. A POSA would understand from the teachings of Mujtaba that the packet format shown in Figure 3 combines the legacy field preamble (the claimed first section) including the legacy signal field (the claimed non-data section) and the HT field (the claimed second section) including the HT signal field (the claimed non-data section) to form a single data packet (the claimed frame structure). Ex. 1010, [0018], Figure 3 (color-coding added); Ex. 1002 ¶295.

FIG. 3



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

In addition, the signals in both the legacy field and the HT field are encoded, interleaved and mapped, and have a guard interval added to each OFDM symbol.

Ex. 1010, [0016]; Ex. 1002 ¶296. Thus, claim 8[f] is disclosed by Mujtaba.

As Mujtaba discloses all elements of claim 8, claim 8 is unpatentable as being anticipated by Mujtaba.

**X. GROUND 4: MUJTABA IN VIEW OF TRAININ RENDERS CLAIMS 8, 44-47 AND 49-50 OBVIOUS**

Claims 8, 44-47 and 49-50 are unpatentable as obvious by the combination of Mujtaba and Trainin.

Trainin discloses an 802.11n mixed mode packet format with a short guard interval in the HT transmission. *Supra* § VI (C). Trainin further discloses that the 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. *Supra* § VIII (A).

The teachings of Trainin to use a short guard interval for the HT transmission in the mixed mode format via a downlink and an uplink could be used to transmit data in Mujtaba's the packet format with a legacy field for the legacy transmission and an HT field for the HT transmission carrying a fixed number of pilot symbols, respectively. Ex. 1002 ¶¶306, 307.

**A. Motivation to Combine**

A POSA would have been motivated to combine Mujtaba with Trainin.

Syed Aon Mujtaba, the name inventor of Mujtaba, is listed as a co-author of the Joint proposal. *Compare* Ex. 1008, at 5 *with* Ex. 1010, cover. In addition, both Solomon B. Trainin and Assaf Kasher, the named inventors in Trainin, are also listed as co-authors of the Joint Proposal. *Compare* Ex. 1008, at 1, 4 and 6 *with* Ex. 1011, cover. The content of the Joint Proposal and Trainin were well-known to the named individuals at the time. Ex. 1002 ¶309.

Mujtaba's system teaches a wireless data transmission in a packet format including legacy fields and HT fields in accordance with 802.11n. *Supra* §VI(B). Trainin also teaches a mixed-mode transmission, including legacy transmission and HT transmission, which is also in accordance with 802.11n. *Supra* §VI(C) Thus, both Mujtaba and Trainin are in the same field of endeavor. Ex. 1002 ¶314.

Moreover, Trainin expressly teaches that “the traffic that may be carried via links 128, 138, and 148 may include packets, frames, or other collections of signals and/or data, such as, *e.g.*, media access controller (MAC) protocol data units (MPDUs) and/or physical layer (PHY) protocol data units (PPDUs).” Ex. 1011 at [0020]; Ex. 1002 ¶315. 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). *Id.* A POSA would also understand from the teachings of Mujtaba that the legacy field (the claimed first section) and the HT field (the claimed section section) are nothing more than a PPDU packet or frame. Ex. 1010, at [0018] (stating that a typical packet format for an exemplary IEEE 802.11 is PLCP Protocol Data Units (PPDU).); Ex. 1002 ¶315.

Additionally, a POSA would understand 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. Ex. 1002 ¶316.

First, Mujtaba explicitly teaches that increasing the number of pilot symbols improves channel estimation. Ex. 1010 at [0006], [0021]; Ex. 1002 ¶316. This is exactly the same problem that the ’096 patent intended to solve. Ex. 1001, at 7:61-8:6; Ex. 1002 ¶310.

Second, 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.**” Ex. 1011 at [0020] (emphasis added); Ex. 1002 ¶316.

