IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC., Plaintiff, v. HP INC. Defendant.	Civil Case No. 2:24-cv-00752-JRG [Lead Case]
WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC., Plaintiff, v. SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC. Defendants.	Civil Case No. 2:24-cv-00746-JRG [Member Case]
WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC., Plaintiff, v. HP INC. Defendant.	Civil Case No. 2:24-cv-00764-JRG [Member Case]

WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC., Plaintiff, v. SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC. Defendants.	Civil Case No. 2:24-cv-00765-JRG [Member Case]
WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC., Plaintiff, v. ASKEY COMPUTER CORP., ASKEY INTERNATIONAL CORP. Defendants.	Civil Case No. 2:24-cv-00766-JRG [Member Case]
WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC., Plaintiff, v. ASKEY COMPUTER CORP., ASKEY INTERNATIONAL CORP. Defendants.	Civil Case No. 2:24-cv-00753-JRG-RSP [Member Case]

DEFENDANTS' P.R. 3-3 AND 3-4 INVALIDITY CONTENTIONS AND SUBJECT MATTER ELIGIBILITY CONTENTIONS

Pursuant to Docket Control Order (Dkt. No. 47) and Local Patent Rule 3-3, Defendants Samsung Electronics Co., Ltd. and, Samsung Electronics America, Inc., and HP, Inc. (collectively,

"Defendants")[1] hereby provide their Invalidity Contentions, which include the accompanying claim charts concerning U.S. Patent Nos. 10,313,077 ("the '077 patent"); 11,159,210 ("the '210 patent"); 10,687,281 ("the '281 patent"); 11,470,595 ("the '595 patent"), 11,116,035 ("the '035 patent"), 11,516,879 ("the '879 patent"), 11,129,163 ("the '163 patent"), and 11,700,597 ("the '597 patent") (collectively, the "Asserted Patents") to Wilus Institute of Standards and Technology Inc. ("Plaintiff" or "Wilus"). Defendants also respectfully submit their subject matter eligibility contentions for the Asserted Claims of the Asserted Patent in accordance with the July 25, 2019 Standing Order Regarding Subject Matter Eligibility Contentions Applicable to All Patent Infringement Cases Assigned to Chief District Judge Rodney Gilstrap ("Standing Order").

The citation of prior art herein and the accompanying exhibits are not intended to reflect Defendants' claim construction contentions, which will be disclosed in due course in accordance with the Docket Control Order and may instead reflect Plaintiff's apparent (and potentially erroneous) claim constructions based on its Infringement Contentions.

I. Introduction

As disclosed in its P.R. 3-1 Infringement Contentions served on Defendants, Plaintiff asserts the following patents and claims:

Patent	Claims
U.S. Patent No. 10,313,077	**1**-7, **8**-14
U.S. Patent No. 10,687,281	1-6, 8-13
U.S. Patent No. 11,470,595	**1**-6, **7**-12
U.S. Patent No. 11,159,210	**1**-5, **6**-9
U.S. Patent No. 11,129,163	**1**-8, **9**-16
U.S. Patent No. 11,700,597	**1**-8, **9**-16
U.S. Patent No. 11,116,035	**1**-5, **8**-10
U.S. Patent No. 11,516,879	**1**-5, **8**-10

[1] Defendants reserve the right to rely on any contentions served separately by Askey Computer Corp., and Askey International Corp.

The claims identified above are referenced to as "the Asserted Claims" unless reference is made specifically with respect to particularly identified one or more of the Asserted Patents and/or one or more of the Asserted Claims.

As further detailed in and supported by these Invalidity Contentions, Defendants contend that each of the Asserted Claims is invalid under at least 35 U.S.C. §§ 101, 102, 103, and/or 112. Defendants reserve the right to prove the invalidity of the Asserted Claims on bases other than those required to be disclosed in these disclosures pursuant to P.R. 3-3.

II. Amendment / Supplementation

Defendants' Invalidity Contentions pertain to the Asserted Claims as identified in Plaintiff's Infringement Contentions. To the extent the Court later allows Plaintiff to amend its infringement contentions and/or assert one or more claims other than the Asserted Claims, Defendants reserve the right to modify, amend, or supplement these Invalidity Contentions accordingly to, for example, show the invalidity of any such newly Asserted Claims.

These Invalidity Contentions are based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. A *Markman* Order in this case has not yet been issued, and in no way shall these Invalidity Contentions be taken as any admission or acquiescence by Defendants as to the proper scope of the Asserted Claims and/or proper claim constructions of terms and phrases recited in those claims. By identifying prior art that anticipates and/or renders obvious the Asserted Claims, Defendants do not admit that the claim limitations are capable of construction, do not admit that any claim limitations are supported with an appropriate written description and enabling disclosure in the applicable patent specifications, and do not adopt

Plaintiff's apparent claim constructions or admit the accuracy of any particular claim construction.[2] Defendants reserve all rights to later challenge or oppose any claim constructions advanced by Plaintiff and to present their own claim construction positions.

Defendants further reserve the right to revise these Invalidity Contentions in view of the Court's construction of terms and phrases recited in one or more of the Asserted Claims, additional information obtained during discovery, additional infringement theories put forth by Plaintiff during fact and/or expert discovery, any findings as to the priority date(s) of the Asserted Claims, and/or positions that Plaintiff, its fact witnesses, or its expert witness(es) may take concerning claim construction, infringement, and/or invalidity issues.

Defendants further reserve the right to supplement their accompanying P.R. 3-4(b) document production should they later discover additional prior art documents, information, testimony, prior art systems and related documentation, and/or software or hardware code, including information provided by third parties after the date of service of these Invalidity Contentions.

Defendants may further rely on inventor admissions concerning the scope or state of the prior art relevant to the Asserted Claims, the patent prosecution histories of the Asserted Patents, related patents and/or patent applications, any deposition or trial testimony of the named inventors on the Asserted Patents, and the papers filed and any evidence produced or submitted by Plaintiff in connection with these cases or other related litigation. Defendants reserve the right to contend

[2] Defendants do not concede that Plaintiff's apparent interpretation of the claims is correct, but rather assert the well-established principle that whatever infringes a claim if later in time anticipates if earlier in time. *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1378 (Fed. Cir. 2001). Thus, where Plaintiff for purposes of its infringement case alleges that a feature of an accused product meets a particular limitation recited in one or more of the Asserted Claims, then that feature, should it be found in the prior art, would also cause that limitation to be met for invalidity purposes.

that one or more of the Asserted Claims are invalid under 35 U.S.C. § 101 in the event Defendants obtain evidence that one or more of the named inventors did not invent the subject matter in the Asserted Claims.

Prior art not included in these Invalidity Contentions, whether known or not known to Defendants, may become relevant. In particular, Defendants are currently unaware of the extent, if any, to which Plaintiff will contend that limitations of the Asserted Claims are not disclosed in the prior art identified in these Invalidity Contentions. Accordingly, Defendants reserve the right to identify other references that would disclose the allegedly missing limitation(s) of the claimed method, device, or system.

The references identified in these Invalidity Contentions, which include the attached claim charts, may disclose the elements of the Asserted Claims explicitly and/or inherently, and/or they may be relied upon to show the state of the art in the relevant time frame. References identified in these Invalidity Contentions, as well as the "References Cited" on the face of the Asserted Patents and the patents cited within the body of the Asserted Patents, may be used to illustrate, but not limit the scope of, the state of the art to which the Asserted Patents pertain (*i.e.*, at a time prior to the date of alleged inventions of the Asserted Claims of the Asserted Patents). Moreover, Defendants reserve the ability to rely on later identified sources of information, including but not limited to witness testimony and other discovery, to establish the state of the art in the relevant time frame pertaining to the Asserted Patents.

Because discovery has just recently begun, Defendants anticipate that additional prior art and invalidity bases may be found. Defendants' investigation and analysis of the prior art is continuing, and thus Defendants reserve the right to supplement, amend, and/or revise the

information provided herein as Defendants conduct further investigation and/or analysis, including identifying, charting, and relying on additional references.

Additionally, in view of likely third-party discovery that will be taken, Defendants reserve the right to present additional items of prior art under 35 U.S.C. § 102 and/or § 103 located during discovery or further investigation, and to assert contentions of invalidity. For example, Defendants expect to issue subpoenas to third parties believed to have knowledge, documents, and/or other evidence concerning invalidity of one or more of the Asserted Claims.

In addition to the positions and prior art identified in these Invalidity Contentions (including the accompanying invalidity claim charts), Defendants also incorporate by reference all invalidity contentions, prior art,[3] and invalidity claim charts (including, without limitation, all anticipation positions, obviousness positions (including all prior art combinations and motivations to combine), indefiniteness positions, written description positions, and non-enablement positions) concerning one or more of the Asserted Patents, as disclosed at any time. This includes without limitation disclosures in previous or related litigation, in United States Patent & Trademark Office ("USPTO") proceedings, by the Plaintiff, or by the named inventors or any individuals associated with the prosecution and/or post-grant review of the Asserted Patents.

Specifically, for example, Defendants identify, as prior art upon which they may rely to show the invalidity of the Asserted Claims, the prior art references disclosed by parties in any other litigation involving one or more of the Asserted Patents, any patent related to any of the Asserted Patents, and/or any other patent allegedly assigned to Wilus claiming priority to the Asserted Patents (collectively, "Other Wilus Proceedings").

[3] Prior art appearing in the file histories of the Asserted Patents is not required to be separately produced by Defendants under P.R. 3-4(b).

Plaintiff has a duty to produce to Defendants all relevant documents from the Other Wilus Proceedings including but not limited to all prior art, invalidity contentions, and expert reports on invalidity (among other relevant items).

Defendants reserve the right to supplement or otherwise amend these Invalidity Contentions in response to any relevant discovery provided by third parties, Plaintiff, opening or rebuttal expert reports, fact or expert depositions, or in response to any claim construction ruling(s) issued by this Court (regardless of how and when such ruling is made). Defendants also reserve the right to supplement or otherwise amend these Invalidity Contentions in response to any rebuttal evidence disclosed by Plaintiff or as otherwise may be necessary or appropriate under the circumstances.

III. P.R. 3-3(a) – Identification of Prior Art

Pursuant to P.R. 3-3(a), and subject to Defendants' reservation of rights, Defendants identify each item of prior art that anticipates or renders obvious the Asserted Claims below.[4]

A. Priority Dates

Wilus's Infringement Contentions appear to allege that:

[4] Defendants' disclosure of prior art is premised on the alleged priority dates of the Asserted Patents as identified in Plaintiff's infringement contentions. Defendants contend Plaintiff is not entitled to the alleged priority dates and reserve the right to modify, amend, or supplement their invalidity contentions with additional prior art references if any Asserted Claim is shown to not be entitled to the respective alleged priority date or if Plaintiff alleges any other priority date for any of the Asserted Claims. Notwithstanding that reservation of rights, Defendants also reserve the right to argue that they have been unduly prejudiced should Plaintiff allege a different priority date for any of the Asserted Claims, and that accordingly Plaintiff should not be allowed to do so.

(1) the ’077 patent claims priority to Korean Patent Application Nos. 10-2015-0092525 (the “’525 application”), filed on June 29, 2015 and 10-2015-0117434 (the “’434 application”), filed on August 20, 2015, and to PCT/KR2016/006976, filed on June 29, 2016;

(2) the ’210 patent claims priority to Korean Patent Application Nos. 10-2017-0003147 (the “’147 application”), filed on January 9, 2017 and 10-2017-0008927 (the “’927 application”), filed on January 18, 2017, and to PCT/KR2018/000443, filed on January 9, 2018;

(3) the ’281 patent claims priority to Korean Patent Application Nos. 10-2015-0186871 (the “’871 application”), filed on December 24 , 2015, 10-2016-0004471 (the “’471 application”), filed on January 13 , 2016,10-2016-0005835 (the “’835 application”), filed on January 18, 2016, 10-2016-0026683 (the “’683 application”), filed on March 4, 2016, 10-2016-0030006 (the “’006 application”), filed on March 13, 2016, 10-2016-0059182 (the “’182 application”), filed on May 14, 2016, 10-2016-0062422 (the “’422 application”), filed on May 20, 2016, 10-2016-0083756 (the “’756 application”), filed on July 1, 2016.

(4) the ’595 patent claims priority to Korean Patent Application Nos. 10-2015-0186871 (the “’871 application”), filed on December 24 , 2015, 10-2016-0004471 (the “’471 application”), filed on January 13 , 2016,10-2016-0005835 (the “’835 application”), filed on January 18, 2016, 10-2016-0026683 (the “’683 application”), filed on March 4, 2016, 10-2016-0030006 (the “’006 application”), filed on March 13, 2016, 10-2016-0059182 (the “’182 application”), filed on May 14, 2016, 10-2016-0062422 (the “’422 application”), filed on May 20, 2016, 10-2016-0083756 (the “’756 application”), filed on July 1, 2016.

(5) the ’035 patent issued from U.S. Patent Appl. No. 16/294,884 (the “’883 application”) and claims priority to Korean Patent Application Nos. 10-2016-0114822 (the “’822 application”), filed on Sept. 7, 2016, 10-2016-0116877 (the “’877 application”), filed on Sept.10, 2016; 10-2016-

0116965, filed on Sept.12, 2016, 10-2016-0117898, filed on Sept. 13, 2016,[5] 10-2016-0122488, filed on Sept. 23, 2016, 10-2016-0147189, filed on Nov. 6, 2016, and 10-2017-0022227, filed on Feb. 20, 2017; and to PCT/KR2017/009841, filed on Sept. 2017.

(6) the '879 patent issued from U.S. Patent Appl. No. 17/383,479 ("'479 application") and claims priority to Korean Patent Application Nos. 10-2016-0114822 (the "'822 application"), filed on Sept. 7, 2016, 10-2016-0116877 (the "'877 application"), filed on Sept.10, 2016; 10-2016-0116965, filed on Sept.12, 2016, 10-2016-0117898, filed on Sept. 13, 2016, 10-2016-0122488, filed on Sept. 23, 2016, 10-2016-0147189, filed on Nov. 6, 2016, and 10-2017-0022227, filed on Feb. 20, 2017; and to PCT/KR2017/009841, filed on Sept. 2017.

(7) the '163 patent claims priority to Korean Patent Application No. 10-2016-0026684 (the "'684 application"), filed on March 4, 2016; and

(8) the '597 patent claims priority to the '684 application, filed on March 4, 2016.

For a patent to be entitled to the filing date of an earlier-filed patent application, all the limitations must be adequately supported by the specification of the earlier-filed patent application. Wilus has not met its burden of establishing that the claims of the Asserted Patents are entitled to the priority dates asserted in its infringement contentions. *See In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1376 (Fed. Cir. 2016) (A "patentee bears the burden of establishing that its claimed invention is entitled to an earlier priority date.").

As to the '077 patent, one or more priority specifications (including the '525 application's specification) fail to provide adequate support to at least the following asserted claim limitations. Thus, the alleged priority application(s) fail to support an earlier priority date for the claims containing those claim limitations, as well as any claims depending therefrom.

[5] The face of the '035 patent incorrectly lists the filing date as Sept. 23, 2016.

’077 Patent Term	Relevant Claim(s)
“obtain length information indicating information on a duration of the non-legacy physical layer frame, from the legacy signaling field” / “obtaining length information indicating information on a duration of the non-legacy physical layer frame after a legacy signaling field, from the legacy signaling field”	1,8
“obtain[\ing] information other than [the] information on the duration of the non-legacy physical layer frame through a remaining value obtained by dividing the length information by a data size transmittable by a symbol of a legacy physical layer frame, wherein the data size transmittable by a symbol of the legacy physical layer frame is 3 octets when a data rate of the legacy physical layer frame is 6 Mbps”	1, 8
“determine the number of symbols of data of the non-legacy physical layer frame according to a following equation, $N_{SYM} = \left\lfloor \left(\frac{\text{L\_LENGTH} + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) / T_{SYM} \right\rfloor - b_{PE\_Disambiguity}$ where $\lfloor x \rfloor$ denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes a value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $b_{PE\_Disambiguity}$ denotes a value of PE Disambiguity field, $T_{HE\_PREAMBLE}$ denotes a duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes a duration of a symbol of the data of the non-legacy physical layer frame”	1
“determining the number of symbols of the data of the non-legacy physical layer frame according to a following equation, $N_{SYM} = \left\lfloor \left(\frac{\text{L\_LENGTH} + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) / T_{SYM} \right\rfloor - b_{PE\_Disambiguity}$ where [x] denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes a value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $b_{PE\_Disambiguity}$ denotes a value of PE Disambiguity field, $T_{HE\_PREAMBLE}$ denotes a duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes a duration of a symbol of the data of the non-legacy physical layer frame,”	8
“wherein the PE Disambiguity field is set based on the duration of a symbol of the data of the non-legacy physical layer frame and an	1, 8

’077 Patent Term	Relevant Claim(s)
increment of duration to set a value of the length information based on a duration of a symbol of [the] legacy physical layer frame”	
“The wireless communication terminal of claim 1, wherein the processor is configured to obtain a duration of a packet extension which is a padding of the non-legacy physical layer frame, according to a following equation, $T_{PE} = \left\lfloor \frac{\left(\frac{L\_LENGTH + m + 3}{3} \times 4 - T_{HE\_PREAMBLE}\right) - N_{SYM} \times T_{SYM}}{4} \right\rfloor \times 4$ where $\lfloor x \rfloor$ denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes the value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $T_{HE\_PREAMBLE}$ denotes the duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes the duration of a symbol of the data of the non-legacy physical layer frame.”	2
“obtaining a duration of a packet extension which is a padding of the non-legacy physical layer frame, according to a following equation, $T_{PE} = \left\lfloor \frac{\left(\frac{L\_LENGTH + m + 3}{3} \times 4 - T_{HE\_PREAMBLE}\right) - N_{SYM} \times T_{SYM}}{4} \right\rfloor \times 4$ where [x] denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes the value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $T_{HE\_PREAMBLE}$ denotes the duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes the duration of a symbol of the data of the non-legacy physical layer frame.”	9
“wherein the increment of duration is a value obtained by multiplying a difference between a value obtained by performing a ceiling operation on a value obtained by dividing the duration of the non-legacy physical layer frame after the legacy signaling field by the duration of a symbol of the legacy physical layer frame and the value obtained by dividing the duration of the non-legacy physical layer frame after the legacy signaling field by the duration of a symbol of the legacy physical layer frame by the duration of a symbol of the legacy physical layer frame.”	3, 10

As to the ’210 patent, one or more priority specifications (including the ’147 application’s specification application’s specification) fail to provide adequate support to at least the following

asserted claim limitations. Thus, the alleged priority application(s) fail to support an earlier priority date for the claims containing those claim limitations, as well as any claims depending therefrom.

’210 Patent Term	Relevant Claim(s)
“wherein when a SIG-B compression field of the HE-SIG-A indicates full bandwidth multi User-Multiple Input Multiple Output(MU-MIMO) transmission, a format of user field(s) included in a user specific field of the HE-SIG-B is identified based on a number of MU-MIMO users indicated by a subfield of the HE-SIG-A”	1, 6
“wherein when the number of MU-MIMO users indicates two or more users, the user specific field of the HE-SIG-B includes user fields for MU-MIMO allocation, and wherein when the number of MU-MIMO users indicates a single user, the user specific field of the HE-SIG-B includes one user field for non-MU-MIMO allocation”	1, 6
“wherein the user field(s) for non-MU-MIMO allocation is a user field based on orthogonal frequency division multiple access (OFDMA) allocation.”	3, 8

As to the ’281 patent, one or more priority specifications (including the ’871 application’s specification) fail to provide adequate support to at least the following asserted claim limitations. Thus, the alleged priority application(s) fail to support an earlier priority date for the claims containing those claim limitations, as well as any claims depending therefrom.

’281 Patent Term	Relevant Claim(s)
obtain bandwidth information indicated via a bandwidth field of HE-SIG-A of the received packet	1, 8
obtain information of an unassigned resource unit via at least one of the bandwidth field of the HE-SIG-A and a subfield of HE-SIG-B of the received packet	1, 8
decode the received packet based on the bandwidth information and the information of the unassigned resource unit	1, 8
wherein the information of the unassigned resource unit is indicated via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B	1, 8
wherein the bandwidth field of the HE-SIG-A indicates channel information to be punctured within the bandwidth, and the resource unit allocation field indicates additional puncturing information for the unassigned resource unit within the bandwidth	1, 8

’281 Patent Term	Relevant Claim(s)
wherein the resource unit allocation field indicates a specific resource unit not assigned to a user through a predetermined index.	2, 9
wherein the information of the unassigned resource unit is obtained through resource unit arrangement information indicated by the resource unit allocation field of the HE-SIG-B and a Null STA ID contained in a user field corresponding to a specific resource unit in the resource unit arrangement.	4, 11
wherein when the bandwidth field indicates puncturing of one of two 20 MHz channels in a secondary 40 MHz channel within a bandwidth of 80 MHz or puncturing of at least one of two 20 MHz channels in a secondary 40 MHz channel within a bandwidth of 160 MHz or 80+80 MHz, the resource unit allocation field indicates which 20 MHz channel in the secondary 40 MHz channel is punctured.	6, 13

As to the ’595 patent, one or more priority specifications (including the ’871 application’s specification) fail to provide adequate support to at least the following asserted claim limitations. Thus, the alleged priority application(s) fail to support an earlier priority date for the claims containing those claim limitations, as well as any claims depending therefrom.

’595 Patent Term	Relevant Claim(s)
obtain bandwidth information indicated via a bandwidth field included in the HE-SIG-A field	1, 7
obtain information of an unassigned resource unit via at least one subfield included in the HE-SIG-B field	1, 7
wherein the bandwidth field is related to bandwidth over which the received wireless packet is transmitted, and is used to obtain the information of the unassigned resource unit	1, 7
decode a data of the received wireless packet based on the bandwidth information and the information of the unassigned resource unit	1, 7
wherein the unassigned resource unit is explicitly indicated with the information of the unassigned resource unit based on the bandwidth field and the at least one subfield	1, 7
wherein the information of the unassigned resource unit includes information of a C26 field indicating whether a user is allocated to a center 26-tone resource unit of 80 MHz upon the bandwidth related to a transmission of the received wireless packet indicated by the bandwidth field being 80 MH or more, not 20 MHz or 40 MHz	1, 7

’595 Patent Term	Relevant Claim(s)
wherein the HE-SIG-B field consists of HE-SIG-B content channel 1 and HE-SIG-B content channel 2 in units of 20 MHz respectively, and wherein the C26 field is carried in both the HE-SIG-B content channel 1 and the HE-SIG-B content channel 2	2, 8
wherein when the received wireless packet is transmitted in a total bandwidth of 80 MHz, both of a C26 field carried in the HE-SIG-B content channel 1 and a C26 field carried in the HE-SIG-B content channel 2 indicate whether a user is allocated to a center 26-tone resource unit in the total bandwidth of 80 MHz	3, 9
herein when the C26 field indicates that a user is allocated to the center 26-tone resource unit, a user field corresponding to the center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 1	4, 10
wherein when the received wireless packet is transmitted in a total bandwidth of 160 MHz or 80+80 MHz, the total bandwidth includes a first 80 MHz bandwidth and a second 80 MHz bandwidth, a first C26 field carried in the HE-SIG-B content channel 1 indicates whether a user is allocated to a first center 26-tone resource unit in the first 80 MHz bandwidth, and a second C26 field carried in the HE-SIG-B content channel 2 indicates whether a user is allocated to a second center 26-tone resource unit in the second 80 MHz bandwidth	5, 11
wherein when the first C26 field indicates that a user is allocated to the first center 26-tone resource unit, a user field corresponding to the first center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 1, and wherein when the second C26 field indicates that a user is allocated to the second center 26-tone resource unit, a user field corresponding to the second center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 2	6, 12

As to the ’035 patent, one or more priority specifications (including the ’822 application’s specification) fail to provide adequate support to at least the following asserted claim limitations. Thus, the alleged priority application(s) fail to support an earlier priority date for the claims containing those claim limitations, as well as any claims depending therefrom.

’035 Patent Term	Relevant Claim(s)
receive, from the base wireless communication terminal, a trigger frame using the transceiver, wherein the trigger frame triggers a orthogonal frequency division multiple access (OFDMA) uplink transmission of the wireless communication terminal,	1,8

’035 Patent Term	Relevant Claim(s)
transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) in response to the trigger frame using the transceiver,	1,8
switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal,	1,8
when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends,	1,8
when the MPDU included in the trigger-based PPDU requests an immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received,	1,8
when the second parameter set timer expires, terminate an application of the second parameter set, and	1,8
access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set.	1,8
wherein the MPDU included in the trigger-based PPDU is a QoS data frame.	2, 9
wherein the processor is configured to receive a beacon frame from the base wireless communication terminal and obtain information indicating a period of the second parameter set timer from the beacon frame.	3, 10
wherein the processor is configured to calculate a random integer value within a contention window (CW),	4, 5
set a backoff timer based on the random integer value, and	4, 5
access the channel based on the back off timer and a predetermined slot time,	4, 5
wherein the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW.	4
if a value of the CW is greater than the maximum value (CWmax) of the CW according to a priority of the data to be transmitted, sets the value of the CW to the CWmax.	5

As to the ’879 patent, one or more priority specifications (including the ’822 application’s specification) fail to provide adequate support to at least the following asserted claim limitations. Thus, the alleged priority application(s) fail to support an earlier priority date for the claims containing those claim limitations, as well as any claims depending therefrom.

’879 Patent Term	Relevant Claim(s)
transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) using the transceiver,	1,8
switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal,	1,8
when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends,	1,8
when the MPDU included in the trigger-based PPDU requests the immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received,	1,8
when the second parameter set timer expires, terminate an application of the second parameter set, and	1,8
access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set.	1,8
wherein the MPDU included in the trigger-based PPDU is a QoS data frame.	2, 9
wherein the processor is configured to receive a beacon frame from the base wireless communication terminal and obtain information indicating a period of the second parameter set timer from the beacon frame.	3, 10
wherein the processor is configured to calculate a random integer value within a contention window (CW),	4, 5
set a backoff timer based on the random integer value, and	4, 5
access the channel based on the back off timer and a predetermined slot time,	4, 5
wherein the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW.	4
if a value of the CW is greater than the maximum value (CWmax) of the CW according to a priority of the data to be transmitted, sets the value of the CW to the CWmax.	5
transmitting the data through the channel.	8

As to the ’163 patent, one or more priority specifications (including the ’684 application’s specification) fail to provide adequate support to at least the following asserted claim limitations.

Thus, the alleged priority application(s) fail to support an earlier priority date for the claims containing those claim limitations, as well as any claims depending therefrom.

'163 Patent Term	Relevant Claim(s)
"wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU) by using the transceiver,"	1-8
"wherein the processor is configured . . . not to use a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed,"	1-8
"wherein the BSS color is an identifier of a BSS,"	1-16
"wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated."	1-16
"wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	2, 3
"wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,"	2, 3, 10, 11
"wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU."	2, 3, 10, 11
"wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,"	3, 11
"wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,"	3, 11
"wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,"	3, 11
"wherein the processor is configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame."	3
"wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	4, 5
"wherein the BSS color collision represents that different BSSs correspond to one BSS color."	4, 5, 12, 13
"wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	5

’163 Patent Term	Relevant Claim(s)
“wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU,”	6, 14
“wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU.”	6, 14
“wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value.”	7, 8
“wherein the predetermined value is 0.”	8, 16
“receiving a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU)”	9-16
“not using a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed,”	9-16
“wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,”	10, 11
“wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame.”	11
“wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,”	12, 13
“wherein the signaling that a BSS color collision has occurred comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame.”	13
“wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value.”	15, 16

As to the ’597 patent, one or more priority specifications (including the ’684 application’s specification) fail to provide adequate support to at least the following asserted claim limitations. Thus, the alleged priority application(s) fail to support an earlier priority date for the claims containing those claim limitations, as well as any claims depending therefrom.