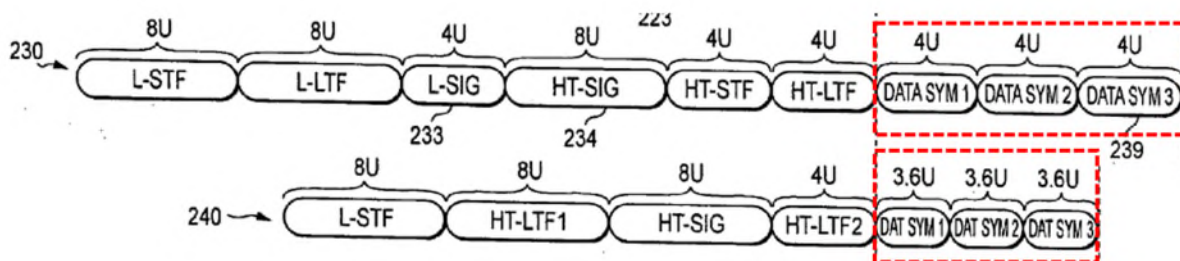
Thus, the combination of Trainin and Mujtaba simply constitutes a conventional wireless transmission system. ¶¶316, 317; *see also* Kim (Ex. 1032), at [0005], [0020] (teaching that RF (radio frequency) channels used by a transmitter to communicate with a receiver are downlink channels, RF (radio frequency) channels used by a receiver to communicate with a transmitter are uplink channels in an MIMO system in accordance with 802.11n.); Yang (Ex. 1033) at 6 (teaching that uplink (UL) transmissions are those from stations to the AP, and downlink (DL) transmissions are those from the AP to stations in the IEEE 802.11n wireless network.); Mujtaba II (Ex. , at [0004],[0015], [0017], [0020] (disclosing four pilot symbols employed to transmit data in OFDM symbols in legacy 802.11 systems.).

Thus, a POSA would have been motivated to combine Mujtaba with Trainin.

## **B. Claim 8**

To the extent Patent Owner argues that Mujtaba does not explicitly teach claim 8, the combination of Mujtaba and Trainin discloses claim 8.

Trainin discloses an 802.11n mixed mode packet format for wireless communication. *Supra* § VI (C); Ex. 1002 ¶303. Trainin further discloses a shortened guard interval (GI) resulting in a short symbol period, which is only available in the HT transmission. Ex. 1011, [0032], Fig.2 (excerpted and annotated); Ex. 1002 ¶304.



**Ex. 1011, Figure 2 (excerpted and annotated)  
Training's Mixed Mode Frame Format**

Trainin also discloses that the short symbol period is 3.6 microseconds and the regular symbol period is 4.0 microseconds. Ex. 1011, [0033]; Ex. 1002 ¶305.

The combination of Mujtaba and Trainin discloses all elements of claim 8 because Mujtaba's teaching of selecting, for example, four pilot symbols employed in both the legacy (claimed first communication system) and the HT transmission (the claimed second communication system) in combination with Trainin's teachings of using a regular guard interval in the legacy transmission and a short guard interval in the HT transmission result in that 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).

*Supra* § IX; Ex. 1002 ¶¶306, 307.

**C. Claim 44**

Claim 44 has the same limitation as claim 8, except for limitation 44[d] and limitation 44[e]. Because of these similarities, limitations 44[pre]-44[c] and 44[f]-44[h] are unpatentable for the same reasons given regarding the unpatentability of limitations 8[pre]-8[f]. *Supra* § X(B); Ex. 1002 ¶318.

**1. Claim 44[d]: wherein: the second format is compatible with the second communication system configured to support higher mobility than the first communication system**

Claim 44[d] is disclosed by the combination of Mujtaba and Trainin.

A POSA 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. *Supra* § VII (B)(1); Ex. 1002 ¶324. And the combination of Trainin and Mujtaba discloses this limitation *Supra* § X(B); Ex. 1002 ¶325.

To the extent Patent Owner argues that the combination of Mujtaba and Trainin does not explicitly teach this limitation, 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[.]” Ex. 1002 ¶326.

Because the combination of Mujtaba and Trainin discloses the HT transmission (the claimed second communication system) with a shorter symbol period and denser pilot symbols than the legacy transmission (the claimed first communication system), a POSA would understand from the combination that the HT transmission (the claimed second communication system) necessarily contains the characteristic of supporting the claimed higher mobility. Ex. 1002 ¶327; *see Pharmaceuticals, Inc.*, 773 F.3d 1186, 112 USPQ2d 1945, 1952 (Fed. Cir. 2014) (citation omitted) (holding that “in order to rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis – the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art.”).

Thus, the combination of Mujtaba and Trainin discloses claim 44 [d].

2. **Claim 44[e]: wherein each symbol in the second communication system has a shorter symbol period than that in the first communication system**

Claim 44[e] is disclosed by Trainin. Train discloses an 802.11n frame structure including a legacy field followed by an HT field and further teaches that a short guard interval, resulting in a shorter symbol period than the legacy transmission (the claimed first communication system), is available for the HT

transmission (the claimed second communication system. *Supra* §§ VI(C), VIII(A), X(B).

**D. Claim 45**

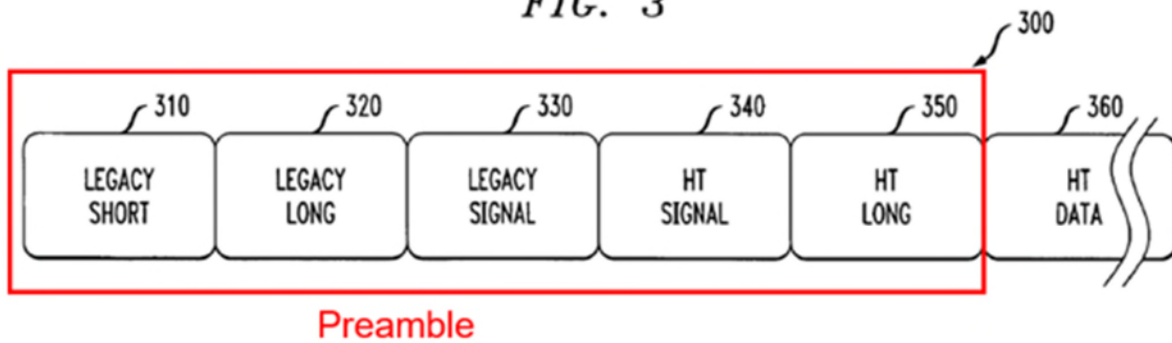
Claim 45 depends on independent claim 44 and recites that “wherein the non-data section comprises mapping information for at least one of the first section and the second section.” The combination of Mujtaba and Trainin discloses this limitation.

A POSA would understand that the claimed “mapping information” is a certain type of information carried in a preamble (*e.g.*, DL-MAP12) field for the receiver to understand the “division” or “structure” of the data field. *Supra* § VII (C); Ex. 1002 ¶346.

The combination of Mujtaba and Trainin discloses claim 45. Mujtaba discloses a data packet format with a preamble including “SIGNAL field” followed by a payload for carrying data and further teaches that the signal field (the claimed no-data section) may carry information indicating to the receiver the parameters, that are required to successfully decode the payload (*i.e.*, data), such as data rate, coding rate and modulation level (the claimed information mapping information). Ex. 1010 at [0015]; Ex. 1002 ¶347.

Mujtaba also discloses a preamble field (310-350) followed by the data field (360) in the following figure. Ex. 1010, Fig. 3; Ex. 1002 ¶350.

FIG. 3



**Ex. 1010, Fig. 3 (annotated)  
Mujtaba's Packet Format**

According to Mujtaba, the preamble 300 includes a legacy field (310-330) (the claimed first section) and an HT field (340-360) (the claimed second section). Ex. 1010, [0019]; Ex. 1002 ¶351. Mujtaba explains that the HT SIGNAL field 340 (the claimed non-data section) may convey to the receiver the number of pilot tones (the claimed mapping information). *Id.*

A POSA would understand from the teachings of Mujtaba that the preamble includes the signal field (the claimed non-data section) in both the legacy field (the claimed first section) and the HT field (the claimed second section) is a non-data section. Ex. 1002 ¶352. A POSA would understand from the teachings of Mujtaba that the “relevant information” in the signal field (the claimed non-data section) indicating data rate, coding rate, modulation level, synchronization, and the number of pilot symbols (the claimed mapping information) is the information that may be used to identify the “division” or “structure” of the data field. *Id.*

In addition to Mujtaba’s teachings, Trainin also discloses a preamble in the legacy format in accordance with 802.11a and such preamble has a “legacy signal field 213” (the claimed non-data section) that is used to identify the type of modulation scheme used and the legacy signal field may include information such as the data rate and the length of the subsequent data portion (the claimed mapping information). Ex. 1011, at [0030], Fig. 2; Ex. 1002 ¶353.