’597 Patent Term	Relevant Claim(s)
“wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Protocol Data Unit (PPDU) by using the transceiver,”	1-8
“wherein the processor is configured . . . not to use a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,”	1-8
“wherein the BSS color is an identifier of a BSS,”	1-16
“wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated.”	1-16
“wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,”	2, 3
“wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,”	2, 3, 10, 11
“wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU.”	2, 3, 10, 11
“wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,”	3, 11
“wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,”	3, 11
“wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,”	3, 11
“wherein the processor is configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame.”	3
“wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,”	4, 5
“wherein the BSS color collision represents that different BSSs correspond to one BSS color.”	4, 5, 12, 13
“wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame.”	5
“wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU,”	6, 14

'597 Patent Term	Relevant Claim(s)
"wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU."	6, 14
"wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by a signaling field of the PPDU is a predetermined value."	7, 8
"wherein the predetermined value is 0."	8, 16
"receiving a physical layer convergence procedure (PLCP) Protocol Data Unit (PPDU);"	9-16
"not using a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,"	9-16
"wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	10, 11
"wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame."	11
"wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	12, 13
"wherein the signaling that a BSS color collision has occurred comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	13
"wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by a signaling field of the PPDU is a predetermined value."	15, 16

B. U.S. Patent No. 10,313,077

Invalidity claim charts identifying disclosures in the references identified in Tables 1-A, 2-A, and 3-A as to the Asserted Claims of the '077 patent are provided in attached Exhibits A-01 through A-08 and Appendix A.[6]

Table 1-A: Prior Art Patents and Printed Publications for the '077 patent

[6] Plaintiff reserves its right to rely on patent or patent application publications that are in the same family as the charted references as well as other revisions of the charted IEEE documents.

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RA-1	US 2016/0345202 to Bharadwaj ("Bharadwaj 202")	November 24, 2016	May 19, 2016
RA-2	US 10,142,067 to Cao ("Cao 067")	November 27, 2018	April 16, 2015
RA-3	IEEE P802.11 802.11-15/0810 "HE PHY Padding and Packet Extension" ("802.11-15/0810")[7]	July 2015	N/A
RA-4	US 2016/0286012 to Yu ("Yu 012")	September 29, 2016	March 25, 2016
RA-5	IEEE 802.11ac[8]	December 2013	N/A
RA-6	US 2018/0102929 to Lin ("Lin 929")	November 24, 2016	Dec. 7, 2017
RA-7	US 9,001,929 to Lee ("Lee 929")	April 7, 2015	January 10, 2012
RA-8	US 10,044,476 to Cao ("Cao 476")	August 7, 2018	April 16, 2015
RA-9	IEEE 802.11-2012	March 2012	N/A

Further, Defendants are actively searching for information regarding at least the following devices and inventions:

Table 2-A: Prior Art Systems and Inventions for the '077 patent

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RA-10	Systems implementing IEEE 802.11ac ("Wi-Fi 5")[9]	2013
RA-11	HP Spectre 13 (2013 Model)	October 2013
RA-12	HP Envy 17 (2014 Model)	February 2014
RA-13	Samsung Galaxy S4 Smartphone	April 2013
RA-14	Samsung Galaxy Note 3 Smartphone	October 2013
RA-15	Samsung Galaxy Tab Pro	February 2014

[7] The IEEE references identified as prior art with respect to any Asserted Patents in instant Invalidity Contentions were published by the IEEE (Institute of Electrical and Electronics Engineers) as of the corresponding date of issue/publication at http://www.ieee802.org and/or http://www.ieee.org.

[8] IEEE 802.11ac is an amendment to IEEE 802.11-2012, as such IEEE 802.11ac incorporates IEEE 802.11-2012. Therefore, any reference in the instant document to IEEE 802.11ac should be interpreted to include IEEE 802.11-2012.

[9] The attached invalidity chart over IEEE 802.11ac (RA-5) demonstrates how the systems implementing IEEE 802.11ac, listed in this table, disclose each element of each asserted claim.

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RA-16	Samsung Galaxy Tab S	July 2014
RA-17	Samsung ATIV Book 9 (2014 Edition)	May 2014
RA-18	Samsung ATIV Book 9 (2015 Edition)	December 2015

For each of the prior art devices identified above, Defendants have listed and produced one or more documents as evidence of the relevant features and functionality. Defendants have obtained or are in the process of obtaining the identified devices and will make them available for inspection. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly.

In addition, Defendants identify, responsive to Plaintiff's infringement contentions, the following patents, publications, and systems as evidence of the state of the art as it relates to techniques for coexistence among legacy and non-legacy wireless communication terminals including techniques for receiving a non-legacy physical layer frame which includes a legacy signaling field, and determining the number of symbols of data of the non-legacy physical layer frame: [10]

- IEEE 802.11n

[10] Plaintiff reserves its right to rely on any unlisted patents, patent application publications, provisional applications that are related to the listed reference.

- WO2016197349
- US12088449B2
- US20230041746A1
- US20220124871A1
- US10951451B2
- US9893790B2
- US20160099796A1
- US20120054587A1
- US20160285526A1
- WO2016197349A1
- US20150304078A1
- WO2016176877A1
- US20150365263A1
- US20150139205A1
- US9641234B2
- US20160242177A1
- US20110116401A1
- WO2016070395A1
- US20050152314A1
- US 9001929B2
- US 11784864B2
- US 8339978B2
- US 20120327871A1
- US 20150139205A1
- US 9088504B2
- US 8339978B2
- US 20100040158A1
- US 20200162190A1
- US 20150117428A1
- US 9853794B2
- US 20150358651A1
- US 9882687B2
- US 9172447B2
- US 7715442B2
- US 20200403740A1
- US 20150071372A1
- US 7782807B2
- US 20160127992A1
- US 7,751,429
- KR 2012-0081040
- US 2015/0163028
- KR 2014-0101740
- US 8,630,367
- US 7,924,764

- EP 1,977,543
- US 8,619,814
- US 8,867,563
- US 8,670,427
- EP 2,534,769
- US 7,885,214
- US8175022B2
- US 7,715,442
- EP 2,681,864
- US 8,811,507
- KR 10-1404372
- US 9,049,155
- US 9,048,994
- US 8,223,857
- US 8,477,805
- US 7,821,976
- US 2014/0153505
- US 8,705,422
- US 2015/0133134
- US 2015/0139115
- US 5,559,804
- US 2008/0031191
- KR 2015-0035569
- US 2016/0198500
- KR 10-1212423
- KR 10-1024926
- US 8,804,609
- JP 5,329,244
- JP 2010-178129
- US 2006/0050661
- US 2008/0310391
- US2012/177144A
- 11-15-0132-02-00ax-spec-framework
- 11-15-0132-07-00ax-spec-framework
- 11-15-0132-09-00ax-spec-framework
- 11-15-0580-01-00ax-11ax-coding-discussion
- 11-15-0887-03-00ax-effcient-padding-for-last-ofdm-symbol
- 11-15-0579-00-00ax-preamble-design-and-autodetection

These references show that such coexistence techniques are not novel, and were well-known in the art for many years. In light of the references discussed herein, the Asserted Claims of the ’077 patent cannot be valid.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself and any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '077 patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether or not any of the third party prior art systems anticipate or render obvious the Asserted Claims of the '077 patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '077 patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes

available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

C. U.S. Patent No. 11,159,210

Invalidity claim charts identifying disclosures in the references identified in Tables 1-B, 2-B, and 3-B as to the Asserted Claims of the '210 patent are provided in attached Exhibits B-01 through B-08 and Appendix B.[11]

Table 1-B: Prior Art Patents and Printed Publications for the '210 patent

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RB-1	US 2017/0181136 ("Bharadwaj 136")	June 22, 2017	December 21, 2016
RB-2	US 2018/0176066 ("Lim 066")	June 21, 2018	December 7, 2017
RB-3	"IEEE P802.11ax/D1.0 Enhancements for High Efficiency WLAN," ("IEEE P802.11ax/D1.0")	November 2016	N/A
RB-4	IEEE 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("IEEE 802.11-15/0132r15")	March 17, 2016	N/A
RB-5	IEEE 802.11ac	December 2013	N/A
RB-6	US 2017/0366310 ("Verma 310")	December 21, 2017	June 14, 2017
RB-7	US 2016/0285526 ("Hedayat 526")	September 29, 2016	March 28, 2016
RB-8	US 2017/0064718 to Bharadwaj ("Bharadwaj 718")	March 2, 2017	August 23, 2016
RB-9	IEEE 802.11-2012	March 2012	N/A
RB-10	IEEE 802.11-2016	December 2016	N/A

[11] Plaintiff reserves its right to rely on patent or patent application publications that are in the same family as the charted references as well as other revisions of the charted IEEE documents.

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RB-11	IEEE P802.11ax/D0.5, "High Efficiency (HE) PHY specification" ("IEEE P802.11ax/D0.5")	October 2016	

Further, Defendants are actively searching for information regarding at least the following devices and inventions:

Table 2-B: Prior Art Systems and Inventions for the '210 patent

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RB-12	Systems implementing IEEE 802.11ac ("Wi-Fi 5")[12]	2013
RB-13	HP Spectre 13 (2013 Model)	October 2013
RB-14	HP Envy 17 (2014 Model)	February 2014
RB-15	Samsung Galaxy S4 Smartphone	April 2013
RB-16	Samsung Galaxy Note 3 Smartphone	October 2013
RB-17	Samsung Galaxy Tab Pro	February 2014
RB-18	Samsung Galaxy Tab S	July 2014
RB-19	Samsung ATIV Book 9 (2014 Edition)	May 2014
RB-20	Samsung ATIV Book 9 (2015 Edition)	December 2015

For each of the prior art devices identified above, Defendants have listed and produced one or more documents as evidence of the relevant features and functionality. Defendants have obtained or are in the process of obtaining the identified devices and will make them available for inspection. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

[12] The attached invalidity chart over IEEE 802.11ac (RB-5) demonstrates how the systems implementing IEEE 802.11ac, listed in this table, disclose each element of each asserted claim.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly.

In addition, Defendants identify, responsive to Plaintiff's infringement contentions, the following patents, publications, and systems as evidence of the state of the art as it relates to signaling for MIMO and MU-MIMO transmissions: [13]

- IEEE 802.11n
- US 9398571B2
- US 9585058B2
- US 10433306B2
- US 20150023291A1
- US 20160014763A1
- US 20160128057A1
- US 20160183224A1
- US 20160330300A1
- US 20170026952A1
- US 20170041929A1
- US 20170048823A1
- US 20170048862A1
- US 20170064718A1
- US 20170093546A1
- US 20170373806A1
- US 20180131553A1
- US 20180138959A1
- US 20180375632A1
- US 20190052353A1
- US 20190124638A1
- US 20190190757A1
- US 20190222393
- US9825789
- US20170331529
- US20110002319
- CN101848525A
- US20180110069
- US 20170280452
- US 2018/0205520

[13] Plaintiff reserves its right to rely on any unlisted patents, patent application publications, provisional applications that are related to the listed reference.

- WO2017036402A1
- US 2014/0078966
- KR 2016-0059443
- KR 2016-0052430
- EP 2,959,624
- US 2016/0286012
- KR 2016-0004955
- KR 2014-0101740
- US 8,811,507
- US 2015/0163028
- US 9,048,994
- US 9,130,812
- US 9,107,099
- US 2016/0198500
- US 9,246,738
- EP 2,681,864
- JP 2015-165676
- KR 2015-0073855
- US 2012/0163317
- US 9,049,155
- US 9,143,293
- KR 2015-0128772
- US 2008/0031191
- US 9,295,074
- US 9,143,293
- US 8,903,441
- US 9,113,313
- KR 2008-0064069
- JP 2008-533833
- KR 2012-0081040
- US 7,924,764
- US 8,615,052
- US 8,542,605
- US8175022B2
- KR 2015-0035569
- EP 2,356,769
- US 2015/0124677
- US 8,619,814
- US 7,715,442
- US 2006/0050661
- JP 2010-178129
- US 8,867,563
- JP 5,329,244
- KR 10-1212423

- US 2008/0310391
- 11-16-0928-02-00ax-cr-on-section-26-3-9-8-he-sig-b
- 11-16-0535-10-00ax-comments-on-tgax-d0-1
- 11-16-0873-00-00ax-cr-he-sig-b-part-i
- 11-16-0024-01-00ax-proposed-draft-specification
- 11-15-0132-17-00ax-spec-framework
- 11-16-0866-04-00ax-comment-resolution-of-section-26-3-13-mu-mimo
- 11-16-0203-00-00ax-signalling-support-for-full-bandwidth-mu-mimo-compressed-sig-b-mode

These references show that signaling for MIMO and MU-MIMO transmissions is not novel, and was well-known in the art for many years. In light of the references discussed herein, the Asserted Claims of the '210 patent cannot be valid.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself and any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '210 patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether or not any of the third party prior art systems anticipate or render obvious the Asserted Claims of the '210 patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '210 patent. Defendants have obtained, and are in the process of

obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

D. U.S. Patent No. 10,687,281

Invalidity claim charts identifying disclosures in the references identified in Tables 1-C, 2-C, and 3-C as to the Asserted Claims of the '281 patent are provided in attached Exhibits C1-C13[14] and Appendix C.

Table 1-C: Prior Art Patents and Printed Publications for the '281 patent

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RC-1	US 2017/0181129A1 ("Bharadwaj 129")	Jun. 22, 2017	Dec. 21. 2015
RC-2	US 2017/0094664A1 ("Lee")	Mar. 30, 2017	Nov. 9, 2015
RC-3	US 2016/0353322A1 ("Li")	Dec. 1, 2016	May 27, 2015

[14] Plaintiff reserves its right to rely on patent or patent application publications that are in the same family as the charted references as well as other revisions of the charted IEEE documents.

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RC-4	US 10,219,271B1 ("Hedayat")	Feb. 26, 2019	Oct. 27, 2015
RC-5	US 2017/0064718A1 ("Bharadwaj 718")	Mar. 2, 2017	Aug. 25, 2015
RC-6	US 2016/0330058A1 ("Chen")	Nov. 10, 2016	Sep. 25, 2015
RC-7	JP 2015-165676A ("Kim")	Sep. 17, 2015	Apr. 1, 2015
RC-8	US 2016/0330300A1 ("Josiam")	Nov. 10, 2016	Sep. 10, 2015
RC-9	IEEE 802.11ac ("802.11ac")[15]	2013	N/A
RC-10	IEEE 802.11-16/ 0045r1	Jan. 19, 2016	N/A
RC-11	IEEE 802.11-15/ 0344r2	Mar. 9, 2015	N/A
RC-12	IEEE 802.11-14/ 1437r1	Nov. 4, 2014	N/A
RC-13	US 2016/0174200A1 ("Seok")	Jun. 16, 2016	Dec. 10, 2015

Further, Defendants are actively searching for information regarding at least the following devices and inventions:

Table 2-C: Prior Art Systems and Inventions for the '281 patent

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RC-14	Systems implementing IEEE 802.11ac ("Wi-Fi 5")[16]	2013
RC-15	HP Spectre 13 (2013 Model)	October 2013
RC-16	HP Envy 17 (2014 Model)	February 2014
RC-17	Samsung Galaxy S4 Smartphone	April 2013
RC-18	Samsung Galaxy Note 3 Smartphone	October 2013
RC-19	Samsung Galaxy Tab Pro	February 2014
RC-20	Samsung Galaxy Tab S	July 2014
RC-21	Samsung ATIV Book 9 (2014 Edition)	May 2014
RC-22	Samsung ATIV Book 9 (2015 Edition)	December 2015

For each of the prior art devices identified above, Defendants have listed and produced one or more documents as evidence of the relevant features and functionality. Defendants have obtained or are in the process of obtaining the identified devices and will make them available

[15] "802.11ac" is also known as "Wi-Fi 5," and is used interchangeably herein.
[16] The attached invalidity chart over IEEE 802.11ac (RC-9) demonstrates how the systems implementing IEEE 802.11ac, listed in Table 2-C, disclose each element of each asserted claim.

for inspection. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly.

In addition, Defendants identify, responsive to Plaintiff's infringement contentions, the following patents, publications, and systems as evidence of the state of the art as it relates to Wi-Fi and discontinuous channel assignment: [17]

- US20170070998A1
- US20170006608A1
- US20170048823A1
- US10154520B1
- US20170041929A1
- US20170041171A1
- WO2016089998 A1
- US10389563B2
- US20160366666A1
- US20180205584A1
- US20160330714A1
- US20160366688A1
- US2015/0381330A
- US20160360528A1
- US20170181130A1
- US2016204912A1
- IEEE 802.11-16/ 0039r1
- IEEE 802.11-15/ 0353r1
- IEEE 802.11-15/ 0132r13
- IEEE 802.11-16/ 0638r2

[17] Plaintiff reserves its right to rely on any unlisted patents, patent application publications, provisional applications that are related to the listed reference.

- IEEE P802.11 Wireless LANs
- IEEE 802.11-15/ 1304r1
- IEEE 802.11-15/ 1066r0
- CN108702375A
- CN113572573A
- CN113572574A
- CN113556209A
- EP3396925A
- EP3849157A
- EP4131813A
- EP4369839A
- JP2019-503151
- JP2020-014250
- KR1020180088470A
- KR1020200091503A
- KR1020200091504A
- KR1020210072839A
- KR1020240011882A
- US2018/0302858A
- US2020/0267653A
- US2020/0267654A
- US2023/0007638A
- WO2017111567A
- US 2016/0198500
- US 2015/0289268
- US 2015/0163028
- US 2015/0139115
- US 2008/0310391
- US 2008/0031191
- US 2006/0050661
- US 9,143,293
- US 9,143,293
- US 9,130,812
- US 9,107,099
- US 9,049,155
- US 9,048,994
- US 8,938,017
- US 8,867,563
- US 8,811,507
- US 8,619,814
- US 7,751,429
- US 7,715,442
- US 8,630,367
- US 8,619,688

- US 7,924,764
- US 5,559,804
- KR 2015-0073855
- KR 2015-0035569
- KR 2014-0101740
- KR 2012-0081040
- KR 2008-0064069
- KR 2008-0028090
- KR 10-1404372
- KR 10-1212423
- KR 10-1024926
- KR 10-0605371
- JP 2015-165676
- JP 2013-009394
- JP 2011-519516
- JP 2011-004100
- JP 2010-178129
- JP 5,329,244
- EP 2,681,864
- EP 2,534,769
- DE 112,008,003,413
- KR 2016-0045023
- EP 3,611,989
- KR 2019-0111162
- EP 3,188,431
- US 9,641,234
- KR 2018-0048909
- JP WO2-015182372
- JP WO2-018062494
- JP 6,062,742
- EP 3,598,831
- EP 2,959,624
- US 9,668,250
- EP 2,619,919
- EP 2,529,490
- KR 2016-0055718
- US 9,516,642
- KR 2013-0112929
- KR 10-1674631
- Broadband MIMO-OFDM Wireless Communications (STÜBER)
- OFDM PAPR Reduction by Shifting Null Subcarriers Among Data Subcarriers (Wang)

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself and any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '281 patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether or not any of the third party prior art systems anticipate or render obvious the Asserted Claims of the '281 patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '281 patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes

available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

E. U.S. Patent No. 11,470,595

Invalidity claim charts identifying disclosures in the references identified in Tables 1-D, 2-D, and 3-D as to the Asserted Claims of the '595 patent are provided in attached Exhibits D1-D16[18] and Appendix D.

Table 1-D: Prior Art Patents and Printed Publications for the '595 patent

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RD-1	US 2017/0181129A1 ("Bharadwaj 129")	Jun. 22, 2017	Dec. 21. 2015
RD-2	US 2017/0094664A1 ("Lee")	Mar. 30, 2017	Nov. 9, 2015
RD-3	US 2016/0353322A1 ("Li")	Dec. 1, 2016	May 27, 2015
RD-4	US 10,219,271B1 ("Hedayat")	Feb. 26, 2019	Oct. 27, 2015
RD-5	US 2017/0064718A1 ("Bharadwaj 718")	Mar. 2, 2017	Aug. 25, 2015
RD-6	US 2016/0330058A1 ("Chen")	Nov. 10, 2016	Sep. 25, 2015
RD-7	JP 2015-165676A ("Kim")	Sep. 17, 2015	Apr. 1, 2015
RD-8	US 2016/0330300A1 ("Josiam")	Nov. 10, 2016	Sep. 10, 2015
RD-9	US 2018/0205584A1 ("Lim")	Jul . 19 , 2018	Dec . 4 , 2015
RD-10	US 2017/0070998A1 ("Wu")	Mar. 9, 2017	Sep. 7, 2015
RD-11	IEEE 802.11ac ("802.11ac")	2013	N/A
RD-12	IEEE 802.11-15/ 1304r1	Nov. 9, 2015	N/A
RD-13	IEEE 802.11-14/ 1437r1	Nov. 4, 2014	N/A
RD-14	IEEE 802.11-16/ 0045r1	Jan. 19, 2016	N/A
RD-15	IEEE 802.11-15/ 1066r0	Sep. 13, 2015	N/A
RD-16	US 2016/0174200A1 ("Seok")	Jun. 16, 2016	Dec. 10, 2015

[18] Plaintiff reserves its right to rely on patent or patent application publications that are in the same family as the charted references as well as other revisions of the charted IEEE documents.

Further, Defendants are actively searching for information regarding at least the following devices and inventions:

Table 2-D: Prior Art Systems and Inventions for the '595 patent

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RD-17	Systems implementing IEEE 802.11ac ("Wi-Fi 5")[19]	2013
RD-18	HP Spectre 13 (2013 Model)	October 2013
RD-19	HP Envy 17 (2014 Model)	February 2014
RD-20	Samsung Galaxy S4 Smartphone	April 2013
RD-21	Samsung Galaxy Note 3 Smartphone	October 2013
RD-22	Samsung Galaxy Tab Pro	February 2014
RD-23	Samsung Galaxy Tab S	July 2014
RD-24	Samsung ATIV Book 9 (2014 Edition)	May 2014
RD-25	Samsung ATIV Book 9 (2015 Edition)	December 2015

For each of the prior art devices identified above, Defendants have listed and produced one or more documents as evidence of the relevant features and functionality. Defendants have obtained or are in the process of obtaining the identified devices and will make them available for inspection. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly.

[19] The attached invalidity chart over IEEE 802.11ac (RD-11) demonstrates how the systems implementing IEEE 802.11ac, listed in Table 2-D, disclose each element of each asserted claim.

In addition, Defendants identify, responsive to Plaintiff's infringement contentions, the following patents, publications, and systems as evidence of the state of the art as it relates to Wi-Fi and discontinuous channel assignment: [20]

- US20170006608A1
- US20170048823A1
- US10154520B1
- US20170041929A1
- US20170041171A1
- WO2016089998 A1
- US10389563B2
- US20160366666A1
- US20160330714A1
- US20160366688A1
- US2015/0381330A
- US20160360528A1
- US20170181130A1
- US2016204912A1
- IEEE 802.11-15/ 0132r13
- IEEE 802.11-15/ 0344r2
- IEEE 802.11-16/ 0039r1
- IEEE 802.11-15/ 0353r1
- IEEE 802.11-16/ 0638r2
- IEEE P802.11 Wireless LANs
- CN108702375A
- CN113572573A
- CN113572574A
- CN113556209A
- EP3396925A
- EP3849157A
- EP4131813A
- EP4369839A
- JP2019-503151
- JP2020-014250
- KR1020180088470A
- KR1020200091503A
- KR1020200091504A
- KR1020210072839A
- KR1020240011882A

[20] Plaintiff reserves its right to rely on any unlisted patents, patent application publications, provisional applications that are related to the listed reference.

- US2018/0302858A
- US2020/0267653A
- US2020/0267654A
- US2023/0007638A
- WO2017111567A
- US 2016/0198500
- US 2015/0289268
- US 2015/0163028
- US 2015/0139115
- US 2008/0310391
- US 2008/0031191
- US 2006/0050661
- US 9,143,293
- US 9,143,293
- US 9,130,812
- US 9,107,099
- US 9,049,155
- US 9,048,994
- US 8,938,017
- US 8,867,563
- US 8,811,507
- US 8,619,814
- US 7,751,429
- US 7,715,442
- US 8,630,367
- US 8,619,688
- US 7,924,764
- US 5,559,804
- KR 2015-0073855
- KR 2015-0035569
- KR 2014-0101740
- KR 2012-0081040
- KR 2008-0064069
- KR 2008-0028090
- KR 10-1404372
- KR 10-1212423
- KR 10-1024926
- KR 10-0605371
- JP 2015-165676
- JP 2013-009394
- JP 2011-519516
- JP 2011-004100
- JP 2010-178129
- JP 5,329,244

- EP 2,681,864
- EP 2,534,769
- DE 112,008,003,413
- KR 2016-0045023
- EP 3,611,989
- KR 2019-0111162
- EP 3,188,431
- US 9,641,234
- KR 2018-0048909
- JP WO2-015182372
- JP WO2-018062494
- JP 6,062,742
- EP 3,598,831
- EP 2,959,624
- US 9,668,250
- EP 2,619,919
- EP 2,529,490
- KR 2016-0055718
- US 9,516,642
- KR 2013-0112929
- KR 10-1674631
- Broadband MIMO-OFDM Wireless Communications (STÜBER)
- OFDM PAPR Reduction by Shifting Null Subcarriers Among Data Subcarriers (Wang)

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself and any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '595 patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether or not any of the third party prior art systems anticipate or render obvious the Asserted

Claims of the ’595 patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the ’595 patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants’ possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

F. U.S. Patent No. 11,116,035

Invalidity claim charts identifying disclosures in the references identified in Tables 1-E, 2-E, and 3-E as to the Asserted Claims of the ’035 patent are provided in attached Exhibits E1-

E27[21] and Appendix E

Table 1-E: Prior Art Patents and Printed Publications for the '035 patent

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RE-1	IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180")	Sept. 1, 2016	
RE-2	US 9,585,166 ("Seok 166")	Feb. 28, 2017	May 15, 2015
RE-3	Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi")	Dec. 30, 2006	
RE-4	IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132")	March 17, 2016	
RE-5	IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	March 2, 2016	
RE-6	IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998")	July 2016	
RE-7	IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963")	July 28, 2016	
RE-8	US 2017/0245261 ("Cariouyea 261")	Aug. 24, 2017	Dec. 28, 2016 (Appl. 62/296,827 filed on Feb. 18, 2016)
RE-9	US 2016/0198500 ("Merlin 500")	July 7, 2016	Jan. 6, 2016
RE-10	US 2018/0146476 A1 (Kim '476)	May 24, 2018	May 20, 2016
RE-11	US 2016/0128102 A1 ("Jauh '102")	May 5, 2015	Oct. 28, 2015
RE-12	US 2018/0352572 ("Carious 572")	Dec. 6, 2018	June 30, 2016
RE-13	CN 102958185 ("Huawei 185")	June 8, 2016	Aug. 17, 2011
RE-14	US 2011/0235596 ("Wentink 596")	Sept. 29, 2011	Sept. 22, 2010
RE-15	US 2017/0325264 ("Cherian 264")	Nov. 9, 2017	May 9, 2016
RE-16	US 2017/0223730 ("Jiang 730")	Aug. 3, 2017	Feb. 2, 2017 (Appl. 62/290,184 filed on Feb. 2, 2016)

[21] Plaintiff reserves its right to rely on patents or patent application publications that are in the same family as the charted references as well as other revisions of the charted IEEE documents.

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RE-17	IEEE 802.11ac ("802.11ac") [22]	Dec. 18, 2013	
RE-18	IEEE 802.11-2012 & 802.11-2016 Specification	March 29, 2012 Dec. 14, 2016	
RE-19	US 2017/0208625 ("Choi 625")	July 20, 2017	Dec. 7, 2015
RE-20	IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535")	April 13, 2016	
RE-21	US 2017/0048048 ("Seok 048")	Feb. 16, 2017	Aug. 15, 2016
RE-22	US 2017/0202023 ("Zhou 023")	July 13, 2017	Jan. 12, 2017 (Appl. 62/278,268 filed on Jan. 13, 2016)
RE-23	IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425)	Nov. 9, 2016	
RE-24	US 2018/0034595 ("Kim 595")	Feb. 1, 2018	Jan. 29, 2016
RE-25	IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")	May 14, 2016	
RE-26	IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")	Nov. 9, 2016	
RE-27	IEEE P802.11ax/D1.0 ("802.11ax D1.0")	Nov. 2016	

Further, Defendants are actively searching for information regarding at least the following devices and inventions:

Table 2-E: Prior Art Systems and Inventions for the '035 patent

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RE-28	Systems implementing IEEE 802.11ac ("Wi-Fi 5") [23]	2013
RE-29	HP Spectre 13 (2013 Model)	October 2013
RE-30	HP Envy 17 (2014 Model)	February 2014
RE-31	Samsung Galaxy S4 Smartphone	April 2013

[22] IEEE 802.11ac is an amendment to IEEE 802.11-2012, as such IEEE 802.11ac incorporates IEEE 802.11-2012. Therefore, any reference in the instant document to IEEE 802.11ac should be interpreted to include IEEE 802.11-2012.

[23] The attached invalidity chart over IEEE 802.11ac (RE-17) demonstrates how the systems implementing IEEE 802.11ac, listed in Table 2-F, disclose each element of each asserted claim.

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RE-32	Samsung Galaxy Note 3 Smartphone	October 2013
RE-33	Samsung Galaxy Tab Pro	February 2014
RE-34	Samsung Galaxy Tab S	July 2014
RE-35	Samsung ATIV Book 9 (2014 Edition)	May 2014
RE-36	Samsung ATIV Book 9 (2015 Edition)	December 2015

For each of the prior art devices identified above, Defendants have listed and produced one or more documents as evidence of the relevant features and functionality. Defendants have obtained or are in the process of obtaining the identified devices and will make them available for inspection. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly.

In addition, Defendants identify, responsive to Plaintiff's infringement contentions, the following patents, publications, and systems as evidence of the state of the art as it relates to switching of parameters for uplink multiuser transmission:[24]

- P802.11ax/D0.5
- US 11,019,660
- KR 10-1674631
- KR 2016-0045023
- EP 3,188,431

[24] Plaintiff reserves its right to rely on any unlisted patents, patent application publications, provisional applications that are related to the listed reference.

- US 9,641,234
- EP 2,619,919
- KR 2019-0111162
- US 9,516,642
- KR 2016-0055718
- EP 2,959,624
- JP WO2-015182372
- EP 3,611,989
- EP 2,529,490
- KR 2018-0048909
- EP 3,598,831
- US 9,668,250
- JP WO2-018062494
- JP 6,062,742
- KR 2013-0112929
- US 10,200,514
- US 2018/0062805
- US 10,116,361
- US 10,575,314
- US 10,341,065
- DE 112,008,003,413
- EP 1,977,543
- EP 2,356,769
- EP 2,534,769
- EP 2,538,742
- EP 2,579,665
- EP 2,959,624
- JP 2008-533833
- JP 2010-178129
- JP 2015-165676
- JP 5,329,244
- KR 10-0605371
- KR 10-1024926
- KR 10-1212423
- KR 10-1623456
- KR 2008-0064069
- KR 2012-0081040
- KR 2015-0035569
- KR 2015-0073855
- KR 2016-0004955
- KR 2016-0052430
- KR 2016-0059443
- US 10,397,916
- US 10,432,381

- US 10,624,131
- US 2006/0050661
- US 2007/0184835
- US 2008/0031191
- US 2008/0310391
- US 2012/0039274
- US 2014/0153505
- US 2015/0124677
- US 2015/0139115
- US 2015/0163028
- US 2019/0364597
- US 2020/0146072
- US 5,559,804
- US 7,545,787
- US 7,715,442
- US 7,751,429
- US 7,821,976
- US 8,040,898
- US 8,116,805
- US 8,223,857
- US 8,477,805
- US 8,526,346
- US 8,619,814
- US 8,681,612
- US 8,724,477
- US 8,861,474
- US 8,867,563
- US 9,049,155
- US 9,295,074
- US 9,451,637
- US 9,585,166
- US 9,807,792
- US 9,980,292
- WO2016112146A
- US2017/0245261A
- US2016/0165637A
- US2005/0141548A
- WO2016129766A
- US2018/0199375A
- US2017325264A
- KR20160045023A
- EP3188431A2
- KR101674631B1
- US9641234B2

- KR101553857
- KR20160048012
- KR20160048012
- KR20170002491
- KR20170017894
- KR20160132418
- KR20160021723
- US20170223730A1
- US20160345362A1
- WO2018048474A1
- US20170373736A
- US9749091
- US10009930
- US20060056457A1
- US20110222447A1
- US7644200
- US20060035589A1
- US20160345362A1
- US20160360546A1
- US7394824
- US20130194931A1
- US20140086222A1

Each of these references (and other references in the same family) show that switching of parameters for uplink multiuser transmission is not novel, and was well-known in the art for many years. In light of the references discussed herein, the Asserted Claims of the '035 patent cannot be valid.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself and any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '035 patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly,

subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether or not any of the third party prior art systems anticipate or render obvious the Asserted Claims of the '035 patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '035 patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

G. U.S. Patent No. 11,516,879

Invalidity claim charts identifying disclosures in the references identified in Tables 1-F, 2-F, and 3-F as to the Asserted Claims of the ’879 patent are provided in attached Exhibits F1-F27[25] and Appendix F

Table 1-F: Prior Art Patents and Printed Publications for the ’879 patent

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RF-1	IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”)	Sept. 1, 2016	
RF-2	US 9,585,166 (“Seok 166”)	Feb. 28, 2017	May 15, 2015
RF-3	Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”)	Dec. 30, 2006	
RF-4	IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”)	March 17, 2016	
RF-5	IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”)	March 2, 2016	
RF-6	IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”)	July 2016	
RF-7	IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”)	July 28, 2016	
RF-8	US 2017/0245261 (“Cariou 261”)	Aug. 24, 2017	Dec. 28, 2016 (Appl. 62/296,827 filed on Feb. 18, 2016)
RF-9	US 2016/0198500 (“Merlin 500”)	July 7, 2016	Jan. 6, 2016
RF-10	US 2018/0146476 A1 (Kim ’476)	May 24, 2018	May 20, 2016
RF-11	US 2016/0128102 A1 (“Jauh ’102”)	May 5, 2015	Oct. 28, 2015
RF-12	US 2018/0352572 (“Carious 572”)	Dec. 6, 2018	June 30, 2016
RF-13	CN 102958185 (“Huawei 185”)	June 8, 2016	Aug. 17, 2011
RF-14	US 2011/0235596 (“Wentink 596”)	Sept. 29, 2011	Sept. 22, 2010
RF-15	US 2017/0325264 (“Cherian 264”)	Nov. 9, 2017	May 9, 2016
RF-16	US 2017/0223730 (“Jiang 730”)	Aug. 3, 2017	Feb. 2, 2017

[25] Plaintiff reserves its right to rely on patent or patent application publications that are in the same family as the charted references as well as other revisions of the charted IEEE documents.

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
			(Appl. 62/290,184 filed on Feb. 2, 2016)
RF-17	IEEE 802.11ac ("802.11ac")[26]	March 29, 2012 Dec. 18, 2013	
RF-18	IEEE 802.11-2012 & 802.11-2016 Specification	March 29, 2012 Dec. 14, 2016	
RF-19	US 2017/0208625 ("Choi 625")	July 20, 2017	Dec. 7, 2015
RF-20	IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535")	April 13, 2016	
RF-21	US 2017/0048048 ("Seok 048")	Feb. 16, 2017	Aug. 15, 2016
RF-22	US 2017/0202023 ("Zhou 023")	July 13, 2017	Jan. 12, 2017 (Appl. 62/278,268 filed on Jan. 13, 2016)
RF-23	IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425)	Nov. 9, 2016	
RF-24	US 2018/0034595 ("Kim 595")	Feb. 1, 2018	Jan. 29, 2016
RF-25	IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")	May 14, 2016	
RF-26	IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")	Nov. 9, 2016	
RE-27	IEEE P802.11ax/D1.0 ("802.11ax D1.0")		

Further, Defendants are actively searching for information regarding at least the following devices and inventions:

Table 2-F: Prior Art Systems and Inventions for the '879 patent

[26] IEEE 802.11ac is an amendment to IEEE 802.11-2012, as such IEEE 802.11ac incorporates IEEE 802.11-2012. Therefore, any reference in the instant document to IEEE 802.11ac should be interpreted to include IEEE 802.11-2012.

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RF-28	Systems implementing IEEE 802.11ac ("Wi-Fi 5")[27]	2013
RF-29	HP Spectre 13 (2013 Model)	October 2013
RF-30	HP Envy 17 (2014 Model)	February 2014
RF-31	Samsung Galaxy S4 Smartphone	April 2013
RF-32	Samsung Galaxy Note 3 Smartphone	October 2013
RF-33	Samsung Galaxy Tab Pro	February 2014
RF-34	Samsung Galaxy Tab S	July 2014
RF-35	Samsung ATIV Book 9 (2014 Edition)	May 2014
RF-36	Samsung ATIV Book 9 (2015 Edition)	December 2015

For each of the prior art devices identified above, Defendants have listed and produced one or more documents as evidence of the relevant features and functionality. Defendants have obtained or are in the process of obtaining the identified devices and will make them available for inspection. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly.

[27] The attached invalidity chart over IEEE 802.11ac (RF-17) demonstrates how the systems implementing IEEE 802.11ac, listed in Table 2-F, disclose each element of each asserted claim.

In addition, Defendants identify, responsive to Plaintiff's infringement contentions, the following patents, publications, and systems as evidence of the state of the art as it relates to switching of parameters for uplink multiuser transmission:[28]

- P802.11ax/D0.5
- US 11,019,660
- KR 10-1674631
- KR 2016-0045023
- EP 3,188,431
- US 9,641,234
- EP 2,619,919
- KR 2019-0111162
- US 9,516,642
- KR 2016-0055718
- EP 2,959,624
- JP WO2-015182372
- EP 3,611,989
- EP 2,529,490
- KR 2018-0048909
- EP 3,598,831
- US 9,668,250
- JP WO2-018062494
- JP 6,062,742
- KR 2013-0112929
- US 10,200,514
- US 2018/0062805
- US 10,116,361
- US 10,575,314
- US 10,341,065
- DE 112,008,003,413
- EP 1,977,543
- EP 2,356,769
- EP 2,534,769
- EP 2,538,742
- EP 2,579,665
- EP 2,959,624
- JP 2008-533833
- JP 2010-178129
- JP 2015-165676

[28] Plaintiff reserves its right to rely on any unlisted patents, patent application publications, provisional applications that are related to the listed reference.

- JP 5,329,244
- KR 10-0605371
- KR 10-1024926
- KR 10-1212423
- KR 10-1623456
- KR 2008-0064069
- KR 2012-0081040
- KR 2015-0035569
- KR 2015-0073855
- KR 2016-0004955
- KR 2016-0052430
- KR 2016-0059443
- US 10,397,916
- US 10,432,381
- US 10,624,131
- US 2006/0050661
- US 2007/0184835
- US 2008/0031191
- US 2008/0310391
- US 2012/0039274
- US 2014/0153505
- US 2015/0124677
- US 2015/0139115
- US 2015/0163028
- US 2019/0364597
- US 2020/0146072
- US 5,559,804
- US 7,545,787
- US 7,715,442
- US 7,751,429
- US 7,821,976
- US 8,040,898
- US 8,116,805
- US 8,223,857
- US 8,477,805
- US 8,526,346
- US 8,619,814
- US 8,681,612
- US 8,724,477
- US 8,861,474
- US 8,867,563
- US 9,049,155
- US 9,295,074
- US 9,451,637

- US 9,585,166
- US 9,807,792
- US 9,980,292
- WO2016112146A
- US2017/0245261A
- US2016/0165637A
- US2005/0141548A
- WO2016129766A
- US2018/0199375A
- US2017325264A
- KR20160045023A
- EP3188431A2
- KR101674631B1
- US9641234B2
- KR101553857
- KR20160048012
- KR20160048012
- KR20170002491
- KR20170017894
- KR20160132418
- KR20160021723
- US20170223730A1
- US20160345362A1
- WO2018048474A1
- US20170373736A
- US9749091
- US10009930
- US20060056457A1
- US20110222447A1
- US7644200
- US20060035589A1
- US20160345362A1
- US20160360546A1
- US7394824
- US20130194931A1
- US20140086222A1

Each of these references (and other references in the same family) show that switching of parameters for uplink multiuser transmission is not novel, and was well-known in the art for many years. In light of the references discussed herein, the Asserted Claims of the ’879 patent cannot be valid.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself and any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '879 patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether or not any of the third party prior art systems anticipate or render obvious the Asserted Claims of the '879 patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '879 patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes

available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

Table 3-F provides additional bases for invalidity of the '879 patent under 35 U.S.C. §§ 101, 115, 282, on the grounds that the inventors of the '879 patent did not themselves invent the subject matter claimed in the '879 patent. The prior art under § 102(a)(1) is identified in Table 3 by the name of the person(s) from whom the invention was derived. The circumstances under which the invention was derived are explained below.

Table 3-F: Prior Art under § 102 for the '879 patent

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
RF-1	IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180")	• Individuals identified as authors in Carious 1180 at pp. 1-5
RF-2	US 9,585,166 ("Seok 166")	• Yong Ho Seok
RF-3	Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi")	• Hassan Takabi • Ali Moghadam • Ahmad Khonsari
RF-4	IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132")	• Robert Stacey
RF-5	IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	• Individuals identified as authors in Stacey 0024 at pp. 1-5
RF-6	IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998")	• Individuals identified as authors in Cariou 0998 at pp. 1-11
RF-7	IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963")	• Jing Ma • Kentaro Ishizu

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
		• Fumihide Kojima
RF-8	US 2017/0245261 (“Cariou 261”)	• Laurent Cariou • Po-Kai Huang • Chittabrata Ghosh • Robert J. Stacey
RF-9	US 2016/0198500 (“Merlin 500”)	• Simone Merlin • Gang Ding
RF-10	US 2018/0146476 A1 (Kim ’476)	• Jeongki Kim • Kiseon Ryu • Hangyu Cho
RF-11	US 2016/0128102 A1 (“Jauh ’102”)	• Yuh-Ren Jaub • Ching-Hwa Yu • James June-Ming Wang • Chao-Chun Wang
RF-12	US 2018/0352572 (“Carious 572”)	• Laurent Cariou • Yaron Alpert • Chittabrata Ghosh • Po-Kai Huang • Robert J. Stacey
RF-13	CN 102958185 (“Huawei 185”)	• Guorui Yang, • Xuehuan Wang • Menghong Liu
RF-14	US 2011/0235596 (“Wentink 596”)	• Maarten Menzo Wentink
RF-15	US 2017/0325264 (“Cherian 264”)	• George Cherian • Alfred Asterjadhi • Simone Merlin • Gwendolyn Denise Barriac • Yan Zhou
RF-16	US 2017/0223730 (“Jiang 730”)	• Jinjing Jiang • Liwen Chu • Lei Wang • Yakun Sun • Hongyuan Zhang • Hui-Ling Lou
RF-17	IEEE 802.11ac (“802.11ac”)	• Members of Task Group ac
RF-18	IEEE 802.11-2012 & 802.11-2016 Specification	• Members of Task Group ac
RF-19	US 2017/0208625 (“Choi 625”)	• Hyeyoung Choi • Kiseon Ryu

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
		• Jeongki Kim • Hangyu Cho • Suhwook Kim • Kwangseok Noh
RF-20	IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535")	• Robert Stacey
RF-21	US 2017/0048048 ("Seok 048")	• Yongho Seok
RF-22	US 2017/0202023 ("Zhou 023")	• Yan Zhou • Simone Merlin • Gwendolyn Denise Barriac • Alfred Asterjadhi • George Cherian
RF-23	IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425)	• Minseok Noh
RF-24	US 2018/0034595 ("Kim 595")	• Jeongki Kim • Kiseon Ryu • Hangyu Cho
RF-25	IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")	• Individuals identified as authors in Asterjadhi 0616 at pp. 1-8
RF-26	IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")	• Minseok Noh
RE-27	IEEE P802.11ax/D1.0 ("802.11ax D1.0")	• Members of Task Group ax

Woojin Ahn – an inventor of the '879 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Woojin Ahn was aware of the draft and final specifications for 802.11ax being

considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it.

Juhyung Son – an inventor of the '879 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it.

Geonjung Ko – an inventor of the '879 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015m,September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it.

Jinsam Kwak – an inventor of the ’ 879 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it.

Moreover, the listed inventors Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak frequently collaborated with other WILUS employees and Yonsei University employees, such as Minseok Noh, Jinsoo Ahn, Ronny Yongho Kim, Hanseul Hong, Kukil Lim, Jinho Lee, Young-Chai Ko, Yongho Seok *See e.g.,* IEEE 11-16-1425, "Clarification on applying MU EDCA parameter set,” available at https://mentor.ieee.org/802.11/dcn/16/11-16-1425-02-00ax-clarification-on-applying-mu-edca-parameter-set.pptx; IEEE 11-16-1424, “Issue on the CWmax value in MU EDCA,” available at https://mentor.ieee.org/802.11/dcn/16/11-16-1424-02-00ax-issue-on-the-cwmax-value-in-mu-edca.pptx; IEEE 11-14-0838, “Discussion on dual-link STR in IEEE 802.11ax,” https://mentor.ieee.org/802.11/dcn/14/11-14-0838-01-00ax-discussion-on-dual-link-str-in-ieee-802-11ax.pptx; IEEE 11-16-0352, “Consideration on MU initial link setup,” https://mentor.ieee.org/802.11/dcn/16/11-16-0352-01-00ax-considerations-on-mu-initial-link-setup.pptx; IEEE 11-16-0641, “Regarding HE fragmentation,” https://mentor.ieee.org/802.11/dcn/16/11-16-0641-02-00ax-regarding-he-fragmentation.pptx;

IEEE 11-16-0916," TID value of ALL ACK signaling," https://mentor.ieee.org/802.11/dcn/16/11-16-0917-01-00ax-text-for-tid-value-of-all-ack-signaling.docx; IEEE 11-16-1426, "DL/UL indication in MU-RTS," https://mentor.ieee.org/802.11/dcn/16/11-16-1426-00-00ax-dl-ul-indication-in-mu-rts.pptx. By virtue of their collaborations, one or more of the listed inventors was aware of the claimed subject matter invented by these collaborators. *See* e.g., US 2017/0048048 ("Seok 048"); US 9,585166 ("Seok 166").

H. U.S. Patent No. 11,129,163

Invalidity claim charts identifying disclosures in the references identified in Tables 1-G, 2-G, and 3-G as to the Asserted Claims of the '163 patent are provided in attached Exhibits G1-G24[29] and Appendix G.

Table 1-G: Prior Art Patents and Printed Publications for the '163 patent

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RG-1	US 2017/0223731 ("Lee 731")	Aug. 3, 2017	Aug. 6, 2014
RG-2	WO 2016/021858 ("Lee 858")	Feb. 11, 2016	Aug. 6, 2014
RG-3	IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	Mar. 2, 2016	N/A
RG-4	IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042")	Jan. 18, 2016	N/A
RG-5	Evgeny Khorov et al., *IEEE 802.11ax: How to Build High Efficiency WLANs*, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov")	Nov. 2015	N/A
RG-6	US 2016/0249397 ("Seok 397")	Aug. 25, 2016	Feb. 23, 2016
RG-7	US 10,666,368 ("Barriac 368")	May 26, 2020	Sept. 15, 2015
RG-8	US 10,321,485 ("Noh 485")	Jun. 11, 2019	Dec. 14, 2015
RG-9	US 2016/0345258 ("Zhou 258")	Nov. 24, 2016	May 22, 2015
RG-10	US 2021/0243787 ("Oteri 787")	Aug. 5, 2021	Jan 14, 2016
RG-11	US 2017/0127352 ("Park '352")	May 4, 2017	Feb. 26, 2015
RG-12	US 2017/0188306 ("Park 306")	June 29, 2017	Feb. 6, 2015
RG-13	US 2015/0124744 ("Zhu 744")	May 7, 2015	Oct. 29, 2014

[29] Plaintiff reserves its right to rely on patent or patent application publications that are in the same family as the charted references as well as other revisions of the charted IEEE documents.

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RG-14	WO 2017/031640 ("Du 640")	Mar. 2, 2017	Aug. 21, 2015
RG-15	US 2017/0078887 ("Barriac 887")	Mar. 16, 2017	Sept. 15, 2015
RG-16	IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396")	Mar. 14, 2016	N/A
RG-17	US 2016/0330663 ("Zhou 663")	Nov. 10, 2016	May 6, 2015
RG-18	EP 2986066A ("Nelson 066")	Feb. 17, 2016	Feb. 23, 2001
RG-19	US 2019/082387 ("Kim 387")	Mar. 14, 2019	Apr. 26, 2016
RG-20	US 2016/330685 ("Asterjadhi 685")	Nov. 10, 2016	Oct. 20, 2015
RG-21	US 2017/257817 ("Itagaki 817")	Sept. 7, 2017	Dec. 25, 2015
RG-22	IEEE 802.11-2012 ("802.11-2012")	2012	N/A
RG-23	IEEE 802.11ac ("802.11ac")	2013	N/A
RG-24	IEEE 802.11ax/D1.0	2016	N/A

Further, Defendants are actively searching for information regarding at least the following devices and inventions:

Table 2-G: Prior Art Systems and Inventions for the '163 patent

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RG-25	Systems implementing IEEE 802.11ac ("Wi-Fi 5")[30]	2013
RG-26	HP Spectre 13 (2013 Model)	October 2013
RG-27	HP Envy 17 (2014 Model)	February 2014
RG-28	Samsung Galaxy S4 Smartphone	April 2013
RG-29	Samsung Galaxy Note 3 Smartphone	October 2013
RG-30	Samsung Galaxy Tab Pro	February 2014
RG-31	Samsung Galaxy Tab S	July 2014
RG-32	Samsung ATIV Book 9 (2014 Edition)	May 2014
RG-33	Samsung ATIV Book 9 (2015 Edition)	December 2015

For each of the prior art devices identified above, Defendants have listed and produced one or more documents as evidence of the relevant features and functionality. Defendants have

[30] The attached invalidity chart over IEEE 802.11ac (RG-23) demonstrates how the systems implementing IEEE 802.11ac, listed in Table 2-G, disclose each element of each asserted claim.

obtained or are in the process of obtaining the identified devices and will make them available for inspection. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly.

In addition, Defendants identify, responsive to Plaintiff's infringement contentions, the following patents, publications, and systems as evidence of the state of the art as it relates to Wi-Fi, basic service set ("BSS"), and overlapping basic service set ("OBSS") systems and solutions:[31]

- US 2006/0050661
- KR 2016-0004955
- EP 2,681,864
- JP 2015-165676
- KR 10-1212423
- KR 2015-0073855
- US 2016/0198500
- US 2015/0163028
- EP 2,959,624
- US 7,912,489
- JP 5,329,244
- US 2012/0163317
- US 7,715,442
- EP 2,534,769
- US 2008/0310391
- US 7,821,976

[31] Plaintiff reserves its right to rely on any unlisted patents, patent application publications, provisional applications that are related to the listed reference.

- KR 2014-0101740
- US 2015/0124677
- EP 2,936,752
- KR 2015-0035569
- US 7,751,429
- US 2014/0153505
- US 8,867,563
- KR 10-0605371
- EP 1,977,543
- KR 10-1024926
- US 8,040,898
- US 8,619,814
- US 8,477,805
- US 9,130,812
- US 8,670,427
- US 2004/0213180
- US 8,811,507
- US 8,630,272
- US 8,681,612
- KR 2012-0081040
- JP 2011-004100
- JP 2010-178129
- US 2008/0031191
- KR 2014-0037693
- US 8,630,367
- US 2017/0006661
- US 2018/0270038
- CN 101360020A
- KR 2016-0045023
- KR 2016-0055718
- EP 3,188,431
- EP 2,529,490
- US 9,516,642
- EP 2,619,919
- US 9,641,234
- KR 2019-0111162
- KR 2018-0048909
- JP WO2-018062494
- EP 3,611,989
- KR 10-1674631
- EP 3,598,831
- JP WO2-015182372
- KR 2013-0112929
- JP 6,062,742

- US 9,668,250
- KR 2019-0111162
- US 20170/094685
- US 2016/0135225
- US 2017/0187848
- US 2017/0171888
- US 2017/0257817
- US 2016/0150514
- US 10,588,165
- US 2017/0127448
- IEEE 802.11-13/0500r1 "IEEE P802.11 Wireless LANs Proposed TGah Draft Amendment"
- IEEE 802.11-15/1326r2 "NAV Considerations for UL MU Response Follow Up"
- IEEE 802.11-15/0595r2 "Discussion on The Receiver Behavior for DSC/CCAC with BSS Color"
- IEEE 802.11-15/1075r1 "Number of BSS Color Bits"
- IEEE 802.11-13/1207r1 "CID 205 BSSID Color Bits"

Each of these references show that OBSSs, BSS color, intra-BSS and basic network allocation vectors ("NAVs"), recognizing BSS color collisions, doze state power save operations, and spatial reuse is/are not novel, and was/were well-known in the art for many years. In light of the references discussed herein, the Asserted Claims of the '163 patent cannot be valid.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself and any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '163 patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding

whether or not any of the third party prior art systems anticipate or render obvious the Asserted Claims of the ’163 patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the ’163 patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants’ possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

I. U.S. Patent No. 11,700,597

Invalidity claim charts identifying disclosures in the references identified in Tables 1-H, 2-H, and 3-H as to the Asserted Claims of the ’597 patent are provided in attached Exhibits H1-H24[32] and Appendix H.

Table 1-H: Prior Art Patents and Printed Publications for the ’597 patent

No.	Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
RH-1	US 2017/0223731 (“Lee 731”)	Aug. 3, 2017	Aug. 6, 2014
RH-2	WO 2016/021858 (“Lee 858”)	Feb. 11, 2016	Aug. 6, 2014
RH-3	IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”)	Mar. 2, 2016	N/A
RH-4	IEEE 802.11-16/0042r2 “BSS Color Settings for a Multiple BSSID Set” (“Ko 0042”)	Jan. 18, 2016	N/A
RH-5	Evgeny Khorov et al., *IEEE 802.11ax: How to Build High Efficiency WLANs*, 2015 Int’l Conf. on Eng’g & Telecomm. 14-19 (2015) (“Khorov”)	Nov. 2015	N/A
RH-6	US 2016/0249397 (“Seok 397”)	Aug. 25, 2016	Feb. 23, 2016
RH-7	US 10,666,368 (“Barriac 368”)	May 26, 2020	Sept. 15, 2015
RH-8	US 10,321,485 (“Noh 485”)	Jun. 11, 2019	Dec. 14, 2015
RH-9	US 2016/0345258 (“Zhou 258”)	Nov. 24, 2016	May 22, 2015
RH-10	US 2021/0243787 (“Oteri 787”)	Aug. 5, 2021	Jan 14, 2016
RH-11	US 2017/0127352 (“Park ’352”)	May 4, 2017	Feb. 26, 2015
RH-12	US 2017/0188306 (“Park 306”)	June 29, 2017	Feb. 6, 2015
RH-13	US 2015/0124744 (“Zhu 744”)	May 7, 2015	Oct. 29, 2014
RH-14	WO 2017/031640 (“Du 640”)	Mar. 2, 2017	Aug. 21, 2015
RH-15	US 2017/0078887 (“Barriac 887”)	Mar. 16, 2017	Sept. 15, 2015
RH-16	IEEE 802.11-16/0396r0 “Issues on BSS Color Collision” (“Ko 0396”)	Mar. 14, 2016	N/A
RH-17	US 2016/0330663 (“Zhou 663”)	Nov. 10, 2016	May 6, 2015
RH-18	EP 2986066A (“Nelson 066”)	Feb. 17, 2016	Feb. 23, 2001
RH-19	US 2019/082387 (“Kim 387”)	Mar. 14, 2019	Apr. 26, 2016
RH-20	US 2016/330685 (“Asterjadhi 685”)	Nov. 10, 2016	Oct. 20, 2015
RH-21	US 2017/257817 (“Itagaki 817”)	Sept. 7, 2017	Dec. 25, 2015
RH-22	IEEE 802.11-2012 (“802.11-2012”)	2012	N/A
RH-23	IEEE 802.11ac (“802.11ac”)	2013	N/A
RH-24	IEEE 802.11ax/D1.0	2016	N/A

[32] Plaintiff reserves its right to rely on patent or patent application publications that are in the same family as the charted references as well as other revisions of the charted IEEE documents.