A POSA would understand from the teachings of Trainin that the preamble including the signal field in both the legacy field (the claimed first section) and the HT field (the claimed second section) are non-data fields. Ex. 1002 ¶354. A POSA would understand from the teachings of Trainin that both the legacy signal and HT signal fields in the preamble (the claimed non-data section) carry the information that may be used to identify the “division” or “structure” of the data field (the claimed mapping information). *Id.*

**E. Claim 46**

Claim 46 depends on independent claim 44 and recites that “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.”

The claimed non-data section comprising a “map” is disclosed by the combination of Mujtaba (Ex. 1002 ¶375) and Trainin. *Supra* §§ V(E), X(D); Ex. 1002 ¶377.

**F. Claim 47**

Claim 47 depends on independent claim 46 and recites “wherein the second section follows the first section in at least one of time sequence and frequency spectrum.”

This limitation is disclosed by Trainin. Trainin discloses a packet frame in the following figure including a legacy preamble (*i.e.*, 802.11a) and an HT preamble (*i.e.*, 802.11n) following by data fields. Ex. 1011 at [0020], [0024], [0025], Fig. 2 (excerpted and color-coding added); Ex. 1002 ¶392.



**Ex. 1011, Fig. 2 (excerpted and color-coding added)  
Trainin's Mixed Mode Frame Format**

As shown in Figure 2 of Trainin, each field in the legacy field and the HT field (the claimed first and second sections) is positioned within the frame time (the claimed time sequence). Ex. 1011, Fig. 2; Ex. 1002 ¶393. For example, L-STF, L-LTF and L-SIG in the legacy field (the claimed first section) are assigned with 8 microseconds, 8 microseconds and 4 microseconds, respectively. *Id.*

Following the legacy field (the claimed first section) within the frame time, HT-SIG, HT-STF and HT-LTF in the HT field (the claimed second section) are assigned with 8 microseconds, 4 microseconds and 4 microseconds, respectively.

*Id.*

From the teachings of Trainin, a POSA would understand that the transmission in the HT field (the claimed second section) follows the transmission in the legacy field (the claimed first section) in time sequence. Ex. 1002 ¶394.

**G. Claim 49**

Claim 49 depends on independent claim 44 and recites that “wherein each of the first section and the second section carries at least one of uplink and downlink data.”

The combination of Mujtaba and Trainin discloses claim 49. Specifically, Trainin discloses using an uplink and a downlink for wireless data transmission between transmitters and receivers. *Supra* §§ VI(C), VIII (A); Ex. 1002 ¶412.

A POSA would understand that the teachings of Trainin using a downlink and an uplink for data transmission between a transmitter and a receiver could be used to transmit data in Mujtaba’s packet format including a legacy field for the legacy transmission and an HT field for the HT transmission. Ex. 1002 ¶414.

To combine Trainin with Mujtaba, a POSA would understand that Mujtaba’s legacy field (the claimed first section) for the legacy transmission via Trainin’s

downlink and uplink constitutes the claimed “first section” carrying the claimed “at least one of uplink and downlink data.” *Id.* In addition, to combine Trainin with Mujtaba, a POSA would understand that Mujtaba’s HT field (the claimed second section) for the HT transmission via Trainin’s downlink and uplink constitutes the claimed “second section” carrying the claimed “at least one of uplink and downlink data.” *Id.*

#### **H. Claim 50**

Claim 50 depends on independent claim 44 and recites that “wherein the second section carries mapping information for data in the second section.”

Because the “mapping information” recited in claim 50 is the same limitation as the “mapping information” recited in claim 45, claim 50 is disclosed by the combination of Mujtaba with Trainin for the same reasons given regarding the unpatentability of claim 45. *Supra* § X(D); Ex. 1002 ¶426.

### **XI. INSTITUTION SHOULD BE GRANTED**

Petitioner submits that the compelling evidence presented in this Petition establishes a strong likelihood that Petitioner will prevail with respect to at least one of the Challenged Claims.

#### **A. 35 U.S.C. § 325 (d)**

None of the Joint Proposal, Mujtaba and Trainin was identified either by the Applicants or the Examiner during original prosecution, by Petitioner Qualcomm

in *Inter Partes* Review No. 2021-00743, or by any other IPR petitioned previously. Accordingly, Section 325 does not apply.