Further, Defendants are actively searching for information regarding at least the following devices and inventions:

Table 2-H: Prior Art Systems and Inventions for the '597 patent

No.	Name of System or Invention	Date of Sale / Offer for Sale / Public Use
RH-25	Systems implementing IEEE 802.11ac ("Wi-Fi 5")[33]	2013
RH-26	HP Spectre 13 (2013 Model)	October 2013
RH-27	HP Envy 17 (2014 Model)	February 2014
RH-28	Samsung Galaxy S4 Smartphone	April 2013
RH-29	Samsung Galaxy Note 3 Smartphone	October 2013
RH-30	Samsung Galaxy Tab Pro	February 2014
RH-31	Samsung Galaxy Tab S	July 2014
RH-32	Samsung ATIV Book 9 (2014 Edition)	May 2014
RH-33	Samsung ATIV Book 9 (2015 Edition)	December 2015

For each of the prior art devices identified above, Defendants have listed and produced one or more documents as evidence of the relevant features and functionality. Defendants have obtained or are in the process of obtaining the identified devices and will make them available for inspection. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly.

[33] The attached invalidity chart over IEEE 802.11ac (RH-23) demonstrates how the systems implementing IEEE 802.11ac, listed in Table 2-H, disclose each element of each asserted claim.

In addition, Defendants identify, responsive to Plaintiff's infringement contentions, the following patents, publications, and systems as evidence of the state of the art as it relates to Wi-Fi, basic service set ("BSS"), and overlapping basic service set ("OBSS") systems and solutions:[34]

- US 2006/0050661
- KR 2016-0004955
- EP 2,681,864
- JP 2015-165676
- KR 10-1212423
- KR 2015-0073855
- US 2016/0198500
- US 2015/0163028
- EP 2,959,624
- US 7,912,489
- JP 5,329,244
- US 2012/0163317
- US 7,715,442
- EP 2,534,769
- US 2008/0310391
- US 7,821,976
- KR 2014-0101740
- US 2015/0124677
- EP 2,936,752
- KR 2015-0035569
- US 7,751,429
- US 2014/0153505
- US 8,867,563
- KR 10-0605371
- EP 1,977,543
- KR 10-1024926
- US 8,040,898
- US 8,619,814
- US 8,477,805
- US 9,130,812
- US 8,670,427
- US 2004/0213180
- US 8,811,507

[34] Plaintiff reserves its right to rely on any unlisted patents, patent application publications, provisional applications that are related to the listed reference.

- US 8,630,272
- US 8,681,612
- KR 2012-0081040
- JP 2011-004100
- JP 2010-178129
- US 2008/0031191
- KR 2014-0037693
- US 8,630,367
- US 2017/0006661
- US 2018/0270038
- CN 101360020A
- KR 2016-0045023
- KR 2016-0055718
- EP 3,188,431
- EP 2,529,490
- US 9,516,642
- EP 2,619,919
- US 9,641,234
- KR 2019-0111162
- KR 2018-0048909
- JP WO2-018062494
- EP 3,611,989
- KR 10-1674631
- EP 3,598,831
- JP WO2-015182372
- KR 2013-0112929
- JP 6,062,742
- US 9,668,250
- KR 2019-0111162
- US 2017/094685
- US 2016/0135225
- US 2017/0187848
- US 2017/0171888
- US 2017/0257817
- US 2016/0150514
- US 10,588,165
- US 2017/0127448
- IEEE 802.11-13/0500r1 “IEEE P802.11 Wireless LANs Proposed TGah Draft Amendment”
- IEEE 802.11-15/1326r2 “NAV Considerations for UL MU Response Follow Up”
- IEEE 802.11-15/0595r2 “Discussion on The Receiver Behavior for DSC/CCAC with BSS Color”
- IEEE 802.11-15/1075r1 “Number of BSS Color Bits”

- IEEE 802.11-13/1207r1 "CID 205 BSSID Color Bits"

Each of these references show that OBSSs, BSS color, intra-BSS and basic network allocation vectors ("NAVs"), recognizing BSS color collisions, doze state power save operations, and spatial reuse is/are not novel, and was/were well-known in the art for many years. In light of the references discussed herein, the Asserted Claims of the '597 patent cannot be valid.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself and any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '597 patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether or not any of the third party prior art systems anticipate or render obvious the Asserted Claims of the '597 patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '597 patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular

individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

IV. P.R. 3-3(b) – Invalidity Grounds

Pursuant to P.R. 3-3(b), Defendants contend that certain prior art references below anticipate one or more Asserted Claims and that to the extent the identified prior art references do not anticipate the Asserted Claims, those claims are invalid as obvious under 35 U.S.C. §103. Each anticipatory prior art reference, either alone or in combination with other prior art, also renders the Asserted Claims invalid as obvious. In particular, each anticipatory prior art reference may be combined with (1) information generally known to persons skilled in the art at the time of the alleged invention, and/or (2) any of the other anticipatory prior art references. To the extent that Plaintiff contends that any of the anticipatory prior art fails to disclose one or more limitations of the Asserted Claims, Defendants contend that any difference between the reference and the corresponding patent claims would have been obvious to one of ordinary skill in the art. Thus, all anticipation charts should be interpreted as both reflecting anticipation by the reference as well as

invalidity due to single reference obviousness, to the extent that Plaintiff contends that any limitation is missing.

A. Anticipation

As stated above, Defendants incorporate by reference all other invalidity contentions related to the Asserted Patents served on or otherwise provided to Plaintiff, whether past or future. In accordance with P.R. 3-3(a), prior art references anticipating the Asserted Claims are provided below. The prior art listed below anticipates the Asserted Claims under the proper construction of the claims and/or under Plaintiff's apparent interpretation of the claims as set forth by Plaintiff in its Complaint and Infringement Contentions.

1. U.S. Patent No. 10,313,077

The Asserted Claims of the '077 patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the '077 patent Asserted Claims in the claim charts of Exhibits A-01 through A-08 and Appendix A which are hereby incorporated by reference as if fully set forth herein. The claim charts and Appendix A provide an explanation showing how these prior art references teach or suggest each and every element of the '077 patent Asserted Claims. For each reference or combination of references suggested by each chart, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the '077 patent Asserted Claims are invalid in view of the prior art references cited in the claim charts and Appendix A, Defendants further contend that the '077 patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102 and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue

to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems.

Defendants' reference to a particular communications device, modem, circuit, software program, device or product in the claim charts and Appendix A should be interpreted as a reference to the product itself and any corresponding patents, publications, or product literature cited in Appendix A that relates to the cited memory module, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art communications device(s), modem(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts. Furthermore, Defendants' reference to a wireless communications standard, such as for example IEEE 802.11ac, in the claim charts and Appendix A should be interpreted as a reference to the products implementing and/or complying with such standard.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '077 patent, all prior art as described in any future *inter partes* review proceedings of the '077 patent, and all prior art disclosed during previous litigation proceedings involving the '077 patent.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Wilus Proceedings wherein invalidity contentions have been, or will be, provided regarding the '077 patent, its foreign counterparts, or any parent or child patent of the '077 patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence

the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well. It should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix A.

2. U.S. Patent No. 11,159,210

The Asserted Claims of the ’210 patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’210 patent Asserted Claims in the claim charts of Exhibits B-01 through B-08 and Appendix B which are hereby incorporated by reference as if fully set forth herein. The claim charts and Appendix B provide an explanation showing how these prior art references teach or suggest each and every element of the ’210 patent Asserted Claims. For each reference or combination of references suggested by each chart, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’210 patent Asserted Claims are invalid in view of the prior art references cited in the claim charts and Appendix B, Defendants further contend that the ’210 patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102 and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems.

Defendants’ reference to a particular communications device, modem, circuit, software program, device or product in the claim charts and Appendix B should be interpreted as a reference to the product itself and any corresponding patents, publications, or product literature cited in Appendix B that relates to the cited memory module, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art communications device(s), modem(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts. Furthermore, Defendants’ reference to a wireless communications standard, such as for example IEEE 802.11ac,

in the claim charts and Appendix B should be interpreted as a reference to the products implementing and/or complying with such standard.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '210 patent, all prior art as described in any future *inter partes* review proceedings of the '210 patent, and all prior art disclosed during previous litigation proceedings involving the '210 patent.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Wilus Proceedings wherein invalidity contentions have been, or will be, provided regarding the '210 patent, its foreign counterparts, or any parent or child patent of the '210 patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well. It should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge.

Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix B.

3. U.S. Patent No. 10,687,281

The Asserted Claims of the ’281 patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’281 patent Asserted Claims in the claim charts of Exhibits C1 through C13 which are hereby incorporated by reference as if fully set forth herein. The claim charts and Appendix C provide an explanation showing how these prior art references teach or suggest each and every element of the ’281 patent Asserted Claims. For each reference or combination of references suggested by each chart, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’281 patent Asserted Claims are invalid in view of the prior art references cited in the claim charts and Appendix C, Defendants further contend that the ’281 patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102

and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems.

Defendants' reference to a particular communications device, modem, circuit, software program, device or product in the claim charts and Appendix C should be interpreted as a reference to the product itself and any corresponding patents, publications, or product literature cited in Appendix C that relates to the cited memory module, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art communications device(s), modem(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts. Furthermore, Defendants' reference to a wireless communications standard, such as for example IEEE 802.11ac, in the claim charts and Appendix C should be interpreted as a reference to the products implementing and/or complying with such standard.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '281 patent, all prior art as described in any future *inter partes* review proceedings of the '281 patent, and all prior art disclosed during previous litigation proceedings involving the '281 patent.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Wilus Proceedings wherein invalidity contentions have been, or will be, provided regarding the '281 patent, its foreign counterparts, or any parent or child patent of the '281 patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the

publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well. It should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an

Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix C.

4. U.S. Patent No. 11,470,595

The Asserted Claims of the ’595 patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’595 patent Asserted Claims in the claim charts of Exhibits D1 through D16 which are hereby incorporated by reference as if fully set forth herein. The claim charts and Appendix D provide an explanation showing how these prior art references teach or suggest each and every element of the ’595 patent Asserted Claims. For each reference or combination of references suggested by each chart, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’595 patent Asserted Claims are invalid in view of the prior art references cited in the claim charts and Appendix D, Defendants further contend that the ’595 patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102 and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems.

Defendants’ reference to a particular communications device, modem, circuit, software program, device or product in the claim charts and Appendix D should be interpreted as a reference to the product itself and any corresponding patents, publications, or product literature cited in Appendix D that relates to the cited memory module, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art communications device(s), modem(s), circuit(s),

software program(s), device(s) or product(s) that are referenced in the charts. Furthermore, Defendants' reference to a wireless communications standard, such as for example IEEE 802.11ac, in the claim charts and Appendix D should be interpreted as a reference to the products implementing and/or complying with such standard.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '595 patent, all prior art as described in any future *inter partes* review proceedings of the '595 patent, and all prior art disclosed during previous litigation proceedings involving the '595 patent.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Wilus Proceedings wherein invalidity contentions have been, or will be, provided regarding the '595 patent, its foreign counterparts, or any parent or child patent of the '595 patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well. It should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement

or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix D.

5. U.S. Patent No. 11,116,035

The Asserted Claims of the ’035 patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’035 patent Asserted Claims in the claim charts of Exhibits E1 through E27 which are hereby incorporated by reference as if fully set forth herein. The claim charts and Appendix E provide an explanation showing how these prior art references teach or suggest each and every element of the ’035 patent Asserted Claims. For each reference or combination of references

suggested by each chart, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the '035 patent Asserted Claims are invalid in view of the prior art references cited in the claim charts and Appendix E, Defendants further contend that the '035 patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102 and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems.

Defendants' reference to a particular communications device, modem, circuit, software program, device or product in the claim charts and Appendix E should be interpreted as a reference to the product itself and any corresponding patents, publications, or product literature cited in Appendix E that relates to the cited memory module, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art communications device(s), modem(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts. Furthermore, Defendants' reference to a wireless communications standard, such as for example IEEE 802.11ac, in the claim charts and Appendix E should be interpreted as a reference to the products implementing and/or complying with such standard.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '035 patent, all prior art as described in any future *inter partes* review proceedings of the '035 patent, and all prior art disclosed during previous litigation proceedings involving the '035 patent.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Wilus Proceedings wherein invalidity contentions have been, or will be, provided regarding the '035 patent, its foreign counterparts, or any parent or child patent of the '035 patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well. It should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining

certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix E.

6. U.S. Patent No. 11,516,879

The Asserted Claims of the '879 patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the '879 patent Asserted Claims in the claim charts of Exhibits F1 through F27 which are hereby incorporated by reference as if fully set forth herein. The claim charts and Appendix F provide an explanation showing how these prior art references teach or suggest each and every element of the '879 patent Asserted Claims. For each reference or combination of references suggested by each chart, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the '879 patent Asserted Claims are invalid in view of the prior art references cited in the claim charts and Appendix F, Defendants further contend that the '879 patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102 and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems.

Defendants' reference to a particular communications device, modem, circuit, software program, device or product in the claim charts and Appendix F should be interpreted as a reference

to the product itself and any corresponding patents, publications, or product literature cited in Appendix F that relates to the cited memory module, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art communications device(s), modem(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts. Furthermore, Defendants' reference to a wireless communications standard, such as for example IEEE 802.11ac, in the claim charts and Appendix F should be interpreted as a reference to the products implementing and/or complying with such standard.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '879 patent, all prior art as described in any future *inter partes* review proceedings of the '879 patent, and all prior art disclosed during previous litigation proceedings involving the '879 patent.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Wilus Proceedings wherein invalidity contentions have been, or will be, provided regarding the '879 patent, its foreign counterparts, or any parent or child patent of the '879 patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text

refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well. It should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix F.

7. U.S. Patent No. 11,129,163

The Asserted Claims of the ’163 patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’163 patent Asserted Claims in the claim charts of Exhibits G1 through G24 which are hereby incorporated by reference as if fully set forth herein. The claim charts and Appendix G provide an explanation showing how these prior art references teach or suggest each and every

element of the ’163 patent Asserted Claims. For each reference or combination of references suggested by each chart, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’163 patent Asserted Claims are invalid in view of the prior art references cited in the claim charts and Appendix G, Defendants further contend that the ’163 patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102 and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems.

Defendants’ reference to a particular communications device, modem, circuit, software program, device or product in the claim charts and Appendix G should be interpreted as a reference to the product itself and any corresponding patents, publications, or product literature cited in Appendix G that relates to the cited memory module, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art communications device(s), modem(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts. Furthermore, Defendants’ reference to a wireless communications standard, such as for example IEEE 802.11ac, in the claim charts and Appendix G should be interpreted as a reference to the products implementing and/or complying with such standard.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the ’163 patent, all prior art as described in any future *inter partes* review

proceedings of the ’163 patent, and all prior art disclosed during previous litigation proceedings involving the ’163 patent.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Wilus Proceedings wherein invalidity contentions have been, or will be, provided regarding the ’163 patent, its foreign counterparts, or any parent or child patent of the ’163 patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well. It should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix G.

8. U.S. Patent No. 11,700,597

The Asserted Claims of the '597 patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the '597 patent Asserted Claims in the claim charts of Exhibits H1 through H24 which are hereby incorporated by reference as if fully set forth herein. The claim charts and Appendix H provide an explanation showing how these prior art references teach or suggest each and every element of the '597 patent Asserted Claims. For each reference or combination of references suggested by each chart, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the '597 patent Asserted Claims are invalid in view of the prior art references cited in the claim charts and Appendix H, Defendants further contend that the '597 patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102 and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue

to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems.

Defendants' reference to a particular communications device, modem, circuit, software program, device or product in the claim charts and Appendix H should be interpreted as a reference to the product itself and any corresponding patents, publications, or product literature cited in Appendix H that relates to the cited memory module, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art communications device(s), modem(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts. Furthermore, Defendants' reference to a wireless communications standard, such as for example IEEE 802.11ac, in the claim charts and Appendix H should be interpreted as a reference to the products implementing and/or complying with such standard.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '597 patent, all prior art as described in any future *inter partes* review proceedings of the '597 patent, and all prior art disclosed during previous litigation proceedings involving the '597 patent.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Wilus Proceedings wherein invalidity contentions have been, or will be, provided regarding the '597 patent, its foreign counterparts, or any parent or child patent of the '597 patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence

the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well. It should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix H.

B. Obviousness

As stated above, Defendants incorporate by reference all other invalidity contentions related to the Asserted Patents served on or otherwise provided to Plaintiff, whether past or in the future. In addition to certain claims being anticipated at least under Plaintiff's apparent claim constructions as indicated above, the Asserted Claims are also invalid as obvious over the same teachings identified for anticipation. Further, the Asserted Claims are obvious over various combinations of the references shown in the claim charts accompanying or incorporated by reference into this disclosure. No Asserted Claim goes beyond combining known elements to achieve predictable results or does more than choose between clear alternatives known to those of skill in the art. Thus, to the extent that an Asserted Claim is not anticipated, it is nevertheless invalid as obvious. Specifically, Defendants assert that any charted or incorporated reference in combination with one or more other charted or incorporated references renders the Asserted Claims obvious.

Motivations to combine, as well as the general state of the art, may be found in a variety of places including in the references defined above, and the specification of the Asserted Patents. For example, each piece of prior art relates to the design and/or structure and/or function of communications devices, such as modems or phones. A person of ordinary skill in the art at the time of the alleged invention would have been motivated to combine any one piece of identified prior art with any other identified piece of prior art. For at least this reason, it would have been obvious to a person of skill in the art at the time of the alleged invention of the Asserted Claims to combine the various references cited herein so as to practice the Asserted Claims and there is a motivation in the art to make such a combination.

Motivations to combine various prior art references are present in the references themselves, the common knowledge of one of ordinary skill in the art, the prior art as a whole, or

the nature of the problems allegedly addressed by the Asserted Patents. Further reasons to combine the references identified in these charts include the nature of the problem being solved, the express, implied, and/or inherent teachings of the prior art, the knowledge of persons of ordinary skill in the art, the fact that the prior art is generally directed towards methods and systems for the design and/or structure and/or function of communications devices (*e.g.,* modems or phones) that such combinations would have yielded predictable results, and that such combinations would have represented known alternatives to a person of ordinary skill in the art.

In *KSR International Co. v. Teleflex, Inc.*, the United States Supreme Court held that, among other things, "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." 127 S. Ct. 1727, 1739 (2007); *see also id.* at 1731 ("[A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions."). In particular, a patent is obvious where "the content of the prior art, the scope of the patent claim, and the level of ordinary skill are not in material dispute, and the obviousness of the claim is apparent in light of these factors." *Id.* at 1745–46. The Supreme Court found that "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *Id.* at 1731.

Moreover, the Supreme Court recognizes that market pressures will motivate a person of ordinary skill to survey known art for solutions to problems. *Id*. at 1732 ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp."). When a person of ordinary skill uses an identified, predictable

solution to solve a problem, "it is likely the product not of innovation but of ordinary skill and common sense." *Id*.

In addition, when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. *Id*. at 1740. If a person of ordinary skill can implement a predictable variation, U.S.C. § 103 bars its patentability. *Id*. The rationale to combine or modify prior art references is significantly stronger when references seek to solve similar problems, come from the same field, and correspond well. *In re Inland Steel Co.*, 265 F.3d 1354, 1362 (Fed. Cir. 2001).

Although the law does not require evidence of motivation to combine, motivation exists to combine one or more of the references disclosed herein with each other. In addition to the specific motivations identified herein, motivation to modify a particular reference or to combine any two or more of the identified references comes from (a) the nature of the problem being solved, (b) the teachings of the prior art, (c) the knowledge of persons of ordinary skill in the art, (d) the fact that all of the references teach systems, apparatuses, and methods related to the subject matter and address the same technical issues described in the Asserted Patents, and (e) one would be motivated by considerations of efficiency, effectiveness, convenience, cost-savings, and accessibility, to combine the various teachings. Additionally, one would be motivated to address the alleged problems or achieve the purported objectives identified in the Background sections of the Asserted Patents.

To the extent not anticipated, the Asserted Claims represent no more than the result of ordinary innovation over the prior art. Moreover, no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known

alternative to one of skill in the art. *See KSR*, 127 S.Ct. at 1739-40 (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 1742. Nevertheless, in keeping with the Local Patent Rules, and in addition to the information contained in the section immediately above and elsewhere in these contentions, additional motivation and reason to combine the cited art are identified. A person having ordinary skill in any or all of these fields would be aware of all prior art in those fields, including but not limited to the identified prior art references and systems, and would have been motivated to combine the teachings of prior art with the field.

In sum, motivations to modify or combine the identified references including the references listed above can be found via, for example, discussions in the cited references, the state of the art discussed in the references, and the knowledge of one of ordinary skill in the art. One of ordinary skill in the art would have been motivated to combine these references, because these references relate to common objectives and subject matter. The references share commonalities in terms of their general subject matter as well as the types of equipment, products, systems, and/or methods used. Further, the prior art references explicitly or implicitly reference other prior art references, share common authors or inventors, were published in the same journals, were compiled by a common author of a compilation or reference book, were presented at the same conferences, and/or were developed at common companies, schools, or organizations which would motivate one of skill in the art to combine them. These references are within the field of the Asserted Patents and are directed to similar subject matter within the field. Additionally, the references, and any

products, devices, or processes described in the references, existed and/or were invented in the same time period providing further motivation for combination. These disclosures were provided without prejudice to any arguments or objections concerning the relevance of motivation to combine in connection with any invalidity contentions.

Defendants reserve the right to further specify the motivations to combine the prior art in response to positions that Plaintiff may take later in this case and as discovery, including third party discovery, proceeds. Defendants may rely on any and all portions of the prior art, other documents, and expert testimony to establish that a person of ordinary skill in the art would have been motivated to modify or combine the prior art so as to render the claims invalid as obvious. Moreover, Defendants reserve the right to rely on later identified sources of information, including but not limited to witness testimony and other discovery, to establish the state of the art in the relevant time frame pertaining to the Asserted Patents.

While Defendants reserve the right to rely on any combination of the references reflected in their charts or incorporated herein by reference, Defendants provide the following exemplary and non-exhaustive references and/or combinations evidencing invalidity of the claims of the Asserted Patents. The combinations of prior art listed below render obvious the Asserted Claims under the proper construction of the claims and/or under Plaintiff's apparent interpretation of the claims as set forth by Plaintiff in its Complaint and Infringement Contentions.

1. U.S. Patent No. 10,313,077

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix A the prior art references that render obvious the Asserted Claims of the '077 patent and include below exemplary combinations showing the obviousness of the '077 patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix A, the limitation would have been obvious in light of the

disclosures within the reference and the knowledge of one of skill in the art at the time of the '077 patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix A, such reference may be combined with any other references listed in Appendix A for such element, thereby rendering the claims invalid for obviousness.

To the extent a finder of fact determines that a limitation of any of the '077 patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '077 patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a) Obviousness Rationale

For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix A along with the knowledge of one of ordinary skill in the art to meet the limitations of the '077 patent Asserted Claims. Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '077 patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and

in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

One or more combinations of the prior art references identified in Appendix A would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix A would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the

marketplace; the existence of a known problem for which there was an obvious solution encompassed by the ’077 patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix A is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Additionally, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix A because all of these references relate to the same area of technology and/or are analogous art. The ’077 patent Asserted Claims are directed to a technique for coexistence among legacy and non-legacy wireless communication terminals, e.g., a terminal and method for receiving a non-legacy physical layer frame which includes a legacy signaling field, and determining the number of symbols of data of the non-legacy physical layer frame. ’077 patent at 1:20-25, 2:65-5:35. The prior art references generally relate to IEEE 802.11 wireless local area network technology. The references, like the ’077 patent, are also reasonably pertinent

to wireless communication issues related to the use of newer technology with "legacy" communications equipment.

Similarly, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix A because all of these references are works of people in the same technical field. For example, many of the authors of the prior art references are members of the IEEE's 802.11 working group. Moreover, one of ordinary skill in the art would have recognized that members of the IEEE's working groups frequently collaborate with, and build on, each other's work. Thus, one of ordinary skill in the art would have recognized that the works by people that are in the same IEEE working group are likely compatible or otherwise work harmoniously when combined.

The '077 patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the '077 patent Asserted Claims.

All of the '077 patent Asserted Claims are directed to a technique for coexistence among legacy and non-legacy wireless communication terminals, e.g., a terminal and method for receiving a non-legacy physical layer frame which includes a legacy signaling field, and determining the number of symbols of data of the non-legacy physical layer frame. '077 patent at 1:20-25, 2:65-5:35. Such technology, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, was widely known before the alleged priority date of the '077 Patent, as evidenced by the references in Appendix A. *See, e.g.*, IEEE

802.11ac § 3.1; Yu 012 at [0059]-[0066], Figure 3, [0077]-[0084], [0099], [158-165], Figure 13; 802.11-15/0810 at 9–10, 13, 23; Bharadwaj 202 at [0042]-[0043], Figure 3A, [0046]–[0050], Figure 4A, Figure 4B, [0054]-[0056]; Cao 067 at 2:66-67; 3:23-45, Figure 1, 4:17-5:40, 5:41-6:12, Figure 2, 6:51-7:5, 7:19-47, Figure 3; Lin 929 at [0122]-[0129]; Lee 929 at 3:52-4:15; Cao 476 at 4:61-5:26; *see also* Appendix A.

One of ordinary skill in the art would have been motivated to combine any of the references in Appendix A because at the time of the alleged invention techniques for coexistence among legacy and non-legacy wireless communication terminals were well-known. In particular, techniques for coexistence among legacy and non-legacy wireless communication terminals were known to persons of ordinary skill in the art and incorporating a legacy signaling field into a non-legacy physical layer frame, and determining the number of symbols of data of the non-legacy physical layer frame was a well-known solution to achieve improved performance and coexistence. *See, e.g.*, IEEE 802.11ac at §§ 22.3.21, 22.3.8.2.4, 22.3.1; IEEE 802.11-2012 at §§ 9.23.4, 20.3.11, 9.3.8, 9.23.5.1, Table 20-6; Yu 012 at [0059]-[0066], Figure 3, [0077]-[0084], [0099], [158-165], Figure 13; 802.11-15/0810 at 9–10, 13, 23; Bharadwaj 202 at [0042]-[0043], Figure 3A, [0046]–[0050], Figure 4A, Figure 4B, [0054]-[0056]; Cao 067 at 2:66-67; 3:23-45, Figure 1, 4:17-5:40, 5:41-6:12, Figure 2, 6:51-7:5, 7:19-47, Figure 3; Lin 929 at [0029]-[0030]; Lee 929 at 3:52-4:15; Cao 476 at 3:22-4:14; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the ’077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, for a processor to be configured to receive a non-legacy physical layer frame by using a transceiver. *See, e.g.*, IEEE 802.11ac at § 22.1.4; Yu 012 at [0059]-[0066], Figure 3, [0077]-[0084]; 802.11-15/0810 at 9–10; Bharadwaj 202 at [0042]-[0043], Figure 3A, [0046]-[0048],

Figure 4A; Cao 067 at 3:23-45, 5:28-40, 5:41-6:12, Figure 2; Lin 929 at [0122]-[0129]; Lee 929 at 3:52-4:15; Cao 476 at 4:61-5:26; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to obtain a legacy signaling field including information decodable by a legacy wireless communication terminal from the non-legacy physical layer frame. *See, e.g.*, IEEE 802.11ac at § 22.3.7.4; IEEE 802.11.12 at § 22.3.7.4; Yu 012 at [0099]; 802.11-15/0810 at 13, 23; Bharadwaj 202 at [0042]-[0043], Figure 3A, [0046]-[0050], Figure 4A, Figure 4B; Cao 067 at 3:23-45, 5:28-40, 5:41-6:12, Figure 2; Lin 929 at [0029]-[0030]; Lee 929 at 3:52-4:15; Cao 476 at 3:22-4:14; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to obtain length information indicating information on a duration of the non-legacy physical layer frame, from the legacy signaling field. *See, e.g.*, IEEE 802.11ac at § 22.3.2; IEEE 802.11-2012 at § 22.3.4.4; Yu 012 at [0158]-[0165], Figure 13; 802.11-15/0810 at 23; Bharadwaj 202 at [0050]-[0051], [0054]-[0056], Figure 3A, [0046]-[0050], Figure 4A, Figure 4B; Cao 067 at 5:41-6:12, Figure 2, 6:51-7:5, 7:19-47, Figure 3; Lin 929 at [0029]-[0030]; Lee 929 at 3:52-4:15; Cao 476 at 15:36-50; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to obtain information other than information on the duration of the non-legacy physical layer frame through a remaining value obtained by dividing the length information by a data size transmittable by a symbol of a legacy physical layer frame, wherein the data size

transmittable by a symbol of the legacy physical layer frame is 3 octets when a data rate of the legacy physical layer frame is 6 Mbps. *See, e.g.*, IEEE 802.11ac at § 22.3.21; IEEE 802.11-2012 at § 9.23.4; Yu 012 at [0232]-[0237], Figure 13; 802.11-15/0810 at 23; Bharadwaj 202 at [0054]-[0056], Figure 3A, [0046]-[0050], Figure 4A, Figure 4B; Cao 067 at 7:19-47; Lin 929 at [0085]-[0092]; Lee 929 at 3:52-4:15; Cao 476 at 15:36-16:16; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to determine a number of symbols of data of the non-legacy physical layer frame according to an equation (such as equations for N_{SYM}). For example, equations for N_{SYM} can be based on, among others, L_LENGTH, an ambiguity or disambiguity field setting, and one or more adjustment values such as "m" (also "M" or "n"). Further, equations for L_LENGTH can also be based on one or more adjustment values such as "m" (also "M" or "n"). The relationships among various equations such as L_LENGTH and N_{SYM} vis-à-vis the one or more adjustment values such as "m" (also "M" or "n") were also well-known (e.g. "-m" in an equation for L_LENGTH has a corresponding "+m" in an equation for N_{SYM} and visa-versa). It also would have been obvious to one of skill in the art to modify the equations of a reference based on the teachings or suggestions of one or more other references for purposes of coexistence, backwards compatibility, fairness, etc. *See, e.g.*, IEEE 802.11ac at § 22.3.8.2.4; IEEE 802.11-2012 at § 9.23.4; Yu 012 at [0232]-[0237]; 802.11-15/0810 at 22-24; Bharadwaj 202 at [0050], [0054]-[0056]; Cao 067 at 16:18-29; Lin 929 at [0059]-[0071]; Lee 929 at 3:52-4:15; Cao 476 at 14:46-15:35; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to use a PE Disambiguity field set based on the duration of a symbol of the data of

the non-legacy physical layer frame and an increment of duration to set a value of the length information based on a duration of a symbol of the legacy physical layer frame. *See, e.g.*, IEEE 802.11ac at § 22.3.1; IEEE 802.11-2012 § 9.3.8; Yu 012 at [0232]-[0237]; 802.11-15/0810 at 22-24; Bharadwaj 202 at [0053]; Cao 067 at 14:47-15:35; Lin 929 at [0085]-[0096]; Lee 929 at 3:52-4:15; Cao 476 at 14:46-15:35; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to obtain a duration of a packet extension which is a padding of the non-legacy physical layer frame, according to an equation (such as equations for T_{PE}). For example, equations for T_{PE} can be based on, among others, L_LENGTH and one or more adjustment values such as "m" (also "M" or "n"). Further, equations for L_LENGTH can also be based on one or more adjustment values such as "m" (also "M" or "n"). The relationships among various equations such as L_LENGTH and T_{PE} vis-à-vis the one or more adjustment values such as "m" (also "M" or "n") were also well-known (e.g. "-m" in an equation for L_LENGTH has a corresponding "+m" in an equation for T_{PE} and visa-versa). It also would have been obvious to one of skill in the art to modify the equations of a reference based on the teachings or suggestions of one or more other references for purposes of coexistence, backwards compatibility, fairness, etc. *See, e.g.*, IEEE 802.11-2012 at § 20.3.20.5A; Yu 012 at [0232]-[0237]; 802.11-15/0810 at 9; Bharadwaj 202 at [0056]; Cao 067 at 16:18-29; Lin 929 at [0085]-[0092]; Lee 929 at 3:52-4:15; Cao 476 at 6:12-21; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, for the increment of duration to be a value obtained by multiplying a difference

between a value obtained by performing a ceiling operation on a value obtained by dividing the duration of the non-legacy physical layer frame after the legacy signaling field by the duration of a symbol of the legacy physical layer frame and the value obtained by dividing the duration of the non-legacy physical layer frame after the legacy signaling field by the duration of a symbol of the legacy physical layer frame by the duration of a symbol of the legacy physical layer frame. *See, e.g.*, Yu 012 at [0232]-[0237]; 802.11-15/0810 at 22-24; Bharadwaj 202 at [0053]–[0054]; Cao 067 at 16:18-29; Lin 929 at [0085]-[0096]; Lee 929 at 3:52-4:15; Cao 476 at 10:12-11:8; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to determine a format of a non-legacy signaling field included in the non-legacy physical layer frame based on the length information. *See, e.g.*, IEEE 802.11-2012 at § 9.23.5.1; Yu 012 at [0232]-[0237]; 802.11-15/0810 at 22-24; Bharadwaj 202 at [0054]; Cao 067 at 5:41-6:12; Lin 929 at [0085]-[0096]; Lee 929 at 3:52-4:15; Cao 476 at 11:66-12:40; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to determine whether the non-legacy physical layer frame comprises a predetermined signaling field based on the length information. *See, e.g.*, IEEE 802.11-2012 at Table 22-1; Yu 012 at [0232]-[0237]; 802.11-15/0810 at 9; Bharadwaj 202 at [0050]; Cao 067 at 5:41-6:12; Lin 929 at [0029]-[0030]; Lee 929 at 3:52-4:15; Cao 476 at 15:67-16:16; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement

contentions, to obtain the information other than the information on the duration of the non-legacy physical layer frame based on the remaining value and a modulation method of a third symbol after the legacy signaling field. *See, e.g.*, IEEE 802.11ac at § 22.3.8.2.4; IEEE 802.11-2012 at § 9.23.4; Yu 012 at [0232]-[0237]; 802.11-15/0810 at 22-24; Bharadwaj 202 at [0050]; Cao 067 at 7:19–47; Lin 929 at [0029]-[0030]; Lee 929 at 3:52-4:15; Cao 476 at 6:22-49; *see also* Appendix A.

It was well-known to one of skill in the art before the time of the '077 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to use a modulation method such as Binary Phase Shift Keying (BPSK) or Quadrature Binary Phase Shift Keying (QBPSK). *See, e.g.*, IEEE 802.11ac at § 22.1.1; Yu 012 at [0232]-[0237]; 802.11-15/0810 at 16; Bharadwaj 202 at [0032]; Cao 067 at 7:19–47; Lin 929 at [0122]-[0129]; Lee 929 at 3:52-4:15; Cao 476 at 6:22-49; *see also* Appendix A.

In addition, the prior art also provided sets of finite, identified, predictable solutions for known problems that would have been obvious to those of ordinary skill to try with a reasonable expectation of success. For example, it would have been obvious to one of skill in the art at the time that the coexistence among legacy and non-legacy wireless communication terminals could be achieved by including legacy information in a preamble of a frame that allows the frame to be understood at least in part by a legacy wireless communication terminal, while still providing non-legacy content to non-legacy terminals was common practice. Given that including such information in the preamble of the frame was common, it would have been obvious to one of skill in the art to try and modify existing communication frames such that they include such information allowing coexistence between legacy and non-legacy wireless communications terminals, while still providing non-legacy content to non-legacy terminals. Such a modification would have

yielded the predictable result of legacy and non-legacy wireless communication terminals being able to coexist.

The prior art references provide motivations to combine because they describe the field of the Asserted Patents, teach improvements, explain desired features, and even expressly state that one of skill in the art would be able to apply their teachings to related systems or methods. *See, e.g.,* Yu 012 at [0003] ("The described technology relates generally to a method for transmitting and receiving frame. More particularly, the described technology relates generally to a method for transmitting and receiving frame in a wireless local area network (WLAN)."); Cao 067 at 1:30–33 ("The present disclosure relates generally to communication networks and, more particularly, to wireless local area networks that utilize orthogonal frequency division multiplexing (OFDM)."); Lin 929 at [0002] ("The present invention relates to the field of communications technologies, and in particular, to a physical layer protocol data unit transmission method and apparatus."); Lee 929 at 1:18-20 ("The present invention relates to a wireless communication system, and more particularly, to a method and an apparatus for transmitting a symbol repeatedly."); Cao 476 at 1:29-33 ("The present disclosure relates generally to communication networks and, more particularly, to wireless local area networks that utilize orthogonal frequency division multiplexing (OFDM).").

Further, the prior art references provide motivations to combine because they explicitly suggest utilizing the teachings and disclosures of other references. *See, e.g.*, Yu 012 at [0006] ("Recently, a high efficiency (HE) WLAN for enhancing the system throughput in high density scenarios is being developed by the IEEE 802.11ax task group."); Cao 476 at 2:32-38 ("In yet another embodiment, the MAC processing unit 18 and the PHY processing unit 20 are additionally configured to operate according to the second communication protocol, a third communication

protocol and/or a fourth communication protocol (e.g., the IEEE 802.11a Standard and/or the IEEE 802.11n Standard)."); Lee 929 at 2:35-36 ("The frame may be a 802.11ac standard very high through put (VHT) frame."); Lin 929 at [0003] ("To improve data transmission efficiency in a WLAN (wireless local area network), a 4x symbol length is introduced into a next - generation WLAN standard 802.11ax , and correspondingly, an 802.11a/n/ac symbol is referred to as a 1x symbol.").

In accordance with these advances, the prior art could have been combined according to methods known to those of ordinary skill within the field of the '077 patent to yield predictable results. The use of information contained in a field within the frame to process the frame could have been predictably achieved by one of ordinary skill at the time of the alleged invention. One of ordinary skill in the art would have been aware of these various applications, including methods for coexistence of legacy and non-legacy wireless communication terminals. Those of ordinary skill in the art could have employed known techniques to improve similar prior art devices in the same way as claimed in the '077 patent.

In addition, one of ordinary skill in the art would be motivated to combine the prior art references because the elements found in the Asserted Claims of the '077 patent are well known in the art. *See, e.g.*, IEEE 802.11ac § 22.1.4; Yu 012 at [0059]-[0066], Figure 3, [0077]-[0084]; 802.11-15/0810 at 9–10; Bharadwaj 202 at [0042]-[0043], Figure 3A, [0046]-[0048], Figure 4A; Cao 067 at 3:23-45, 5:28-40, 5:41-6:12, Figure 2; Lin 929 at [0085]-[0096]; Lee 929 at 3:52-4:15; Cao 476 at 11:66-12:40; *see also* Appendix A.

Moreover, it would have been obvious to one of ordinary skill in the art at the time to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specifications, technical submissions,

working group meeting presentations) with a system implementing an older IEEE standard such as IEEE 802.11ac, IEEE 802.11-2012, or a draft standard. For example, one of ordinary skill in the art would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process with a real wireless communications hardware/device to yield a working wireless communication system with the improvements and benefits offered by the new standard. In another example, one of ordinary skill in the art would have been motivated to simply substitute an older version of a wireless module implemented on a wireless device/hardware with one implementing a newer version of the standard that addresses the shortcomings of the older standard. In yet another example, one of ordinary skill in the art would have been motivated to apply the known techniques disclosed in the documents submitted as part of the IEEE 802.11ax standard development process to an older wireless communications system implementing IEEE 802.11ax to yield the predictable results of improved wireless communication performance. Further, one of ordinary skill in the art would have been prompted by the teachings in the documents submitted as part of the IEEE 802.11ax standard development process to modify the wireless communications hardware/device to meet market demands for improved wireless performance.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (e.g., working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of a reference pertaining to hardware/devices for wireless communications (*e.g.*, wireless local area network (WLAN)). For instance, a person of ordinary skill would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process—which generally address narrow technical issues

and solutions—with references disclosing WLAN devices and hardware more broadly (*e.g.*, devices with transceivers and configurable processors) to yield a blueprint for a working device that addresses the technical problem disclosed in the IEEE 802.11ax standard development document. Such a combination amounts to combining known prior art elements according to known methods to yield predictable results. Further, to the extent any prior art WLAN devices/hardware documents disclose deficiencies or technical issues with the state of the art, one of ordinary skill in the art would have been prompted to combine these references with the teachings in documents submitted as part of the IEEE 802.11ax standard development process to meet market demands for improved wireless performance. This disclosure of deficiencies and/or technical issues would provide a teaching, suggestion, or motivation for a person of ordinary skill to modify the prior art reference based on the IEEE 802.11ax standard working documents.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of another document submitted as part of IEEE 802.11ax standard development process. For instance, considering the common underlying technical subject matter of the IEEE 802.11ax standard development documents, it would be obvious to one of ordinary skill to try combining the teachings of multiple documents. In doing so, a person of ordinary skill would have a reasonable expectation of success. Moreover, given the common goals and design incentives among authors of IEEE 802.11ax standard development documents (*e.g.*, improving WLAN device performance), a person of ordinary skill would find it obvious to combine the technical solutions disclosed in multiple IEEE 802.11ax standard development documents. Further, given the additive nature of the IEEE standard development process, a person of ordinary

skill would have understood that various IEEE 802.11ax standard development documents could be combined to create a cohesive solution. A person of ordinary skill would have a reasonable expectation of success in combining the teachings in these documents.

Any reference or combination of references that anticipates or makes obvious an asserted independent claim also makes obvious any asserted claim dependent on that independent claim, as the element of each dependent '077 patent Asserted Claim was known by a person of ordinary skill at the time of the alleged invention, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, Defendants contend that each Asserted Claim would have been obvious not only by the combinations described in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

In addition to the specific examples of motivation provided above, Defendants reserve the right to rely on the disclosures of the references listed in Appendix A for additional motivation to combine. The above-identified examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendants reserve the right to contend that the above-described motivations to combine apply to other combinations at the appropriate time, i.e., in expert reports regarding invalidity.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix A with any other reference or references listed in Appendix A along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '077 patent. For example, and without limitation, the Asserted

Claims of the ’077 patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

Patent No. or Title (Primary Inventor/Author)	**In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))**
Bharadwaj 202	• Asserted Patents Admitted Prior Art (APA) • Cao 067 • Yu 012 • 802.11-15/0810 • IEEE 802.11-2012 • IEEE 802.11ac • Lin 929 • Lee 929 • Cao 476 • Knowledge of a person of ordinary skill
Cao 067	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 202 • Yu 012 • 802.11-15/0810 • IEEE 802.11-2012 • IEEE 802.11ac • Lin 929 • Lee 929 • Cao 476 • Knowledge of a person of ordinary skill
Yu 012	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 202 • Cao 067 • 802.11-15/0810 • IEEE 802.11-2012 • IEEE 802.11ac • Lin 929 • Lee 929 • Cao 476 • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
802.11-15/0810	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 202 • Cao 067 • Yu 012 • IEEE 802.11-2012 • IEEE 802.11ac • Lin 929 • Lee 929 • Cao 476 • Knowledge of a person of ordinary skill
IEEE 802.11-2012	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 202 • Cao 067 • Yu 012 • 802.11-15/0810 • IEEE 802.11ac • Lin 929 • Lee 929 • Cao 476 • Knowledge of a person of ordinary skill
IEEE 802.11ac	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 202 • Cao 067 • Yu 012 • 802.11-15/0810 • IEEE 802.11-2012 • Lin 929 • Lee 929 • Cao 476 • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Lin 929	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 202 • Cao 067 • Yu 012 • 802.11-15/0810 • IEEE 802.11-2012 • IEEE 802.11ac • Lee 929 • Cao 476 • Knowledge of a person of ordinary skill
Lee 929	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 202 • Cao 067 • Yu 012 • 802.11-15/0810 • IEEE 802.11-2012 • IEEE 802.11ac • Lin 929 • Cao 476 • Knowledge of a person of ordinary skill
Cao 476	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 202 • Cao 067 • Yu 012 • 802.11-15/0810 • IEEE 802.11-2012 • IEEE 802.11ac • Lin 929 • Lee 929 • Knowledge of a person of ordinary skill

As mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. Moreover, the exemplary combinations are provided based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a

Markman Order has not yet been issued in this case. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

2. U.S. Patent No. 11,159,210

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix B the prior art references that render obvious the Asserted Claims of the '210 patent and include below exemplary combinations showing the obviousness of the '210 patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix B, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of skill in the art at the time of the '210 patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix B, such reference may be combined with any other references listed in Appendix B for such element, thereby rendering the claims invalid for obviousness.

To the extent a finder of fact determines that a limitation of any of the '210 patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '210 patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a) Obviousness Rationale

For at least the reasons described in these contentions, it would have been obvious to one

of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix B along with the knowledge of one of ordinary skill in the art to meet the limitations of the '210 patent Asserted Claims. Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the 210 patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

One or more combinations of the prior art references identified in Appendix B would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or

motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix B would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '210 patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix B is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various

technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Additionally, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix B because all of these references relate to the same area of technology and/or are from analogous art. The ’210 patent Asserted Claims are directed to signaling for Multi User-Multiple Input Multiple Output (MU-MIMO) transmissions. ’210 patent at claims 1 and 6. The prior art references generally relate to IEEE 802.11 wireless local area network technology. The references, like the ’210 patent, are also reasonably pertinent to wireless communication issues related to signaling for Multi User-Multiple Input Multiple Output (MU-MIMO) transmissions.

Similarly, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix B because all of these references are works of people in the same technical field. For example, many of the authors of the prior art references are members of the IEEE’s 802.11 working group. Moreover, one of ordinary skill in the art would have recognized that members of the IEEE’s working groups frequently collaborate with, and build on, each other’s work. Thus, one of ordinary skill in the art would have recognized that the works by people that are in the same IEEE working group are likely compatible or otherwise work harmoniously when combined.

The ’210 patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or

embodied in the prior art listed above to practice the ’210 patent Asserted Claims.

All of the ’210 patent Asserted Claims are directed to signaling for Multi User-Multiple Input Multiple Output (MU-MIMO) transmissions. ’210 patent at 2:56–4:11. Such technology, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, was widely known before the alleged priority date of the ’210 Patent, as evidenced by the references in Appendix B. *See, e.g.*, IEEE 802.11ac at § 22.3.4.10; IEEE P802.11ax/D1.0 at pp. 9, 209; Bharadwaj 136 at [0093]-[0094], Figure 1; Lim 066 at [0209]-[0211]; IEEE 802.11-15/0132r15 at pp. 2–3; Verma 310 at [0034]; Hedayat 526 at [0025]; Bharadwaj 718 at [0110].

One of ordinary skill in the art would have been motivated to combine any of the references in Appendix B because at the time of the alleged invention signaling for Multi User-Multiple Input Multiple Output (MU-MIMO) transmissions was a common problem with a well-known solution. In particular, common problems with conventional techniques for signaling for Multi User-Multiple Input Multiple Output (MU-MIMO) transmissions were known to persons of ordinary skill in the art and incorporating a preamble of a data unit that includes specific fields with a given meaning was a well-known solution to achieve improved performance. *See, e.g.*, IEEE 802.11ac at § 22.3.4.10; IEEE P802.11ax/D1.0 at pp. 9, 209; Bharadwaj 136 at [0093]-[0094], Figure 1; Lim 066 at [0209]-[0211]; IEEE 802.11-15/0132r15 at pp. 2–3; Verma 310 at [0034]; Hedayat 526 at [0025]; Bharadwaj 718 at [0110].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, to receive, through a communication unit, a high efficiency multi-user PHY protocol data unit (HE MU PPDU). *See, e.g.*, IEEE 802.11ac at § 22.3.4.10; IEEE P802.11ax/D1.0 at pp.

9, 209; Bharadwaj 136 at [0093]-[0094], Figure 1; Lim 066 at [0209]-[0211]; IEEE 802.11-15/0132r15 at pp. 2–3; Verma 310 at [0029]; Hedayat 526 at [0112]; Bharadwaj 718 at [0111].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, for a preamble of an HE MU PPDU to include fields such as a high efficiency signal A field (HE-SIG-A) and high efficiency signal B field (HE-SIG-B). *See, e.g.*, IEEE 802.11ac at § 22.3.1; IEEE P802.11ax/D1.0 at pp. 240-241, 267, 272, 285-286; Bharadwaj 136 at [102]-[103], Figure 2, Figure 3; Lim 066 at [0145]-[0148]; IEEE 802.11-15/0132r15 at pp. 8–9; Verma 310 at [0050]; Hedayat 526 at [0058]; Bharadwaj 718 at [0058].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, to decode the received HE MU PPDU based on information obtained from the preamble. *See, e.g.*, IEEE 802.11ac at § 22.3.8.3.3; IEEE P802.11ax/D1.0 at pp. 272, 285-286; Bharadwaj 136 at [0098], Figure 1; Lim 066 at [0145], Figure 23A; IEEE 802.11-15/0132r15 at pp. 8–9; Verma 310 at [0006]; Hedayat 526 at [0058]; Bharadwaj 718 at [0091].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, when a SIG-B compression field of the HE-SIG-A indicates full bandwidth multi User-Multiple Input Multiple Output (MU-MIMO) transmission, a format of user field(s) included in a user specific field of the HE-SIG-B could be identified based on a number of MU-MIMO users indicated by a subfield of the HE-SIG-A. *See, e.g.*, IEEE 802.11ac at § 22.3.8.3.3; IEEE P802.11ax/D1.0 at pp. 238-239; Bharadwaj 136 at [162], Figure 15B; Lim 066 at [0172]-[0173]; IEEE 802.11-15/0132r15 at pp. 8–9; Verma 310 at [0029]; Hedayat 526 at [0058]; Bharadwaj 718

at [0062].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, when the number of MU-MIMO users indicates two or more users, the user specific field of the HE-SIG-B includes user fields for MU-MIMO allocation. *See, e.g.*, IEEE 802.11ac at § 22.3.1; IEEE P802.11ax/D1.0 at pp. 293-294; Bharadwaj 136 at Figure 15B; Lim 066 at [155]; IEEE 802.11-15/0132r15 at pp. 8–9; Verma 310 at [0050]; Hedayat 526 at [0058]; Bharadwaj 718 at [0099].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, when the number of MU-MIMO users indicates a single user, the user specific field of the HE-SIG-B includes one user field for non-MU-MIMO allocation. *See, e.g.*, IEEE 802.11ac § 22.3.1; IEEE P802.11ax/D1.0 at p. 296; Bharadwaj 136 at [0126]; Lim 066 at [155]; IEEE 802.11-15/0132r15 at pp. 10–12; Verma 310 at [0050]; Hedayat 526 at [0058]; Bharadwaj 718 at [0098].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, the user field(s) for MU-MIMO allocation includes a spatial configuration field indicating the total number of spatial streams in an MU-MIMO allocation and the number of spatial streams for each terminal in the MU-MIMO allocation, and wherein the user field for non-MU-MIMO allocation includes a number of space time streams (NSTS) field. *See, e.g.*, IEEE 802.11ac at Table 22-12; IEEE P802.11ax/D1.0 at 296; Bharadwaj 136 at [0098]; Lim 066 at [0155]; IEEE 802.11-15/0132r15 at pp. 8–9; Verma 310 at [0010]; Hedayat 526 at [0072]; Bharadwaj 718 at

[0108].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, the user field(s) for non-MU-MIMO allocation is a user field based on orthogonal frequency division multiple access (OFDMA) allocation. *See, e.g.*, IEEE P802.11ax/D1.0 at p. 209; Bharadwaj 136 at [0098]; Lim 066 at [155]; IEEE 802.11-15/0132r15 at pp. 8–9; Verma 310 at [0050]; Hedayat 526 at [0058]; Bharadwaj 718 at [0108].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, the number of MU-MIMO users is indicated by a number of HE-SIG-B symbols field in the HE-SIG-A. *See, e.g.*, IEEE P802.11ax/D1.0 at pp. 9, 209; Bharadwaj 136 at [0093]-[0094], Figure 1; Lim 066 at [0148]; IEEE 802.11-15/0132r15 at pp. 8–9; Verma 310 at [0039]; Hedayat 526 at [0022]; Bharadwaj 718 at [0022].

It was well-known to one of skill in the art before the time of the ’210 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, the HE-SIG-A includes the SIG-B compression field and the specific subfield, and wherein the SIG-B compression field indicates whether full bandwidth MU-MIMO transmission is used, and when the SIG-B compression field indicates full bandwidth MU-MIMO transmission, the specific subfield indicates the number of MU-MIMO users. *See, e.g.*, IEEE 802.11ac at Table 22-12; IEEE P802.11ax/D1.0 at 238-239; Bharadwaj 136 at [0093]-[0094]; Lim 066 at [0209]-[0211]; IEEE 802.11-15/0132r15 at pp. 8–9; Verma 310 at [0050]; Hedayat 526 at [0058]; Bharadwaj 718 at [0022].

In addition, the prior art also provided sets of finite, identified, predictable solutions for

known problems that would have been obvious to those of ordinary skill to try with a reasonable expectation of success. For example, it would have been obvious to one of skill in the art at the time that signaling for MU-MIMO transmissions could be achieved by utilizing fields within the preamble of a frame, as including various information related to the processing of the frame within fields in the preamble of a frame was common, it would have been obvious to one of skill in the art to try and modify existing communication frames such that they include such information allowing signaling for MU-MIMO transmissions. Such a modification would have yielded the predictable result of being able to determine when a frame was an MU-MIMO frame.

The prior art references provide motivations to combine because they describe the field of the Asserted Patents, teach improvements, explain desired features, and even expressly state that one of skill in the art would be able to apply their teachings to related systems or methods. *See, e.g.*, Bharadwaj 136 at [0005] ("A wireless network, for example a Wireless Local Area Network (WLAN), such as a Wi-Fi network (IEEE 802.11) may include an access point (AP) that may communicate with one or more stations (STAs) or mobile devices."); Lim 066 at [0001] ("The present specification relates to a wireless LAN system, and more particularly, to a method for transmitting or receiving a signal on the basis of MU-MIMO in a wireless LAN system and a station for performing the same."); Bharadwaj 718 at [0002] ("The present disclosure, for example, relates to wireless communication systems, and more particularly to techniques for resource allocation signaling in a high efficiency wireless local area network (WLAN) preamble."); Verma 310 at [0002] ("The present disclosure relates to wireless communication, and more specifically to full bandwidth multicast indication to multiple users."); Hedayat 526 at [0002] ("The present description relates in general to wireless communication systems and methods, and more particularly to, for example, without limitation, aggregation methods and systems for multi-user

(MU) multiple-input/multiple-output (MIMO) or orthogonal frequency-division multiple access (OFDMA) operation.").

Further, the prior art references provide motivations to combine because they explicitly suggest utilizing the teachings and disclosures of other references.

In accordance with these advances, the prior art could have been combined according to methods known to those of ordinary skill within the field of the '210 patent to yield predictable results. The use of information contained in a field within the frame to process the frame could have been predictably achieved by one of ordinary skill at the time of the alleged invention. One of ordinary skill in the art would have been aware of these various applications, including methods for signaling that a packet is a multi-user packet. Those of ordinary skill in the art could have employed known techniques to improve similar prior art devices in the same way as claimed in the '210 patent.

Moreover, it would have been obvious to one of ordinary skill in the art at the time to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specifications, technical submissions, working group meeting presentations) with a system implementing an older IEEE standard such as IEEE 802.11ac, IEEE 802.11-2012, or a draft standard. For example, one of ordinary skill in the art would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process with a real wireless communications hardware/device to yield a working wireless communication system with the improvements and benefits offered by the new standard. In another example, one of ordinary skill in the art would have been motivated to simply substitute an older version of a wireless module implemented on a wireless device/hardware with one implementing a newer version of the standard that addresses

the shortcomings of the older standard. In yet another example, one of ordinary skill in the art would have been motivated to apply the known techniques disclosed in the documents submitted as part of the IEEE 802.11ax standard development process to an older wireless communications system implementing IEEE 802.11ax to yield the predictable results of improved wireless communication performance. Further, one of ordinary skill in the art would have been prompted by the teachings in the documents submitted as part of the IEEE 802.11ax standard development process to modify the wireless communications hardware/device to meet market demands for improved wireless performance.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (e.g., working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of a reference pertaining to hardware/devices for wireless communications (*e.g.*, wireless local area network (WLAN)). For instance, a person of ordinary skill would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process—which generally address narrow technical issues and solutions—with references disclosing WLAN devices and hardware more broadly (*e.g.*, devices with transceivers and configurable processors) to yield a blueprint for a working device that addresses the technical problem disclosed in the IEEE 802.11ax standard development document. Such a combination amounts to combining known prior art elements according to known methods to yield predictable results. Further, to the extent any prior art WLAN devices/hardware documents disclose deficiencies or technical issues with the state of the art, one of ordinary skill in the art would have been prompted to combine these references with the teachings in documents submitted as part of the IEEE 802.11ax standard development process to

meet market demands for improved wireless performance. This disclosure of deficiencies and/or technical issues would provide a teaching, suggestion, or motivation for a person of ordinary skill to modify the prior art reference based on the IEEE 802.11ax standard working documents.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of another document submitted as part of IEEE 802.11ax standard development process. For instance, considering the common underlying technical subject matter of the IEEE 802.11ax standard development documents, it would be obvious to one of ordinary skill to try combining the teachings of multiple documents. In doing so, a person of ordinary skill would have a reasonable expectation of success. Moreover, given the common goals and design incentives among authors of IEEE 802.11ax standard development documents (*e.g.*, improving WLAN device performance), a person of ordinary skill would find it obvious to combine the technical solutions disclosed in multiple IEEE 802.11ax standard development documents. Further, given the additive nature of the IEEE standard development process, a person of ordinary skill would have understood that various IEEE 802.11ax standard development documents could be combined to create a cohesive solution. A person of ordinary skill would have a reasonable expectation of success in combining the teachings in these documents.