**B. 35 U.S.C. § 314 (a)—*Fintiv***

An initial scheduling order in the District Court Action was just recently entered on December 18, 2023. Petitioner is not a party to the District Court Action, although it has timely moved to intervene in the case. Briefing on the motion to intervene should be complete in early January 2024.<sup>2</sup> Petitioner's filing and prosecution of this Petition is in no way dependent on its pending motion to intervene in the District Court Action or on the Court's ruling on that motion.

The Board considers the *Fintiv* factors when determining whether a co-pending action bears on institution. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, (PTAB Mar. 20, 2020) ("*Fintiv*"). Petitioner submits that these factors weigh strongly in favor of institution. In particular, (1) Petitioner is not a current party to the District Court Action, (2) any trial will not occur under the current schedule until May 2025 at the earliest, (3) almost no work has occurred in the district court, (4) Petitioner diligently prepared this petition, (5) this petition

---

<sup>2</sup> Petitioner filed a motion to intervene on November 22, 2023; Patent Owner filed an opposition to the motion on December 20; and Petitioner's reply on the motion is currently due to be filed on January 8, 2024.

challenges claims not at issue in the District Court Action, and (6) the petition is substantively strong.

**1. Factor 1**

Petitioner is not a party to the District Court Action. If the court were to grant Petitioner's motion to intervene, and if institution were granted, then Petitioner may file a stay motion. It is not possible to predict how or when the district court will rule on the pending motion to intervene. Thus, this factor is neutral. *See Sand Revolution II, LLC v. Cont'l Intermodal Grp. – Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) ("*Sand Revolution*") (the Board will not attempt to predict how the district court litigation will proceed).

**2. Factor 2**

For the District Court Action in which Petitioner has sought to intervene, the initial scheduling order currently has set "Jury Selection/Trial" for May 19, 2025. Ex. 1031. This factor is neutral, particularly since Petitioner is not a party to the District Court Action, and the earliest trial date initially set by the district court is still almost 18 months away, near the date of any final decision in this proceeding. *Nvidia Corp. v. Invensas Corp.*, IPR2020-00603, Paper 11 at 23 (PTAB Sept. 3, 2020).

**3. Factor 3**

To the extent the Board were to consider the current status of the District Court Action, the parties and Court appear to have invested little in the action. The

parties are many months away from the exchange of claim construction terms and have not yet conducted any substantial fact discovery. No fact or expert discovery has been served or conducted. No summary judgment or other dispositive motions have been filed. Further, Petitioner acted expeditiously in preparing and filing this Petition, a mere 3 months after one of its customers was sued on the '096 patent.

*Fintiv*, IPR2020-00019, Paper 11 at 11.

This factor weighs in favor of institution. *See Sand Revolution* at 10-11.

#### **4. Factor 4**

This factor also favors institution and should be given significant weight because Petition challenges claims not currently at issue in the District Court Action. Specifically, Patent Owner does not assert Claims 44-47 and 49-50 in the District Court Action. *See Ex. 1028* at 1-2. Those claims are challenged here.

Moreover, if this petition is instituted on the '096 patent, and if Petitioner is permitted to intervene in the District Court Action, Petitioner stipulates it will not pursue any instituted grounds as invalidity defenses in the District Court Action, thus completely eliminating any overlap in issues. The Board has found that such stipulations weigh in favor of institution. *See Sand Revolution* at 11-12; *Apple Inc. v. Maxell, Ltd.*, IPR2020-00204, Paper 11 at 15-17 (PTAB June 19, 2020).

Accordingly, this factor weighs strongly in favor of institution.

**5. Factor 5**

This factor weighs against discretionary denial when the petitioner is not the same party as the defendant. *Fintiv*, IPR2020-00019, Paper 11 at 13 (considering “whether the petitioner and the defendant in the parallel proceeding are the same party”); *id.* at 10 11, n.20 (“If the parallel litigation involves a party different than Petitioner, this fact weighs against exercising authority to deny institution[.]”). Petitioner is not a current party in the District Court Action, and it is not affiliated with the defendants in that action. This factor therefore weighs against denial.