Any reference or combination of references that anticipates or makes obvious an asserted independent claim also makes obvious any asserted claim dependent on that independent claim, as the element of each dependent '210 patent Asserted Claim was known by a person of ordinary skill at the time of the alleged invention, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, and it would have been obvious to

combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, Defendants contend that each Asserted Claim would have been obvious not only by the combinations described in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

In addition to the specific examples of motivation provided above, Defendants reserve the right to rely on the disclosures of the references listed in Appendix B for additional motivation to combine. The above-identified examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendants reserve the right to contend that the above-described motivations to combine apply to other combinations at the appropriate time, *i.e.*, in expert reports regarding invalidity.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix B with any other reference or references listed in Appendix B along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the ’210 patent. For example, and without limitation, the Asserted Claims of the ’210 patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Bharadwaj 136	• Asserted Patents Admitted Prior Art (APA) • Lim 066 • Verma 310 • Hedayat 526 • Bharadwaj 718 • IEEE P802.11ax/D0.5 • IEEE P802.11ax/D1.0 • IEEE 802.11-2012, 802.11ac, and/or 802.11-2016 • Knowledge of a person of ordinary skill
Lim 066	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 136 • Verma 310 • Hedayat 526 • Bharadwaj 718 • IEEE P802.11ax/D0.5 • IEEE P802.11ax/D1.0 • IEEE 802.11-2012, 802.11ac, and/or 802.11-2016 • Knowledge of a person of ordinary skill
IEEE P802.11ax/D1.0	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 136 • Lim 066 • Verma 310 • Hedayat 526 • Bharadwaj 718 • IEEE 802.11-2012, 802.11ac, and/or 802.11-2016 • Knowledge of a person of ordinary skill
IEEE 802.11ac	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 136 • Lim 066 • Verma 310 • Hedayat 526 • Bharadwaj 718 • IEEE 802.11-2012, 802.11ac, and/or 802.11-2016 • IEEE P802.11ax/D0.5 • IEEE P802.11ax/D1.0 • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE P802.11ax/D0.5	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 136 • Lim 066 • Verma 310 • Hedayat 526 • Bharadwaj 718 • IEEE 802.11-2012, 802.11ac, and/or 802.11-2016 • Knowledge of a person of ordinary skill
Verma 310	• Asserted Patents Admitted Prior Art (APA) • Lim 066 • Bharadwaj 136 • Hedayat 526 • Bharadwaj 718 • IEEE P802.11ax/D0.5 • IEEE P802.11ax/D1.0 • IEEE 802.11-2012, 802.11ac, and/or 802.11-2016 • Knowledge of a person of ordinary skill
Hedayat 526	• Asserted Patents Admitted Prior Art (APA) • Lim 066 • Bharadwaj 136 • Verma 310 • Bharadwaj 718 • IEEE P802.11ax/D0.5 • IEEE P802.11ax/D1.0 • IEEE 802.11-2012, 802.11ac, and/or 802.11-2016 • Knowledge of a person of ordinary skill
Bharadwaj 718	• Asserted Patents Admitted Prior Art (APA) • Lim 066 • Bharadwaj 136 • Verma 310 • Hedayat 526 • IEEE P802.11ax/D0.5 • IEEE P802.11ax/D1.0 • IEEE 802.11-2012, 802.11ac, and/or 802.11-2016 • Knowledge of a person of ordinary skill

As mentioned above, Defendants have not yet completed their search or discovery

concerning additional prior art. Moreover, the exemplary combinations are provided based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a *Markman* Order has not yet been issued in this case. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

3. U.S. Patent No. 10,687,281

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix C the prior art references that render obvious the Asserted Claims of the '281 patent and include below exemplary combinations showing the obviousness of the '281 patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix C, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of skill in the art at the time of the '281 patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix C, such reference may be combined with any other references listed in Appendix C for such element, thereby rendering the claims invalid for obviousness.

To the extent a finder of fact determines that a limitation of any of the '281 patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '281 patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known

to those of ordinary skill in the art.

a) Obviousness Rationale

For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix C along with the knowledge of one of ordinary skill in the art to meet the limitations of the '281 patent Asserted Claims. Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '281 patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

One or more combinations of the prior art references identified in Appendix C would have been obvious because these references would have been combined using: known methods to yield

predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix C would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the ’281 patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix C is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a

known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Additionally, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix C because all of these references relate to the same area of technology and/or are from analogous art. The '281 patent Asserted Claims are directed to scheduling wireless resources. '281 patent at Abstract. The '281 patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the '281 patent Asserted Claims.

All of the '281 patent Asserted Claims are directed to scheduling wireless resources. Such technology, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, was widely known before the alleged priority date of the '281 Patent, as evidenced by the references in Appendix C.

One of ordinary skill in the art would have been motivated to combine any of the references in Appendix C because at the time of the alleged invention scheduling wireless resources was a common problem with well-known solutions. In particular, common problems with conventional techniques for scheduling wireless resources were known to persons of ordinary skill in the art and using HE-SIG-A and HE-SIG-B fields to indicate the unassigned resources was a well-known

solution to achieve higher bandwidth utilization. Bharadwaj 129 at [0112], [0141]; Lee at [0235]; Li at [0032], 0036]; Bharadwaj 718 at [0059], [0063]; Chen at [0093]; Kim at [0052], and 802.11ac at Section 22.3.8.3.3.

For example, it was well-known to one of skill in the art before the time of the '281 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "obtain bandwidth information indicated via a bandwidth field of HE-SIG-A of the received packet." *See, e.g.*, Bharadwaj 129 at [0112], Li at [0032]; Bharadwaj 718 at [0063]; Kim at [0052], Josiam at [0132], 802.11ac at Section 22.3.8.3.3, 0045r1 at 8, 0344r2 at 4, and Seok at [0126]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits C1-C13 with any one or more of the above exemplary cited references (Bharadwaj 129, Li, Bharadwaj 718, Kim, Josiam, 802.11ac, 0045r1, 0344r2, and Seok) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for using HE-SIG-A field to provide bandwidth information to user terminals:

- Bharadwaj 129 at [0112] ("In some instances, the HE-SIG-A field 305-a where the BW field 410 indicates a higher bandwidth, e.g. 40 MHz, 80 MHz, or 160 MHz, the HE-SIG-A field for the SU HE extended range PPDU may have the same format as for a non-extended range format PPDU, e.g. the HE-SIG-A field for the SU HE PPDU. Maintaining a similar format for the HE-SIG-A field for certain bandwidths of the SU extended range HE PPDU as the SU HE PPDU may increase simplicity of implementation.")

- Li at [0032] ("Once the total bandwidth or the available subchannels are known from the HE-SIG-A or R-L-SIG fields, the number of bits in RU allocation 402 may be known.")

- Bharadwaj 718 at [0063] ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Kim at [0052] ("It should be noted that VHT-SIG-A (forming part of the VHT set of symbols in FIGS. 10A–10C) includes bandwidth and MCS (modulation) information.")

- Josiam at [0132] ("The size of the RU position index carried in the block of user allocation information varies according to the bandwidth information signaled in the HE-SIG-A. If the size of the block of a user allocation is fixed, then the extra bits needed for the RU position indication can be derived by shrinking the size of the partial STA-ID signaled in the block. For example, in a 20 MHz MU PPDU, the STA-ID can use 9 bits and the RU position indexing is 5 bits (4 bits+1 bit reserved). In a 40 MHz MU PPDU, the STA-ID can use 8 bits and the RU position indexing can be 6 bits. In an 80 MHz MU PPDU, the STA-ID can use 7 bits and the RU position indexing can be 7 bits.")

- 802.11ac at Section 22.3.8.3.3 (showing VHT-SIG-A including a bandwidth field)

- 0045r1 at 8 (showing VHT-SIG-A including a bandwidth field)

- 0344r2 at 4 (showing VHT-SIG-A including a bandwidth field)

- Seok at [0126] ("Table II illustrates fields, bit positions, numbers of bits, and descriptions included in each of two parts, VHT-SIG-A1 and VHT-SIG-A2, of the VHT-SIG-A field defined by the IEEE 802.11ac standard. For example, a BW (BandWidth) field occupies two Least Significant Bits (LSBs), B0 and B1 of the VHT-SIG-A1 field and has a size of 2 bits. If the 2 bits are set to 0, 1, 2, or 3, the BW field indicates 20 MHz, 40 MHz, 80 MHz, or 160 and 80+80 MHz. For details of the fields included in the VHT-SIG-A field, refer to the IEEE 802.11ac-2013 technical specification, which is hereby incorporated by reference. In the HE PPDU frame format of the present disclosure, the HE-SIG-A field may include one or more of the fields included in the VHT-SIG-A field, and it may provide backward compatibility with IEEE 802.11ac stations.")

And each of the remaining references provided in Exhibits C1-C13 seek ways of scheduling wireless resources:

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

Combining the prior art identified in Exhibits C1-C13 with any one of the above exemplary references (Bharadwaj 129, Li, Bharadwaj 718, Kim, Josiam, 802.11ac, 0045r1, 0344r2, and Seok) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits C1-C13 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or

more of the references provided in Exhibits C1-C13. A POSITA would have been motivated to incorporate using HE-SIG-A field to provide bandwidth information to user terminals, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Li, Bharadwaj 718, Kim, Josiam, 802.11ac, 0045r1, 0344r2, and Seok), using HE-SIG-A field to provide bandwidth information to user terminals well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits C1-C13 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '281 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "obtain information of an unassigned resource unit via at least one of the bandwidth field of the HE-SIG-A and a subfield of HE-SIG-B of the received packet." *See, e.g.*, Bharadwaj 129 at [0141], Lee at [0235], Li at [0036], Bharadwaj 718 at [0059], Chen at [0093], Kim at [0033], Josiam at [0084], 0045r1 at 9, 0344r2 at 3, Seok at [0258]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits C1-C13 with any one or more of the above exemplary cited references (Bharadwaj 129, Lee, Li, Bharadwaj 718, Chen, Kim, Josiam, 0045r1, 0344r2, Seok) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for using HE-SIG-B field to provide resource assignment:

- Bharadwaj 129 at [0141] ("In a second example, a special or dedicated RU allocation bit sequence may be used to indicate that a 20 MHz channel is punctured. The indication may be made by adding an additional entry in a RU allocation table. A size of the common portion may be unchanged for either content channel. According to this example an explicit indication of the punctured 20 MHz channel may not be

needed, though the additional RU allocation bit sequence may result in additional overhead in the common portion of the SIG-B field.")

- Lee at [0235] ("In embodiments, a transmitting device transmits resource allocation information as well as other control signaling information necessary for correct reception of data signals in one or more HE-SIG-B fields.")

- Li at [0036] ("In one embodiment, the number of unallocated RUs may determine the structure of a common part 446 of a HE-SIG-B field. Based on a predetermined threshold the structure of the HE-SIG-B common part may follow either the structure of common part 444 shown in FIG. 4A or the structure of common part 446 shown in FIG. 4B. It is understood that the predetermined threshold of unallocated RUs may be determined by the network, a system administrator, or other factors. For example, if there are only a few RUs (e.g. 1, 2, or 3) unallocated, the previous method using {0} stream indicator may be efficient. However, if there are many RUs unallocated, a one bit per RU may indicate whether the RU is allocated or not. A bit map for all the RUs may be placed after the RU allocation of FIG. 4A as shown in FIG. 4B. The length of the RU bit map can be determined by the RU allocation, more precisely the number of RUs in the indicated allocation pattern. Therefore, the RU allocation may be encoded separately with a known length. The RU bit map and the list of active RUs' stream allocations may be encoded and separated from the RU allocation. The RU bit map and the list of active RUs' stream allocations may be encoded together. Since the unallocated RUs are indicated by the RU bit map, only the stream allocations for the actually allocated RU may be in the list of active RU's stream allocations.")

- Bharadwaj 718 at [0059] ("The HE-SIG-B field may also include resource allocation information so that each STA scheduled to receive a MU transmission has information concerning which portions of the data to decode, e.g. which RU or RUs are meant to be decoded by that particular STA.")

- Chen at [0093] ("Explicit indication of the non-allocated RU in the common part of HE-SIG-B may be understood with reference to FIG. 14. FIG. 14 depicts a datagram illustrating another example HE-SIG-B portion 1400 indicating a sequence of RU allocation information with an unallocated RU, in accordance with example embodiments of the disclosure.")

- Kim at [0033] ("According to an aspect of improved wireless transmission, a bitmap may be used to indicate whether each of BWU1, BWU2, BWU3, or BWU4 is being used. Specifically, each BWU may be assigned a bit number, that is, bit 0 for BWU1, bit 1 for BWU2, bit 2 for BWU3, and bit 3 for BWU4. As shown in Table 4, each of bits 1–3 has a value of "0" if the BWU is unused and a value of "1" if the BWU is used in the packet. Since BWU1 includes both primary and secondary channels, "0" indicates that only the primary channel is used, and "1" indicates that both the primary and secondary channels are used. In one embodiment, this bitmap is transmitted as 4 bits in the VHT-SIG-A field, which is provided in the proposed

802.11ac. In one embodiment, for any packet bandwidth greater than 40 MHz, BWU1 must use 40 MHz (bit 0=1).")

- Josiam at [0084] ("The VHT-SIG-B field is one symbol and includes 26 bits in a 20 MHz PPDU, 27 bits in a 40 MHz PPDU and 29 bits in 80 MHz, 160 MHz and 80+80 MHz PPDUs for each user. The fields in the VHT-SIG-B field are listed in Table 1 below. The interpretation of the fields for MU or SU PPDU is drawn from the 6 bit GROUP_ID field carried at bit positions B4-B9 in VHT-SIG-A1: a value of 0 or 63 indicates a VHT SU PPDU; otherwise, indicates a VHT MU PPDU. VHT-SIG_B Length field for user u is set as … where APEP−LENGTHu is the TXVECTOR parameter for APEP_LENGTH for user u. For each user u, the VHT-SIG-B field is binary convolutional code (BCC) encoded at rate R=½ and mapped to a BPSK constellation. Unlike VHT-SIG-A which is a commonly signaled for all users, VHT-SIG-B is user-specific and is mapped to NSTS,u space-time streams by the user-specific elements of the first column of the PVHTLTF matrix.")

- 0045r1 at 9 (showing HE-SIG-B content)

- 0344r2 at 3(showing HE-SIG-B content)

- Seok at [0258] at "Each STA may also determine a subchannel allocated to the STA based on the resource allocation information included in the HE-SIG field of the HE PPDU received on the transmission channel (e.g., one or more 20-MHz channels) in step S1940, move to the determined subchannel (i.e., a subchannel having a smaller bandwidth than the transmission channel of the HE PPDU), and receive the remaining fields (e.g., an HE-STF, an HE-LTF, and a data unit) of the HE PPDU on the subchannel allocated to the STA in step S1950. The subsequent operations are performed in the same manner as described before with reference to FIG. 19 and thus will not be described to avoid redundancy.")

And each of the remaining references provided in Exhibits C1-C13 seek ways of scheduling wireless resources:

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

Combining the prior art identified in Exhibits C1-C13 with any one of the above exemplary references (Bharadwaj 129, Lee, Li, Bharadwaj 718, Chen, Kim, Josiam, 0045r1, 0344r2, Seok) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits C1-C13 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits C1-C13. A POSITA would have been motivated to incorporate using HE-SIG-B field to provide resource assignment, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Lee, Li, Bharadwaj 718, Chen, Kim, Josiam, 0045r1, 0344r2, Seok), using HE-SIG-B field to provide resource assignment well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in

Exhibits C1-C13 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '281 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "decode the received packet based on the bandwidth information and the information of the unassigned resource unit." *See, e.g.*, Bharadwaj 129 at [0103]-[0104], Li at [0070], Bharadwaj 718 at [0178], Chen at [0070], [0076], Josiam at [0094], Seok [0123]-[0124]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits C1-C13 with any one or more of the above exemplary cited references (Bharadwaj 129, Li, Bharadwaj 718, Chen, Josiam, Seok) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for decoding a received packet based on bandwidth information and information of the unassigned resources:

- Bharadwaj 129 at [0103] ("The first WLAN signaling field 305 also includes information usable by the identified number of APs or stations to decode the second WLAN signaling field 310."); at [0104] ("[T]he second WLAN signaling field 310 includes information usable by the number of APs or stations to transmit/encode or receive/decode data in the data field 220.")

- Li at [0070] ("For example, the high efficiency SIGNAL field device 919 may be configured to generate a HE-SIG-B that may be comprised of at least two portions: a common portion and user device specific portion(s). The common portion may have two parts, a fixed length part, and a variable length part. The fixed length part may be for the ease of channel decoding and it may contain information about frequency bandwidth allocation. After the first part is decoded, the length of the second part can be calculated for channel decoding. The second part may contain information about spatial stream allocation for each of the allocated resource units (RUs). For reducing overhead, the '0' number of streams may be used to indicate an unallocated resource unit (RU) in frequency. On average, this may consume 5.5 bits for each unallocated RU as compared to the typical 17 bits using null or dummy association ID (AID) in user device specific part. Thus resulting in reduced overhead.")

- Bharadwaj 718 at [0178] ("At 2330, the dedicated field generator 2255 generates the STA-specific field(s) of the HE-SIG-B signaling field of the WLAN preamble. These STA-specific field(s) include control information specific to each scheduled user (e.g. STA) to enable the user to decode the data (e.g., MCS, coding, spatial multiplexing, and other control information).")

- Chen at [0070] ("The processor(s) 300 may still further be configured to use the information carried in the HE-SIG-A, such as MCS information and/or length information, to decode the HE-SIG-B."); at [0076] ("The HE-SIG-B 414 may include information needed for decoding the data of all scheduled STAs 140.")

- Josiam at [0094] ("The header 500 includes training fields and packet type indication fields. For example, the header 500 may be a PLCP header. The header 500 includes a legacy short training field (L-STF) 305, a legacy long training field (L-LTF) 310, a legacy signal field (L-SIG) 315, Repeated L-SIG (RL-SIG) (520), HE signal A (HE-SIG-A) and HE signal B (HE-SIG-B) fields 525 and 530, respectively, HE short and long training symbols field 535 and 540, respectively. The fields with a legacy prefix are meant to indicate the packet type and duration to the non-VHT legacy users who may stop further processing of the PPDU after decoding the legacy portions of the header 500. The HE portion of the preamble includes the RL-SIG 520, HE-SIG-A 525, HE-SIG-B 530, HE-STF 535, and HE-LTF 540. In a HE-SU PPDU, the HE-SIG-B 530 field is not present. In a HE-MU PPDU, the HE-SIG-B 530 field is present. In a HE-Extended Range PPDU, the HE-SIG-B 530 is not present and the symbols of the HE-SIG-A 525 are repeated. Various embodiments of the present disclosure provide signaling and addressing schemes for HE portion to support OFDMA that allow multiplexing of multiple users on different portions of the bandwidth and MU-MIMO. In particular, various embodiments provide HE-SIG-A and HE-SIG-B fields 525 and 530, respectively, that carry information required to interpret the HE-PPDUs. The various embodiments of the present disclosure provide the signaling necessary to support indication of bandwidth segments to different STAs in an OFDMA/MU-MIMO multiplexing protocol.")

- Seok at [0123] (HE-SIG-A (or HEW SIG-A) represents High Efficiency Signal A (or High Efficiency WLAN Signal A), and includes HE PPDU (or HEW PPDU) modulation parameters, etc. for HE preamble (or HEW preamble) decoding at an HE STA (or HEW STA). The set of parameters included in the HEW SIG-A field may include one or more of Very High Throughput (VHT) PPDU modulation parameters transmitted by IEEE 802.11ac stations, as listed in Table II below, to ensure backward compatibility with legacy STAs (e.g., IEEE 802.11ac stations)"); at [0124] ("In the case where a STA is not capable of decoding or is configured not to decode other subchannels than a subchannel allocated to the STA, it may be configured that resource allocation information about a plurality of subchannels does not overlap with each other, as described above. However, this is purely exemplary. Thus, even in the case where a STA is capable of decoding other non-allocated subchannels, it may be also configured that resource allocation information about a plurality of subchannels does not overlap with each other.")

And each of the remaining references provided in Exhibits C1-C13 seek ways of scheduling wireless resources:

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

Combining the prior art identified in Exhibits C1-C13 with any one of the above exemplary references (Bharadwaj 129, Li, Bharadwaj 718, Chen, Josiam, Seok) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g.,

resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits C1-C13 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits C1-C13. A POSITA would have been motivated to incorporate decoding a received packet based on bandwidth information and information of the unassigned resources, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Li, Bharadwaj 718, Chen, Josiam, Seok), decoding a received packet based on bandwidth information and information of the unassigned resources well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits C1-C13 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '281 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "the information of the unassigned resource unit is indicated via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B." *See, e.g.*, Bharadwaj 129 at [0138], Li at [0030], Josiam at [0094]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided

in Exhibits C1-C13 with any one or more of the above exemplary cited references (Bharadwaj 129, Li) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating the information of unassigned resources via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B:

- Bharadwaj 129 at [0138] ("In a second example, for example for an 80 MHz bandwidth as illustrated in FIG. 11A, or a 160 MHz bandwidth containing duplicated SIG-B content, information and/or contents of the SIG-B filed that was found in the punctured secondary 20 MHz channel corresponding to the 2nd 20 MHz may be decoded from a 4th 20 MHz channel. In such case an indication of the SIG-B decoding may be signaled in the SIG-A field, for example by including an indicator in the SIG-A field. In this example, there may a limitation that the 4th 20 MHz is not also punctured.")

- Li at [0030] ("In that case, available subchannels may be signaled before the HE-SIG-B field. For example, the available subchannels may be indicated in the HE-SIG-A or R-L-SIG. Therefore, before decoding HE-SIG-B 142, a user device may already know the total bandwidth (e.g., 20, 40, 80, or 160 MHz) and know which subchannels within the total bandwidth are available.")

- Josiam at [0094] ("The header 500 includes training fields and packet type indication fields. For example, the header 500 may be a PLCP header. The header 500 includes a legacy short training field (L-STF) 305, a legacy long training field (L-LTF) 310, a legacy signal field (L-SIG) 315, Repeated L-SIG (RL-SIG) (520), HE signal A (HE-SIG-A) and HE signal B (HE-SIG-B) fields 525 and 530, respectively, HE short and long training symbols field 535 and 540, respectively. The fields with a legacy prefix are meant to indicate the packet type and duration to the non-VHT legacy users who may stop further processing of the PPDU after decoding the legacy portions of the header 500. The HE portion of the preamble includes the RL-SIG 520, HE-SIG-A 525, HE-SIG-B 530, HE-STF 535, and HE-LTF 540. In a HE-SU PPDU, the HE-SIG-B 530 field is not present. In a HE-MU PPDU, the HE-SIG-B 530 field is present. In a HE-Extended Range PPDU, the HE-SIG-B 530 is not present and the symbols of the HE-SIG-A 525 are repeated. Various embodiments of the present disclosure provide signaling and addressing schemes for HE portion to support OFDMA that allow multiplexing of multiple users on different portions of the bandwidth and MU-MIMO. In particular, various embodiments provide HE-SIG-A and HE-SIG-B fields 525 and 530, respectively, that carry information required to interpret the HE-PPDUs. The various embodiments of the present disclosure provide the signaling necessary to support indication of bandwidth segments to different STAs in an OFDMA/MU-MIMO multiplexing protocol.")

And each of the remaining references provided in Exhibits C1-C13 seek ways of scheduling wireless resources:

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF) field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits C1-C13 with any one of the above exemplary references (Bharadwaj 129, Li, Josiam) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits C1-C13 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits C1-C13. A POSITA would have been motivated to incorporate indicating the information of unassigned resources via a combination of the bandwidth

field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Li, Josiam), indicating the information of unassigned resources via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits C1-C13 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '281 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "the bandwidth field of the HE-SIG-A indicates channel information to be punctured within the bandwidth, and the resource unit allocation field indicates additional puncturing information for the unassigned resource unit within the bandwidth." *See, e.g.*, Bharadwaj 129 at [0132], [0138[, [0140]-[0141]; Josiam at [0193], [0196]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits C1-C13 with any one or more of the above exemplary cited references (Bharadwaj 129, Josiam) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating channel puncturing information using HE-SIG-A and HE-SIG-B:

- Bharadwaj 129 at [0132] ("In a first example, illustrated in FIG. 11B, information/contents of the SIG-B that was found in the secondary 20 MHz channel may be transmitted on the primary 20 MHz channel. In such case an indication of the puncturing of the 20 MHz channel may be signaled in the SIG-A field, for example by including an indicator, which in some examples may be a 1 bit indicator."); at [138] ("In a second example, for example for an 80 MHz bandwidth as illustrated in FIG. 11A, or a 160 MHz bandwidth containing duplicated SIG-B content, information and/or contents of the SIG-B filed that was found in the punctured

secondary 20 MHz channel corresponding to the 2nd 20 MHz may be decoded from a 4th 20 MHz channel. In such case an indication of the SIG-B decoding may be signaled in the SIG-A field, for example by including an indicator in the SIG-A field. In this example, there may a limitation that the 4th 20 MHz is not also punctured.")' at [0140] ("In a first example, RU allocation for the punctured 20 MHz channels are not transmitted. A size of the common portion of the SIG-B field may be modified depending on the number and location of the punctured channels. In addition, a common portion size may be different between the two SIG-B content channels. An explicit indication of punctured channels may be indicated in the SIG-A field."; at [0141] ("In a second example, a special or dedicated RU allocation bit sequence may be used to indicate that a 20 MHz channel is punctured. The indication may be made by adding an additional entry in a RU allocation table. A size of the common portion may be unchanged for either content channel. According to this example an explicit indication of the punctured 20 MHz channel may not be needed, though the additional RU allocation bit sequence may result in additional overhead in the common portion of the SIG-B field.")

- Josaim at [0193] ("FIG. 38 illustrates an example of RU nulling 3800 for non-contiguous channel bonding according to one or more embodiments of the present disclosure, FIG. 39 illustrates an example of RU nulling 3900 when a channel on the inside is nulled using non-contiguous channel bonding according to one or more embodiments of the present disclosure, and FIG. 40 illustrates an example of RU nulling 4000 when two channels are nulled according to one or more embodiments of the present disclosure. The example of RU nulling 3800, 3900, and 4000 illustrated in FIGS. 38-40 is for illustration only. Other examples of RU nulling could be used without departing from the scope of this disclosure."); at [0196] ("In this illustrative embodiment, depending on the nulling indicated in HE-SIG-A, the RU arrangement for the channels that carry data indicates where the data are carried and the edge RUs that need to be ignored. The process begins with the STA 111 determining whether a non-contiguous channel bonding field is set to indicate null channels (step 4105). For example, in step 4105, the STA 111 may identify the non-contiguous channel bonding field from the HE-SIG-A field in a packet header, such as the packet header 300 in FIG. 3.")

And each of the remaining references provided in Exhibits C1-C13 seek ways of scheduling wireless resources:

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as

described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Li at Abstract ("This disclosure describes methods, apparatus, and systems related to a high efficiency SIGNAL field in high efficiency wireless LAN access network. A device may determine at least one communication channel with one or more devices including a first device and a second device. The device may generate a high efficiency preamble in accordance with a high efficiency communication standard, the high efficiency preamble including, at least in part, a first high efficiency SIGNAL field and a second high efficiency SIGNAL field. The device may partition the second high efficiency SIGNAL fields into, at least in part, a common subfield, and one or more device specific subfields. The device may send the high efficiency preamble to at least one of the one or more devices.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined.

Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Josiam at Abstract ("Methods and apparatuses for scheduling and indicating scheduling information in a wireless local area network (WLAN). A station (STA) includes a transceiver configured to receive a header for a protocol data unit and a controller configured to identify common information for a plurality of STAs that are scheduled in the WLAN from a common field in the header and to identify user-specific information for the STA from a user-specific field in the header that follows the common field. An access point (AP) includes a controller configured to include common information for a plurality STAs that are scheduled in the WLAN in a common field in a header of a protocol data unit, and to include user-specific information for the STAs in a user-specific field in the header that follows the common field. The AP also includes a transceiver configured to transmit the protocol data unit including the header.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF) field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits C1-C13 with any one of the above exemplary references (Bharadwaj 129, Josiam)would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits C1-C13 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits C1-C13. A POSITA would have been motivated to incorporate indicating channel puncturing information using HE-SIG-A and HE-SIG-B, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Josiam), indicating channel puncturing information using HE-SIG-A and HE-SIG-B well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits C1-C13 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '281 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "the resource unit allocation field indicates a specific resource unit not assigned to a user through a predetermined index." *See, e.g.*, Lee at [0323]-[0325], Li at [0032], Seok at [0243], [0244]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits C1-C13 with any one or more of the above exemplary cited references (Lee, Li, Seok) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating a specific resource unit not assigned to a user through a predetermined index:

- Lee at [0323] ("FIGS. 18A, 18B, 18C, and 18D, show first, second, third, and fourth parts, respectively of Table 1. Table 1 is a table of index values used in RU allocation subfields of an HE-SIG-B field (such as an HE-SIG-B1 field or an HE-SIG-B2 field) for indicating RU allocations, according to an embodiment. That is, Table 1 is an RU

allocation table, according to the embodiment."); at [0324] ("Each RU allocation subfield includes 8 bits indicating an index that corresponds to a resource allocation structure shown in Table 1."); at [0325] ("For example, an index value of 2 indicates that there are first to fifth per-STA info subfields in the HE-SIG-B field, and that the first to fifth per-STA info subfields correspond to a first 52-tone RU, a second 52-tone RU, a 26-tone RU, a third 52-tone RU, and a fourth 52-tone RU, respectively, sequential arranged in the frequency domain, and that the first to fifth per-STA info subfields are SU-type per-STA info subfields.")

- Li at [0032] ("In one embodiment, common part 444 of an HE-SIG-B field is illustrated in FIG. 4A. The frequency band may be partitioned based on the RU allocation 402. The RU allocation 402 may contain, at least in part, an index of bandwidth allocation pattern to be used by one or more user devices that may be serviced by an AP. The index may take about 5, 10, and 20 bits for contiguous 20, 40, and 80 MHz channels, respectively. In another embodiment, the index may take about 8, 17, and 37 bits for contiguous 20, 40, and 80 MHz channels, respectively. For non-contiguous channels in non-contiguous channel bonding, the numbers of required bits may be similar. The indexing for contiguous channel may be reused for non-contiguous channel. In this case, some 242-tone RU may be indicated as unavailable RU. Once the total bandwidth or the available subchannels are known from the HE-SIG-A or R-L-SIG fields, the number of bits in RU allocation 402 may be known. RU allocation 402 may be protected by a channel code word encoded separately from the rest of the spatial stream allocation part. Since the length of the RU allocation 402 may be known, a user device receiving the HE-SIG-B field may first decode this part so that the sizes and locations of all the available RUs in the band may be known. In the example of FIG. 4A, a contiguous 20 MHz channel may be used, which may be divided into a 106-tone RU, a 26-tone RU, and a 106-tone RU.")

- Seok at [0243] ("The Membership Status Array field may have a size of 8 octets. The 8-octet Membership Status Array field may be indexed by a Group ID and include a 1-bit Membership Status subfield for each of 64 Group IDs. If a STA is not a member of a group identified by a Group ID, the 1-bit Membership Status subfield for the Group ID may be set to 0, and if the STA is a member of the group, the 1-bit Membership Status subfield may be set to 1. The Membership Status subfields for Group ID 0 (i.e., transmission to an AP) and Group ID 63 (i.e., DL SU transmission) may be reserved."); at [0244] ("The User Position Array field may be 16 octets long. The 16-octet User Position Array field may be indexed by a Group ID, and include a 2-bit User Position subfield for each of the 64 Group IDs. If the User Position subfield is set to 00, 01, 10, and 11, it may indicate user positions 0, 1, 2, and 3, respectively. If the Membership Status subfield for a Group ID is 0 (i.e., the STA is not a member of a group identified by the Group ID), the User Position subfield for the Group ID may be reserved. The User Position subfields for Group ID 0 (i.e., transmission to an AP) and Group ID 63 (i.e., DL SU transmission) may be reserved.")

And each of the remaining references provided in Exhibits C1-C13 seek ways of scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content channel. The first common portion may include the first indicator. The transmitter may identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined.

Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Josiam at Abstract ("Methods and apparatuses for scheduling and indicating scheduling information in a wireless local area network (WLAN). A station (STA) includes a transceiver configured to receive a header for a protocol data unit and a controller configured to identify common information for a plurality of STAs that are scheduled in the WLAN from a common field in the header and to identify user-specific information for the STA from a user-specific field in the header that follows the common field. An access point (AP) includes a controller configured to include common information for a plurality STAs that are scheduled in the WLAN in a common field in a header of a protocol data unit, and to include user-specific information for the STAs in a user-specific field in the header that follows the common field. The AP also includes a transceiver configured to transmit the protocol data unit including the header.")

Combining the prior art identified in Exhibits C1-C13 with any one of the above exemplary references (Lee, Li, Seok) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits C1-C13 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits C1-C13. A POSITA would have been motivated to incorporate indicating a specific resource unit not assigned to a user through a predetermined

index, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Lee, Li, Seok), indicating a specific resource unit not assigned to a user through a predetermined index well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits C1-C13 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '281 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "the information of the unassigned resource unit is obtained through resource unit arrangement information indicated by the resource unit allocation field of the HE-SIG-B and a Null STA ID contained in a user field corresponding to a specific resource unit in the resource unit arrangement." *See, e.g.*, Lee at [0309], [0329]; Li at [0034], [0070]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits C1-C13 with any one or more of the above exemplary cited references (Lee, Li) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for using a Null STA ID contained in a user field corresponding to a specific resource unit:

- Lee at [0309] ("In an embodiment, the example shown, the Channel C RU allocation subfield 1706C may indicate a "zero assigned user" state (shown as "empty" in FIG. 17A). This is possible because another RU allocation subfield (specifically, Channel D RU allocation subfield 1706D) conveys an indication of the resource assignments for channels C and D, therefore no duplicate indication is needed. In an embodiment, the Channel C RU allocation subfield 1706C may indicate "zero user 484 RU" state, so the Channel C RU allocation subfield 1706C indicates that the third 20 MHz channel C is combined with the fourth 20 MHz channel D to make a second RU 1716 (RU2) having 484 tones and that a number of user fields in the first user specific field 1708-1 that correspond to the second RU 1716 is zero."); at [0329] ("Additionally, a "zero user assigned" state may be included in the RU allocation table, which is used to indicate no assignment from the RU allocation subfield. Index value 0 is used for

this purpose in the embodiment shown in Table 1. The other RU allocation subfields within the common field may indicate resource assignment.")

- Li at [0034] ("In one embodiment, using a special index of stream allocation e.g. {0} for unallocated RU may reduce the overhead. Typically, it would have taken about 17 bits per unused RU. However, with one or more embodiments of the disclosure, this may take about 5.5 bits per unused RU on average. The zero stream allocation may also signal the unavailable subchannel. Therefore, by assigning a zero stream to the 242-tone RU, the AP may signal the unavailability of the corresponding 20 MHz subchannel using the tone plan for contiguous channel."); at [0070] ("For reducing overhead, the '0' number of streams may be used to indicate an unallocated resource unit (RU) in frequency. On average, this may consume 5.5 bits for each unallocated RU as compared to the typical 17 bits using null or dummy association ID (AID) in user device specific part. Thus resulting in reduced overhead.")

And each of the remaining references provided in Exhibits C1-C13 seek ways of scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content channel. The first common portion may include the first indicator. The transmitter may identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- information in a wireless local area network (WLAN). A station (STA) includes a transceiver configured to receive a header for a protocol data unit and a controller configured to identify common information for a plurality of STAs that are scheduled in the WLAN from a common field in the header and to identify user-specific information for the STA from a user-specific field in the header that follows the common field. An access point (AP) includes a controller configured to include common information for a plurality STAs that are scheduled in the WLAN in a common field in a header of a protocol data unit, and to include user-specific information for the STAs in a user-specific field in the header that follows the common field. The AP also includes a transceiver configured to transmit the protocol data unit including the header.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF)

field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits C1-C13 with any one of the above exemplary references (Lee, Li) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits C1-C13 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits C1-C13. A POSITA would have been motivated to incorporate using a Null STA ID contained in a user field corresponding to a specific resource unit, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Lee, Li), using a Null STA ID contained in a user field corresponding to a specific resource unit well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits C1-C13 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '281 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "when the bandwidth field indicates puncturing of one of two 20 MHz

channels in a secondary 40 MHz channel within a bandwidth of 80 MHz or puncturing of at least one of two 20 MHz channels in a secondary 40 MHz channel within a bandwidth of 160 MHz or 80+80 MHz, the resource unit allocation field indicates which 20 MHz channel in the secondary 40 MHz channel is punctured." *See, e.g.*, Bharadwaj 129 at [0132], [0138]; Kim at [0033]-[0036], Josaim at [0194], 0045r1 at 5, Seok at [0213]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits C1-C13 with any one or more of the above exemplary cited references (Bharadwaj 129, Kim, Josaim, 0045r1, Seok) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for puncturing sub-channels in a secondary channel:

- Bharadwaj 129 at [0132] ("In a first example, illustrated in FIG. 11B, information/contents of the SIG-B that was found in the secondary 20 MHz channel may be transmitted on the primary 20 MHz channel. In such case an indication of the puncturing of the 20 MHz channel may be signaled in the SIG-A field, for example by including an indicator, which in some examples may be a 1 bit indicator."); at [0138] ("In a second example, for example for an 80 MHz bandwidth as illustrated in FIG. 11A, or a 160 MHz bandwidth containing duplicated SIG-B content, information and/or contents of the SIG-B filed that was found in the punctured secondary 20 MHz channel corresponding to the 2nd 20 MHz may be decoded from a 4th 20 MHz channel. In such case an indication of the SIG-B decoding may be signaled in the SIG-A field, for example by including an indicator in the SIG-A field. In this example, there may a limitation that the 4th 20 MHz is not also punctured.")

- Kim at [0033] ("According to an aspect of improved wireless transmission, a bitmap may be used to indicate whether each of BWU1, BWU2, BWU3, or BWU4 is being used. Specifically, each BWU may be assigned a bit number, that is, bit 0 for BWU1, bit 1 for BWU2, bit 2 for BWU3, and bit 3 for BWU4. As shown in Table 4, each of bits 1–3 has a value of "0" if the BWU is unused and a value of "1" if the BWU is used in the packet. Since BWU1 includes both primary and secondary channels, "0" indicates that only the primary channel is used, and "1" indicates that both the primary and secondary channels are used. In one embodiment, this bitmap is transmitted as 4 bits in the VHT-SIG-A field, which is provided in the proposed 802.11ac. In one embodiment, for any packet bandwidth greater than 40 MHz, BWU1 must use 40 MHz (bit 0=1).")

- Josiam at [0194] (In these illustrative embodiments, when non-contiguous channel bonding is indicated in HE-SIG-A or a prior request to transmit (RTS)/clear to transmit (CTS) transaction, the edge RUs of the channels adjacent to the channels being nulled do not carry any information and no per-STA information fields are carried for those RUs. Even if the RU arrangement indicates the presence or use of an RU, the presence of per-STA information fields is determined based on whether the non-contiguous channel bonding field is set to indicate certain unused channels. For example, if one secondary (SEC) channel is unused, the primary (PRI) channel adjacent to the secondary channel as illustrated in FIG. 38 will not use the edge RU. Depending on the arrangement, a 26 tone RU at the edge may be unused or a 52 tone edge RU may be nulled. For different channels being nulled, the common information including the RU arrangement may not be carried. For those channels that carry data, common control and per-user signaling fields are mapped to their respective HE-SIG-B channels as per the mapping rules. Different types of channel bonding can be supported as illustrated in FIGS. 38-40.")

- 0045r1 at 5 (showing allocation for primary and secondary 20Mhz channels)

- Seok at [0213] ("As illustrated in FIG. 16, one 40-MHz channel may include a primary 20-MHz channel and a secondary 20-MHz channel which are contiguous. One 80-MHz channel may include a primary 40-MHz channel and a secondary 40-MHz channel which are contiguous. One 160-MHz channel may include a primary 80-MHz channel and a secondary 80-MHz channel which are contiguous. As illustrated in FIG. 17, one 80+80-MHz channel may include a primary 80-MHz channel and a secondary 80-MHz channel which are non-contiguous.")

And each of the remaining references provided in Exhibits C1-C13 seek ways of scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content channel. The first common portion may include the first indicator. The transmitter may identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first

frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Li at Abstract ("This disclosure describes methods, apparatus, and systems related to a high efficiency SIGNAL field in high efficiency wireless LAN access network. A device may determine at least one communication channel with one or more devices including a first device and a second device. The device may generate a high efficiency preamble in accordance with a high efficiency communication standard, the high efficiency preamble including, at least in part, a first high efficiency SIGNAL field and a second high efficiency SIGNAL field. The device may partition the second high efficiency SIGNAL fields into, at least in part, a common subfield, and one or more device specific subfields. The device may send the high efficiency preamble to at least one of the one or more devices.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU

pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

Combining the prior art identified in Exhibits C1-C13 with any one of the above exemplary references (Bharadwaj 129, Kim, Josaim, 0045r1, Seok)would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits C1-C13 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits C1-C13. A POSITA would have been motivated to incorporate puncturing sub-channels in a secondary channel, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Kim, Josaim, 0045r1, Seok), puncturing sub-channels in a secondary channel well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits C1-C13 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

In addition, the prior art also provided sets of finite, identified, predictable solutions for known problems that would have been obvious to those of ordinary skill to try with a reasonable

expectation of success. For example, it would have been obvious to one of skill in the art at the time that the disclosures relating to HE-SIG-A and HE-SIG-B that these messages were used to provide resource scheduling parameters to user terminals.

The prior art references provide motivations to combine because they describe the field of the Asserted Patents, teach improvements, explain desired features, and even expressly state that one of skill in the art would be able to apply their teachings to related systems or methods. *See, e.g.*, Bharadwaj 129 at [0234], Lee [0530]-[0537], Li at [00p4], Hedayat 54:63-55:4, Bharadwaj 718 at [0193], Chen at [0136]-[0139], Kim at [0068], 802.11ac at 10-12.

Further, the prior art references provide motivations to combine because they explicitly suggest utilizing the teachings and disclosures of other references.

In accordance with these advances, the prior art could have been combined according to methods known to those of ordinary skill within the field of the ’281 patent to yield predictable results. For example, resource scheduling using a discontinuous channel could have been predictably achieved by one of ordinary skill at the time of the alleged invention. One of ordinary skill in the art would have been aware of these various applications, including methods for resource scheduling using a discontinuous channel. Those of ordinary skill in the art could have employed known techniques to improve similar prior art devices in the same way as claimed in the ’281 patent.

In addition, one of ordinary skill in the art would be motivated to combine the prior art references because the elements found in the Asserted Claims of the ’281 patent are well known in the art. Indeed, the listed inventors of the Asserted Patents admitted as much in the specification of the ’281 Patent. *See, e.g,* ’281 patent at 1:30-5:14.

Any reference or combination of references that anticipates or makes obvious an asserted

independent claim also makes obvious any asserted claim dependent on that independent claim, as the element of each dependent ’281 patent Asserted Claim was known by a person of ordinary skill at the time of the alleged invention, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, Defendants contend that each Asserted Claim would have been obvious not only by the combinations described in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

In addition to the specific examples of motivation provided above, Defendants reserve the right to rely on the disclosures of the references listed in Appendix C for additional motivation to combine. The above-identified examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendants reserve the right to contend that the above-described motivations to combine apply to other combinations at the appropriate time, *i.e.*, in expert reports regarding invalidity.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix C with any other reference or references listed in Appendix C along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the ’281 patent. For example, and without limitation, the Asserted Claims of the ’281 patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Bharadwaj 129	• Asserted Patents Admitted Prior Art (APA) • Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, or 802.11ac • Knowledge of a person of ordinary skill
Lee	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, 802.11ac, 802.11-16 0045r1, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
Li	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, 802.11ac, 802.11-16 0045r1, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
Hedayat	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Bharadwaj 718, Chen, Kim, Josiam, 802.11ac, 802.11-16 0045r1, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
Bharadwaj 718	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Chen, Kim, Josiam, 802.11ac, 802.11-16 0045r1, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
Chen	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Kim, Josiam, 802.11ac, 802.11-16 0045r1, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
Kim	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Josiam, 802.11ac, 802.11-16 0045r1, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Josiam	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, 802.11ac, 802.11-16 0045r1, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
802.11ac	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, 802.11-16 0045r1, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
802.11-16 0045r1	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, 802.11ac, 802.11-15 0344r2, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
802.11-15 0344r2	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, 802.11ac, 802.11-16 0045r1, or 802.11-14 1437r1 • Knowledge of a person of ordinary skill
802.11-14 1437r1	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, 802.11ac, 802.11-16 0045r1, or 802.11-15 0344r2 • Knowledge of a person of ordinary skill

As mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. Moreover, the exemplary combinations are provided based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a *Markman* Order has not yet been issued in this case. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well

as to detail and explain such combinations.

4. U.S. Patent No. 11,470,595

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix D the prior art references that render obvious the Asserted Claims of the '595 patent and include below exemplary combinations showing the obviousness of the '595 patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix D, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of skill in the art at the time of the '595 patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix D, such reference may be combined with any other references listed in Appendix D for such element, thereby rendering the claims invalid for obviousness.

To the extent a finder of fact determines that a limitation of any of the '595 patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '595 patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a) Obviousness Rationale

For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix D along with the knowledge of one of ordinary skill in the art to meet the limitations of the '595 patent Asserted Claims. Moreover,

as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '595 patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

One or more combinations of the prior art references identified in Appendix D would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on

predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix D would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the ’595 patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix D is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Additionally, it would be obvious to one of skill in the art to consult and/or combine any

of the prior art listed in Appendix D because all of these references relate to the same area of technology and/or are from analogous art. The ’595 patent Asserted Claims are directed to scheduling wireless resources. ’595 patent at Abstract. The ’595 patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the ’595 patent Asserted Claims.

All of the ’595 patent Asserted Claims are directed to scheduling wireless resources. Such technology, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, was widely known before the alleged priority date of the ’595 Patent, as evidenced by the references in Appendix D.

One of ordinary skill in the art would have been motivated to combine any of the references in Appendix D because at the time of the alleged invention scheduling wireless resources was a common problem with well-known solutions. In particular, common problems with conventional techniques for scheduling wireless resources were known to persons of ordinary skill in the art and using HE-SIG-A and HE-SIG-B fields to indicate the unassigned resources was a well-known solution to achieve higher bandwidth utilization. Bharadwaj 129 at [0112], [0141]; Lee at [0235]; Li at [0032], 0036]; Bharadwaj 718 at [0059], [0063]; Chen at [0093]; Kim at [0052], and 802.11ac at Section 22.3.8.3.3.

For example, it was well-known to one of skill in the art before the time of the ’595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s

infringement contentions, to "obtain bandwidth information indicated via a bandwidth field included in the HE-SIG-A field." *See, e.g.*, Bharadwaj 129 at [0112], Li at [0032]; Bharadwaj 718 at [0063]; Kim at [0052], Josiam at [0132], 802.11ac at Section 22.3.8.3.3, 0045r1 at 8, and Seok at [0126]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Bharadwaj 129, Li, Bharadwaj 718, Kim, Josiam, 802.11ac, 0045r1, Seok) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for using HE-SIG-A field to provide bandwidth information to user terminals:

- Bharadwaj 129 at [0112] ("In some instances, the HE-SIG-A field 305-a where the BW field 410 indicates a higher bandwidth, e.g. 40 MHz, 80 MHz, or 160 MHz, the HE-SIG-A field for the SU HE extended range PPDU may have the same format as for a non-extended range format PPDU, e.g. the HE-SIG-A field for the SU HE PPDU. Maintaining a similar format for the HE-SIG-A field for certain bandwidths of the SU extended range HE PPDU as the SU HE PPDU may increase simplicity of implementation.")

- Li at [0032] ("Once the total bandwidth or the available subchannels are known from the HE-SIG-A or R-L-SIG fields, the number of bits in RU allocation 402 may be known.")

- Bharadwaj 718 at [0063] ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Kim at [0052] ("It should be noted that VHT-SIG-A (forming part of the VHT set of symbols in FIGS. 10A–10C) includes bandwidth and MCS (modulation) information.")

- Josiam at [0132] ("The size of the RU position index carried in the block of user allocation information varies according to the bandwidth information signaled in the HE-SIG-A. If the size of the block of a user allocation is fixed, then the extra bits needed for the RU position indication can be derived by shrinking the size of the partial STA-ID signaled in the block. For example, in a 20 MHz MU PPDU, the STA-ID can

use 9 bits and the RU position indexing is 5 bits (4 bits+1 bit reserved). In a 40 MHz MU PPDU, the STA-ID can use 8 bits and the RU position indexing can be 6 bits. In an 80 MHz MU PPDU, the STA-ID can use 7 bits and the RU position indexing can be 7 bits.")

- 802.11ac at Section 22.3.8.3.3 (showing VHT-SIG-A including a bandwidth field)

- 0045r1 at 8 (showing VHT-SIG-A including a bandwidth field)

- Seok at [0126] ("Table II illustrates fields, bit positions, numbers of bits, and descriptions included in each of two parts, VHT-SIG-A1 and VHT-SIG-A2, of the VHT-SIG-A field defined by the IEEE 802.11ac standard. For example, a BW (BandWidth) field occupies two Least Significant Bits (LSBs), B0 and B1 of the VHT-SIG-A1 field and has a size of 2 bits. If the 2 bits are set to 0, 1, 2, or 3, the BW field indicates 20 MHz, 40 MHz, 80 MHz, or 160 and 80+80 MHz. For details of the fields included in the VHT-SIG-A field, refer to the IEEE 802.11ac-2013 technical specification, which is hereby incorporated by reference. In the HE PPDU frame format of the present disclosure, the HE-SIG-A field may include one or more of the fields included in the VHT-SIG-A field, and it may provide backward compatibility with IEEE 802.11ac stations.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a

Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Wu at Abstract ("Methods and apparatus are provided for HE-SIG-B common field formats and indications. In one novel aspect, a fixed format is used for HE-SIG-B common field indicating resource allocations (RA). In one embodiment, look-up tables (LUT) are configured for the resource allocation and indicated in the HE-SIG-B common field. In one embodiment, one or more RA LUTs are used based on the operation bandwidth. The RA LUTs are placed in an order of channel indexes from lower channel to upper channel signaled in each corresponding RA LUT. In another novel aspect, MU-MIMO is used for operation bandwidth of 160 MHz and a compression indicator is set in the HE-SIG-A field indicating a saving of all RA LUTS in the HE-SIG-B common field. In yet another novel aspect, a one-bit middle-tone indicator is included in the HE-SIG-B common field indicating whether the one or more middle 26 tone is used.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Bharadwaj 129, Li, Bharadwaj 718, Kim, Josiam, 802.11ac, 0045r1, Seok) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g.,

improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate using HE-SIG-A field to provide bandwidth information to user terminals, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Li, Bharadwaj 718, Kim, Josiam, 802.11ac, 0045r1, Seok), using HE-SIG-A field to provide bandwidth information to user terminals well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "obtain information of an unassigned resource unit via at least one subfield included in the HE-SIG-B field." *See, e.g.*, Bharadwaj 129 at [0141], Lee at [0235], Li at [0036], Bharadwaj 718 at [0059], Chen at [0093], Kim at [0033], Josiam at [0084], 0045r1 at 9, Seok at [0258]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Bharadwaj 129, Lee, Li, Bharadwaj 718, Chen, Kim, Josiam, 0045r1, Seok) to

improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for using HE-SIG-B field to provide resource assignment:

- Bharadwaj 129 at [0141] ("In a second example, a special or dedicated RU allocation bit sequence may be used to indicate that a 20 MHz channel is punctured. The indication may be made by adding an additional entry in a RU allocation table. A size of the common portion may be unchanged for either content channel. According to this example an explicit indication of the punctured 20 MHz channel may not be needed, though the additional RU allocation bit sequence may result in additional overhead in the common portion of the SIG-B field.")

- Lee at [0235] ("In embodiments, a transmitting device transmits resource allocation information as well as other control signaling information necessary for correct reception of data signals in one or more HE-SIG-B fields.")

- Li at [0036] ("In one embodiment, the number of unallocated RUs may determine the structure of a common part 446 of a HE-SIG-B field. Based on a predetermined threshold the structure of the HE-SIG-B common part may follow either the structure of common part 444 shown in FIG. 4A or the structure of common part 446 shown in FIG. 4B. It is understood that the predetermined threshold of unallocated RUs may be determined by the network, a system administrator, or other factors. For example, if there are only a few RUs (e.g. 1, 2, or 3) unallocated, the previous method using {0} stream indicator may be efficient. However, if there are many RUs unallocated, a one bit per RU may indicate whether the RU is allocated or not. A bit map for all the RUs may be placed after the RU allocation of FIG. 4A as shown in FIG. 4B. The length of the RU bit map can be determined by the RU allocation, more precisely the number of RUs in the indicated allocation pattern. Therefore, the RU allocation may be encoded separately with a known length. The RU bit map and the list of active RUs' stream allocations may be encoded and separated from the RU allocation. The RU bit map and the list of active RUs' stream allocations may be encoded together. Since the unallocated RUs are indicated by the RU bit map, only the stream allocations for the actually allocated RU may be in the list of active RU's stream allocations.")

- Bharadwaj 718 at [0059] ("The HE-SIG-B field may also include resource allocation information so that each STA scheduled to receive a MU transmission has information concerning which portions of the data to decode, e.g. which RU or RUs are meant to be decoded by that particular STA.")

- Chen at [0093] ("Explicit indication of the non-allocated RU in the common part of HE-SIG-B may be understood with reference to FIG. 14. FIG. 14 depicts a datagram illustrating another example HE-SIG-B portion 1400 indicating a sequence of RU allocation information with an unallocated RU, in accordance with example embodiments of the disclosure.")

- Kim at [0033] ("According to an aspect of improved wireless transmission, a bitmap may be used to indicate whether each of BWU1, BWU2, BWU3, or BWU4 is being used. Specifically, each BWU may be assigned a bit number, that is, bit 0 for BWU1, bit 1 for BWU2, bit 2 for BWU3, and bit 3 for BWU4. As shown in Table 4, each of bits 1–3 has a value of "0" if the BWU is unused and a value of "1" if the BWU is used in the packet. Since BWU1 includes both primary and secondary channels, "0" indicates that only the primary channel is used, and "1" indicates that both the primary and secondary channels are used. In one embodiment, this bitmap is transmitted as 4 bits in the VHT-SIG-A field, which is provided in the proposed 802.11ac. In one embodiment, for any packet bandwidth greater than 40 MHz, BWU1 must use 40 MHz (bit 0=1).")

- Josiam at [0084] ("The VHT-SIG-B field is one symbol and includes 26 bits in a 20 MHz PPDU, 27 bits in a 40 MHz PPDU and 29 bits in 80 MHz, 160 MHz and 80+80 MHz PPDUs for each user. The fields in the VHT-SIG-B field are listed in Table 1 below. The interpretation of the fields for MU or SU PPDU is drawn from the 6 bit GROUP_ID field carried at bit positions B4-B9 in VHT-SIG-A1: a value of 0 or 63 indicates a VHT SU PPDU; otherwise, indicates a VHT MU PPDU. VHT-SIG_B Length field for user u is set as … where APEP−LENGTHu is the TXVECTOR parameter for APEP_LENGTH for user u. For each user u, the VHT-SIG-B field is binary convolutional code (BCC) encoded at rate R=½ and mapped to a BPSK constellation. Unlike VHT-SIG-A which is a commonly signaled for all users, VHT-SIG-B is user-specific and is mapped to NSTS,u space-time streams by the user-specific elements of the first column of the PVHTLTF matrix.")