**6. Factor 6**

The Board has explained that if the merits of the petition are strong, then institution may “serve the interest of overall system efficiency and integrity because it allows the proceeding to continue in the event that the parallel proceeding settles or fails to resolve the patentability question presented in the PTAB proceeding.” *Fintiv* at 15; *see also*, *Samsung Elecs. Co. v. Scramoge Tech., Ltd.*, IPR2022-00241, Paper 10 (June 13, 2022) (*Fintiv* analysis concludes that “very strong” evidence on the merits outweigh concurrent litigation involving earlier scheduled trial date and significant overlap in proceedings). Petitioner submits that its petition has significant substantive merit.

The public records demonstrate that at least one of the named inventors affiliated with the original assignee ITRI of the '096 patent was a member of the

TGn since as early as 2004, and none of the named inventors of the '096 patent was involved in the Joint Proposal specifying the packet format for 802.11n, featured with a short symbol period and denser pilot symbols in the HT transmission, with backward compatibility in the legacy systems. Ex. 1002 ¶83.

The public records further show that the packet format specified in the Joint Proposal became publicly available long before TGM's earliest call for proposals to develop 802.16m, at which the '096 patent is seemingly directed. *Supra* § VI (A). And both Mujtaba and Trainin expressly reference 802.11n and disclose a packet format which is substantially identical to the mixed mode packet format specified in the Joint Proposal and the "frame structure" claimed in the '096 patent.

Under the circumstances where the Board found challenged claims 1-4 and 6-7 unpatentable as obvious in IPR2021-00375, Petitioner advances this Petition with two succinct anticipation arguments based upon previously unconsidered references that undisputedly cover the exact same technology. The strength of the present Petition strongly weighs in favor of institution. Moreover, Patent Owner asserts that certain 802.11ac/ax compliant products, which are ubiquitous, infringe the '096 patent. Given the substantial impact that the '096 patent could have on the industry, it is in the public interest to address invalidity, especially under new prior art never before submitted to the Board. And as the Supreme Court recently explained, there is a significant public interest against "leaving bad patents

enforceable.” *Thryv, Inc. v. Click-To-Call Techs., LP*, 140 S. Ct. 1367, 1374 (2020).

Thus, this factor strongly favors institution.

## **XII. CONCLUSION**

As explained above, Petitioner is likely to prevail in showing that at least one of the challenged claims of the '096 patent is unpatentable and requests that IPR be instituted and that the challenged claims be canceled.

Dated: January 3, 2024

By: /Christopher J. Higgins/

---

Christopher J. Higgins, Reg. No. 66,422  
Orrick, Herrington & Sutcliffe LLP  
1152 15th Street, N.W.  
Washington, DC 20005-1706  
Telephone: (202) 339-8400  
Facsimile: (202) 339-8500  
0CHPTABDocket@orrick.com

*Attorneys for Petitioner*

## **CERTIFICATE OF WORD COUNT**

The undersigned certifies that the foregoing PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,265,096 PURSUANT TO 35 U.S.C. § 312 AND 37 C.F.R. § 42.104 complies with the type volume limitation in 37 C.F.R. § 42.24(a)(1)(i). According to the utilized word-processing system's word count, the petition—excluding the caption, table of contents, table of exhibits, mandatory notices, certificate of word count, and certificate of service—contains 13,194 words.

Dated: January 3, 2024

By: /Christopher J. Higgins/

Christopher J. Higgins

*Attorney for Petitioner*

## CERTIFICATE OF SERVICE

The undersigned hereby confirms that the foregoing Petition for *Inter Partes* Review and associated exhibits were caused to be served on January 3, 2024 via overnight courier upon the following counsel of record for Patent Owner:

Alston & Bird LLP  
Vantage South End  
1120 South Tryon Street  
Suite 300  
Charlotte, NC 28203

Courtesy copies were also served via electronic mail on Patent Owner's counsel of record in a related district court litigation:

Michael W. Shore (mshore@shorefirm.com)  
Chijioke E. Offer (coffor@shorefirm.com)  
THE SHORE FIRM LLP  
901 Main Street, Suite 3300  
Dallas, Texas 75202

Charles L. Ainsworth (charley@pbatyler.com)  
Robert Christopher Bunt (rcbunt@pbatyler.com)  
PARKER, BUNT & AINSWORTH, P.C.  
100 East Ferguson, Suite 418  
Tyler, Texas 75702

By: /Christopher J. Higgins/

Christopher J. Higgins  
Reg. No. 66,422