- 0045r1 at 9 (showing HE-SIG-B content)

- Seok at [0258] at "Each STA may also determine a subchannel allocated to the STA based on the resource allocation information included in the HE-SIG field of the HE PPDU received on the transmission channel (e.g., one or more 20-MHz channels) in step S1940, move to the determined subchannel (i.e., a subchannel having a smaller bandwidth than the transmission channel of the HE PPDU), and receive the remaining fields (e.g., an HE-STF, an HE-LTF, and a data unit) of the HE PPDU on the subchannel allocated to the STA in step S1950. The subsequent operations are performed in the same manner as described before with reference to FIG. 19 and thus will not be described to avoid redundancy.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including

the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Wu at Abstract ("Methods and apparatus are provided for HE-SIG-B common field formats and indications. In one novel aspect, a fixed format is used for HE-SIG-B common field indicating resource allocations (RA). In one embodiment, look-up tables (LUT) are configured for the resource allocation and indicated in the HE-SIG-B common field. In one embodiment, one or more RA LUTs are used based on the operation bandwidth. The RA LUTs are placed in an order of channel indexes from lower channel to upper channel signaled in each corresponding RA LUT. In another novel aspect, MU-MIMO is used for operation bandwidth of 160 MHz and a compression indicator is set in the HE-SIG-A field indicating a saving of all RA LUTS in the HE-SIG-B common field. In yet another novel aspect, a one-bit middle-tone indicator is included in the HE-SIG-B common field indicating whether the one or more middle 26 tone is used.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Bharadwaj 129, Lee, Li, Bharadwaj 718, Chen, Kim, Josiam, 0045r1, Seok)would have

amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate using HE-SIG-B field to provide resource assignment, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Lee, Li, Bharadwaj 718, Chen, Kim, Josiam, 0045r1, Seok), using HE-SIG-B field to provide resource assignment well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that "the bandwidth field is related to bandwidth over which the received wireless packet is transmitted, and is used to obtain the information of the unassigned resource unit." *See, e.g.*, Bharadwaj 129 at [0138], Li at [0030], Josiam at [0132], Seok at [0126]. One of

ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Bharadwaj 129, Li, Josiam, Seok) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating the information of unassigned resources via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B:

- Bharadwaj 129 at [0138] ("In a second example, for example for an 80 MHz bandwidth as illustrated in FIG. 11A, or a 160 MHz bandwidth containing duplicated SIG-B content, information and/or contents of the SIG-B filed that was found in the punctured secondary 20 MHz channel corresponding to the 2nd 20 MHz may be decoded from a 4th 20 MHz channel. In such case an indication of the SIG-B decoding may be signaled in the SIG-A field, for example by including an indicator in the SIG-A field. In this example, there may a limitation that the 4th 20 MHz is not also punctured.")

- Li at [0030] ("In that case, available subchannels may be signaled before the HE-SIG-B field. For example, the available subchannels may be indicated in the HE-SIG-A or R-L-SIG. Therefore, before decoding HE-SIG-B 142, a user device may already know the total bandwidth (e.g., 20, 40, 80, or 160 MHz) and know which subchannels within the total bandwidth are available.")

- Josiam at [0132] ("The size of the RU position index carried in the block of user allocation information varies according to the bandwidth information signaled in the HE-SIG-A. If the size of the block of a user allocation is fixed, then the extra bits needed for the RU position indication can be derived by shrinking the size of the partial STA-ID signaled in the block. For example, in a 20 MHz MU PPDU, the STA-ID can use 9 bits and the RU position indexing is 5 bits (4 bits+1 bit reserved). In a 40 MHz MU PPDU, the STA-ID can use 8 bits and the RU position indexing can be 6 bits. In an 80 MHz MU PPDU, the STA-ID can use 7 bits and the RU position indexing can be 7 bits.")

- Seok at [0126] ("Table II illustrates fields, bit positions, numbers of bits, and descriptions included in each of two parts, VHT-SIG-A1 and VHT-SIG-A2, of the VHT-SIG-A field defined by the IEEE 802.11ac standard. For example, a BW (BandWidth) field occupies two Least Significant Bits (LSBs), B0 and B1 of the VHT-SIG-A1 field and has a size of 2 bits. If the 2 bits are set to 0, 1, 2, or 3, the BW field indicates 20 MHz, 40 MHz, 80 MHz, or 160 and 80+80 MHz. For details of the fields included in the VHT-SIG-A field, refer to the IEEE 802.11ac-2013 technical specification, which is hereby incorporated by reference. In the HE PPDU frame format of the present disclosure, the HE-SIG-A field may include one or more of the fields

included in the VHT-SIG-A field, and it may provide backward compatibility with IEEE 802.11ac stations.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU

allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Wu at Abstract ("Methods and apparatus are provided for HE-SIG-B common field formats and indications. In one novel aspect, a fixed format is used for HE-SIG-B common field indicating resource allocations (RA). In one embodiment, look-up tables (LUT) are configured for the resource allocation and indicated in the HE-SIG-B common field. In one embodiment, one or more RA LUTs are used based on the operation bandwidth. The RA LUTs are placed in an order of channel indexes from lower channel to upper channel signaled in each corresponding RA LUT. In another novel aspect, MU-MIMO is used for operation bandwidth of 160 MHz and a compression indicator is set in the HE-SIG-A field indicating a saving of all RA LUTS in the HE-SIG-B common field. In yet another novel aspect, a one-bit middle-tone indicator is included in the HE-SIG-B common field indicating whether the one or more middle 26 tone is used.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Bharadwaj 129, Li, Josiam, Seok) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource

scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate indicating the information of unassigned resources via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Li, Josiam, Seok), indicating the information of unassigned resources via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to "decode a data of the received wireless packet based on the bandwidth information and the information of the unassigned resource unit." *See, e.g.*, Bharadwaj 129 at [0103]-[0104], Li at [0070], Bharadwaj 718 at [0178], Chen at [0070], [0076] Josiam at [0094], Seok [0123]-[0124]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above

exemplary cited references (Bharadwaj 129, Li, Bharadwaj 718, Chen, Josiam, Seok) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for decoding a received packet based on bandwidth information and information of the unassigned resources:

- Bharadwaj 129 at [0103] ("The first WLAN signaling field 305 also includes information usable by the identified number of APs or stations to decode the second WLAN signaling field 310."); at [0104] ("[T]he second WLAN signaling field 310 includes information usable by the number of APs or stations to transmit/encode or receive/decode data in the data field 220.")

- Li at [0070] ("For example, the high efficiency SIGNAL field device 919 may be configured to generate a HE-SIG-B that may be comprised of at least two portions: a common portion and user device specific portion(s). The common portion may have two parts, a fixed length part, and a variable length part. The fixed length part may be for the ease of channel decoding and it may contain information about frequency bandwidth allocation. After the first part is decoded, the length of the second part can be calculated for channel decoding. The second part may contain information about spatial stream allocation for each of the allocated resource units (RUs). For reducing overhead, the '0' number of streams may be used to indicate an unallocated resource unit (RU) in frequency. On average, this may consume 5.5 bits for each unallocated RU as compared to the typical 17 bits using null or dummy association ID (AID) in user device specific part. Thus resulting in reduced overhead.")

- Bharadwaj 718 at [0178] ("At 2330, the dedicated field generator 2255 generates the STA-specific field(s) of the HE-SIG-B signaling field of the WLAN preamble. These STA-specific field(s) include control information specific to each scheduled user (e.g. STA) to enable the user to decode the data (e.g., MCS, coding, spatial multiplexing, and other control information).")

- Chen at [0070] ("The processor(s) 300 may still further be configured to use the information carried in the HE-SIG-A, such as MCS information and/or length information, to decode the HE-SIG-B."); at [0076] ("The HE-SIG-B 414 may include information needed for decoding the data of all scheduled STAs 140.")

- Josiam at [0094] ("The header 500 includes training fields and packet type indication fields. For example, the header 500 may be a PLCP header. The header 500 includes a legacy short training field (L-STF) 305, a legacy long training field (L-LTF) 310, a legacy signal field (L-SIG) 315, Repeated L-SIG (RL-SIG) (520), HE signal A (HE-SIG-A) and HE signal B (HE-SIG-B) fields 525 and 530, respectively, HE short and long training symbols field 535 and 540, respectively. The fields with a legacy prefix are meant to indicate the packet type and duration to the non-VHT legacy users who may stop further processing of the PPDU after decoding the legacy portions of the

header 500. The HE portion of the preamble includes the RL-SIG 520, HE-SIG-A 525, HE-SIG-B 530, HE-STF 535, and HE-LTF 540. In a HE-SU PPDU, the HE-SIG-B 530 field is not present. In a HE-MU PPDU, the HE-SIG-B 530 field is present. In a HE-Extended Range PPDU, the HE-SIG-B 530 is not present and the symbols of the HE-SIG-A 525 are repeated. Various embodiments of the present disclosure provide signaling and addressing schemes for HE portion to support OFDMA that allow multiplexing of multiple users on different portions of the bandwidth and MU-MIMO. In particular, various embodiments provide HE-SIG-A and HE-SIG-B fields 525 and 530, respectively, that carry information required to interpret the HE-PPDUs. The various embodiments of the present disclosure provide the signaling necessary to support indication of bandwidth segments to different STAs in an OFDMA/MU-MIMO multiplexing protocol.")

- Seok at [0123] (HE-SIG-A (or HEW SIG-A) represents High Efficiency Signal A (or High Efficiency WLAN Signal A), and includes HE PPDU (or HEW PPDU) modulation parameters, etc. for HE preamble (or HEW preamble) decoding at an HE STA (or HEW STA). The set of parameters included in the HEW SIG-A field may include one or more of Very High Throughput (VHT) PPDU modulation parameters transmitted by IEEE 802.11ac stations, as listed in Table II below, to ensure backward compatibility with legacy STAs (e.g., IEEE 802.11ac stations)"); at [0124] ("In the case where a STA is not capable of decoding or is configured not to decode other subchannels than a subchannel allocated to the STA, it may be configured that resource allocation information about a plurality of subchannels does not overlap with each other, as described above. However, this is purely exemplary. Thus, even in the case where a STA is capable of decoding other non-allocated subchannels, it may be also configured that resource allocation information about a plurality of subchannels does not overlap with each other.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the

allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Wu at Abstract ("Methods and apparatus are provided for HE-SIG-B common field formats and indications. In one novel aspect, a fixed format is used for HE-SIG-B common field indicating resource allocations (RA). In one embodiment, look-up tables (LUT) are configured for the resource allocation and indicated in the HE-SIG-B common field. In one embodiment, one or more RA LUTs are used based on the operation bandwidth. The RA LUTs are placed in an order of channel indexes from lower channel to upper channel signaled in each corresponding RA LUT. In another novel aspect, MU-MIMO is used for operation bandwidth of 160 MHz and a compression indicator is set in the HE-SIG-A field indicating a saving of all RA LUTS in the HE-SIG-B common field. In yet another novel aspect, a one-bit middle-tone indicator is included in the HE-SIG-B common field indicating whether the one or more middle 26 tone is used.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary

references (Bharadwaj 129, Li, Bharadwaj 718, Chen, Josiam, Seok) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate decoding a received packet based on bandwidth information and information of the unassigned resources, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Li, Bharadwaj 718, Chen, Josiam, Seok), decoding a received packet based on bandwidth information and information of the unassigned resources well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that "the unassigned resource unit is explicitly indicated with the

information of the unassigned resource unit based on the bandwidth field and the at least one subfield." *See, e.g.*, Bharadwaj 129 at [0138], Li at [0030], Josiam at [0094]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Bharadwaj 129, Li, Josiam) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating the information of unassigned resources via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B:

- Bharadwaj 129 at [0138] ("In a second example, for example for an 80 MHz bandwidth as illustrated in FIG. 11A, or a 160 MHz bandwidth containing duplicated SIG-B content, information and/or contents of the SIG-B filed that was found in the punctured secondary 20 MHz channel corresponding to the 2nd 20 MHz may be decoded from a 4th 20 MHz channel. In such case an indication of the SIG-B decoding may be signaled in the SIG-A field, for example by including an indicator in the SIG-A field. In this example, there may a limitation that the 4th 20 MHz is not also punctured.")

- Li at [0030] ("In that case, available subchannels may be signaled before the HE-SIG-B field. For example, the available subchannels may be indicated in the HE-SIG-A or R-L-SIG. Therefore, before decoding HE-SIG-B 142, a user device may already know the total bandwidth (e.g., 20, 40, 80, or 160 MHz) and know which subchannels within the total bandwidth are available.")

- Josiam at [0094] ("The header 500 includes training fields and packet type indication fields. For example, the header 500 may be a PLCP header. The header 500 includes a legacy short training field (L-STF) 305, a legacy long training field (L-LTF) 310, a legacy signal field (L-SIG) 315, Repeated L-SIG (RL-SIG) (520), HE signal A (HE-SIG-A) and HE signal B (HE-SIG-B) fields 525 and 530, respectively, HE short and long training symbols field 535 and 540, respectively. The fields with a legacy prefix are meant to indicate the packet type and duration to the non-VHT legacy users who may stop further processing of the PPDU after decoding the legacy portions of the header 500. The HE portion of the preamble includes the RL-SIG 520, HE-SIG-A 525, HE-SIG-B 530, HE-STF 535, and HE-LTF 540. In a HE-SU PPDU, the HE-SIG-B 530 field is not present. In a HE-MU PPDU, the HE-SIG-B 530 field is present. In a HE-Extended Range PPDU, the HE-SIG-B 530 is not present and the symbols of the HE-SIG-A 525 are repeated. Various embodiments of the present disclosure provide signaling and addressing schemes for HE portion to support OFDMA that allow multiplexing of multiple users on different portions of the bandwidth and MU-MIMO.

In particular, various embodiments provide HE-SIG-A and HE-SIG-B fields 525 and 530, respectively, that carry information required to interpret the HE-PPDUs. The various embodiments of the present disclosure provide the signaling necessary to support indication of bandwidth segments to different STAs in an OFDMA/MU-MIMO multiplexing protocol.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU

allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Wu at Abstract ("Methods and apparatus are provided for HE-SIG-B common field formats and indications. In one novel aspect, a fixed format is used for HE-SIG-B common field indicating resource allocations (RA). In one embodiment, look-up tables (LUT) are configured for the resource allocation and indicated in the HE-SIG-B common field. In one embodiment, one or more RA LUTs are used based on the operation bandwidth. The RA LUTs are placed in an order of channel indexes from lower channel to upper channel signaled in each corresponding RA LUT. In another novel aspect, MU-MIMO is used for operation bandwidth of 160 MHz and a compression indicator is set in the HE-SIG-A field indicating a saving of all RA LUTS in the HE-SIG-B common field. In yet another novel aspect, a one-bit middle-tone indicator is included in the HE-SIG-B common field indicating whether the one or more middle 26 tone is used.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF)

field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Bharadwaj 129, Li, Josiam)would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate indicating the information of unassigned resources via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Bharadwaj 129, Li, Josiam), indicating the information of unassigned resources via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595

patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that "the information of the unassigned resource unit includes information of a C26 field indicating whether a user is allocated to a center 26-tone resource unit of 80 MHz upon the bandwidth related to a transmission of the received wireless packet indicated by the bandwidth field being 80 MH or more, not 20 MHz or 40 MHz." *See, e.g.*, Lee at [0332], [0334], [0338]- [0339], Josiam at [0110], Wu at [0007]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Lee, Josiam, Wu) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating allocation of 26-center tone resource unit using HE-SIG-B:

- Lee at [0332] ("The above embodiment may use additional bits, other than the 8 bits used in the RU allocation table shown in Table 1, to signal the allocation of the special center 26 RU (for example, 26-tone RU 1180 shown in FIG. 11) that is present in 80 MHz and 160 MHz PPDUs."); at [0334] ("Entries are provided in Table 2 to support indication of the allocation of the special center 26 RU in 80 MHz and 160 MHz, shown as column "S-RU" in Table 2. The NA in the S-RU column indicates that there is no assignment of the special center 26 RU. The special center 26 RU in 80 MHz is, for example, the 26-tone RU 1180 shown in FIG. 11."); at [0338] ("In another embodiment, states 83 to 165 in Table 3 are instead mapped to states 128 to 210, respectively. This is equivalent of having a separate bit indication for the special central 26-tone RU and using 7 bits to indicate the rest of the RU assignments in the 8 bit RU allocation unit."); at [0339] ("In embodiments where allocation state about the special center 26 RU is indicated using an RU allocation table value carried in an 8 bit field of RU allocation subfields of an HE-SIG-B1 field and an HE-SIG-B2 field, 8 bit fields of different RU allocation subfields may indicate the allocation state of the special center 26-tone RU for first and second 80 MHz bandwidths, respectively, of an 160 MHz transmission.")

- Josiam at [0110] ("Scheduling information for users scheduled in the center 26 tone RU of a 80 MHz allocation or allocations greater than 20 MHz can be carried in one or more portions. In one example, the center 26 tone scheduling information can be carried as the last allocation information in the 20 MHz whose subcarrier index precedes the first subcarrier index of the center 26 tone RU. In another example, the center 26 tone scheduling information can be carried as the first allocation information in the 20 MHz

segment whose subcarrier index is greater than the first subcarrier index of the center 26 tone RU. In yet another example, the center 26 tone scheduling information can be duplicated in the 20 MHz segments that encase the central 26 tone allocation. The order of the STA-ID indicated in the common portion is maintained when carrying information for the center 26 tone RU when carried using any of the above three examples.")

- Wu at [0007] ("In yet another novel aspect, a one-bit middle-tone indicator is included in the HE-SIG-B common field indicating whether the one or more middle 26 tone is used. In one embodiment, the operation bandwidth is 80 MHz and the middle-tone indicator is included at a fixed HE-SIG-B channel. In another embodiment, the operation bandwidth is 80 MHz and the middle-tone indicator is included at an allocated HE-SIG-B channel based on a load balance decision for the HE-SIG-B channels. In yet another embodiment, the operation bandwidth is 160 MHz, and wherein the middle-tone indicator for RUs of lower 80 MHz is placed at an end of HE-SIG-B channel-1 and the middle-tone indicator for RUs of upper 80 MHz is placed at an end of HE-SIG-B channel-2.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content channel. The first common portion may include the first indicator. The transmitter may identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Li at Abstract ("This disclosure describes methods, apparatus, and systems related to a high efficiency SIGNAL field in high efficiency wireless LAN access network. A device may determine at least one communication channel with one or more devices including a first device and a second device. The device may generate a high efficiency preamble in accordance with a high efficiency communication standard, the high efficiency preamble including, at least in part, a first high efficiency SIGNAL field and a second high efficiency SIGNAL field. The device may partition the second high efficiency SIGNAL fields into, at least in part, a common subfield, and one or more device specific subfields. The device may send the high efficiency preamble to at least one of the one or more devices.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel

differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF) field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Lee, Josiam, Wu) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate indicating allocation of 26-center tone resource unit using HE-SIG-B, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Lee, Josiam, Wu), indicating allocation of 26-center tone resource unit using HE-SIG-B well-known in the art by the time of the Asserted Patent's claimed invention and

thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that "the C26 field is carried in both the HE-SIG-B content channel 1 and the HE-SIG-B content channel 2." *See, e.g.*, Lim at [0197], Josiam at [0190]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Lim, Josiam) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating allocation of 26-center tone resource unit using both the HE-SIG-B content channel 1 and the HE-SIG-B content channel 2:

- Lim at [0197] ("For example, if a bandwidth of 80 MHz is used, the 20 MHz channel 1 and the 20 MHz channel 2 may be subjected to pairing and 20 MHz channel 3 and 20 MHz channel 4 may be subjected to pairing, whereby HE-SIG-B transmission for load balancing may be performed. That is, for alignment of the per 20 MHz HE-SIG-Bs, the 20 MHz channel 1 and the 20 MHz channel 2 may transmit per user HE-SIG-B of STA to which a data resource is allocated at its 20 MHz channel through 20 MHz channel paired therewith. In this embodiment, it is assumed that two 20 MHz channels are subjected to pairing. However, according to another embodiment, the 20 MHz channels 1 to 4 may be set to one pairing set. Also, the number of 20 MHz channels which belong to a pairing set may be determined in accordance with a system bandwidth. For example, although two 20 MHz channels are set to one pairing set at a system bandwidth of 80 MHz, 4 20 MHz channels may be set to one pairing set at a system bandwidth of 160 MHz. Meanwhile, pairing may be performed only if a system bandwidth exceeds a certain size. For example, if the system bandwidth is 40 MHz or less, pairing of 20 MHz channels may not be performed.")

- Josaim at [0190] ("Two 26 tone RUs are signaled using 1 bit separately. By convention, one in HE-SIG-B channel-1 3715 and the other in HE-SIG-B channel-2 3720. The common information portion 3705 in each of the HE-SIG- B channels 3715 and 3720 also includes 1 bit indicated if the central 26 tone RU is assigned to an user or not. By

convention, this indication may be carried in HE-SIG-B channel-1 3715 after the RU arrangements for segments are indicated and encoded together. If the bit is set to 1, the per-user allocation information is carried at the end, after the user allocations for other segments are carried.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content channel. The first common portion may include the first indicator. The transmitter may identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Li at Abstract ("This disclosure describes methods, apparatus, and systems related to a high efficiency SIGNAL field in high efficiency wireless LAN access network. A device may determine at least one communication channel with one or more devices including a first device and a second device. The device may generate a high efficiency preamble in accordance with a high efficiency communication standard, the high efficiency preamble including, at least in part, a first high efficiency SIGNAL field and a second high efficiency SIGNAL field. The device may partition the second high efficiency SIGNAL fields into, at least in part, a common subfield, and one or more device specific subfields. The device may send the high efficiency preamble to at least one of the one or more devices.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Wu at Abstract ("Methods and apparatus are provided for HE-SIG-B common field formats and indications. In one novel aspect, a fixed format is used for HE-SIG-B common field indicating resource allocations (RA). In one embodiment, look-up tables (LUT) are configured for the resource allocation and indicated in the HE-SIG-B common field. In one embodiment, one or more RA LUTs are used based on the

operation bandwidth. The RA LUTs are placed in an order of channel indexes from lower channel to upper channel signaled in each corresponding RA LUT. In another novel aspect, MU-MIMO is used for operation bandwidth of 160 MHz and a compression indicator is set in the HE-SIG-A field indicating a saving of all RA LUTS in the HE-SIG-B common field. In yet another novel aspect, a one-bit middle-tone indicator is included in the HE-SIG-B common field indicating whether the one or more middle 26 tone is used.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF) field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Lim, Josiam) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate indicating allocation of 26-center tone resource unit using both the HE-SIG-B content channel 1 and the HE-SIG-B content channel 2, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Lim, Josiam),

indicating allocation of 26-center tone resource unit using both the HE-SIG-B content channel 1 and the HE-SIG-B content channel 2 well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that "both of a C26 field carried in the HE-SIG-B content channel 1 and a C26 field carried in the HE-SIG-B content channel 2 indicate whether a user is allocated to a center 26-tone resource unit in the total bandwidth of 80 MHz." *See, e.g.*, Wu at [0043], [0047], Josiam at [0165], [0190]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Wu, Josiam) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating allocation of 26-center tone resource unit in both of C26 field carried in the HE-SIG-B content channel 1 and C26 field carried in the HE-SIG-B content channel 2 in the total bandwidth of 80 MHz:

- Wu at [0043] ("In another novel aspect, the middle 26-tone RU for 80 MHz and 160 MHz can be signaled by the common field. A one-bit indication in the HE-SIG-B common filed. If operation BW is 80 MHz, define 1-bit in the common field to indicate whether the middle 26-tone RU is used. This bit duplicates on common field-1 and field-2. If operation BW is 160 Mhz, define 1-bit in the SIG-B channel-1 common field to indicate lower RU, and 1-bit in the SIG-B channel-2 common field to indicate the upper 26-tone RU. FIG. 5 and FIG. 6 illustrate the indication of the middle 26-tone RU. "); at [0047] ("In another embodiment, two user specific fields for middle RU of lower and upper 80 MHz when operation BW is 160 MHz as shown in 620. In yet another embodiment, as shown in 630, two unused indices in the RA LUT are used to indicate whether the middle 26 tone RU for 80 Mhz is assigned.")

- Josiam at [0165] ("In this illustrative embodiment, the HE-SIG-B multiplexing scheme 2900 for an 80 MHz MU PPDU includes two channels 2915 and 2920 as illustrated in FIG. 29. Each HE-SIG- B channel 2915 and 2920 carries different information and the HE-SIG- B channels 2915 and 2920 are duplicated per 40 MHz i.e., HE-SIG-B Channel 1 2915 is carried in channel A & C of 80 MHz while HE-SIG-B Channel 2 2915 2920 is carried in B & D of 80 MHz as illustrated in FIG. 29. 80 MHz channel includes four 20 MHz segments identified as channels A, B, C and D in FIG. 29 and the multiplexing information used or required for decoding the PPDU for users scheduled in each of these segments have to be mapped to 2 HE-SIG-B channels duplicated per 40 MHz."); at [0190] ("Two 26 tone RUs are signaled using 1 bit separately. By convention, one in HE-SIG-B channel-1 3715 and the other in HE-SIG-B channel-2 3720. The common information portion 3705 in each of the HE-SIG- B channels 3715 and 3720 also includes 1 bit indicated if the central 26 tone RU is assigned to an user or not. By convention, this indication may be carried in HE-SIG-B channel-1 3715 after the RU arrangements for segments are indicated and encoded together. If the bit is set to 1, the per-user allocation information is carried at the end, after the user allocations for other segments are carried.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content channel. The first common portion may include the first indicator. The transmitter may identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Li at Abstract ("This disclosure describes methods, apparatus, and systems related to a high efficiency SIGNAL field in high efficiency wireless LAN access network. A device may determine at least one communication channel with one or more devices including a first device and a second device. The device may generate a high efficiency preamble in accordance with a high efficiency communication standard, the high efficiency preamble including, at least in part, a first high efficiency SIGNAL field and a second high efficiency SIGNAL field. The device may partition the second high efficiency SIGNAL fields into, at least in part, a common subfield, and one or more device specific subfields. The device may send the high efficiency preamble to at least one of the one or more devices.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit

is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF) field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Wu, Josiam) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been

obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate indicating allocation of 26-center tone resource unit in both of C26 field carried in the HE-SIG-B content channel 1 and C26 field carried in the HE-SIG-B content channel 2 in the total bandwidth of 80 MHz, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Wu, Josiam), indicating allocation of 26-center tone resource unit in both of C26 field carried in the HE-SIG-B content channel 1 and C26 field carried in the HE-SIG-B content channel 2 in the total bandwidth of 80 MHz well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that "a user field corresponding to the center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 1." *See, e.g.*, Lee at [0332], [0334], [0338]- [0339]; Wu at [0043], [0047]; Josiam [0165], [0190]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Lee, Wu, Josiam) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating allocation of center 26-tone resource unit via a user field carried in a user specific field of the HE-SIG-B content channel 1:

- Lee at [0332] ("The above embodiment may use additional bits, other than the 8 bits used in the RU allocation table shown in Table 1, to signal the allocation of the special

center 26 RU (for example, 26-tone RU 1180 shown in FIG. 11) that is present in 80 MHz and 160 MHz PPDUs."); at [0334] ("Entries are provided in Table 2 to support indication of the allocation of the special center 26 RU in 80 MHz and 160 MHz, shown as column "S-RU" in Table 2. The NA in the S-RU column indicates that there is no assignment of the special center 26 RU. The special center 26 RU in 80 MHz is, for example, the 26-tone RU 1180 shown in FIG. 11."); at [0338] ("In another embodiment, states 83 to 165 in Table 3 are instead mapped to states 128 to 210, respectively. This is equivalent of having a separate bit indication for the special central 26-tone RU and using 7 bits to indicate the rest of the RU assignments in the 8 bit RU allocation unit."); at [0339] ("In embodiments where allocation state about the special center 26 RU is indicated using an RU allocation table value carried in an 8 bit field of RU allocation subfields of an HE-SIG-B1 field and an HE-SIG-B2 field, 8 bit fields of different RU allocation subfields may indicate the allocation state of the special center 26-tone RU for first and second 80 MHz bandwidths, respectively, of an 160 MHz transmission.")

- Wu at [0043] ("In another novel aspect, the middle 26-tone RU for 80 MHz and 160 MHz can be signaled by the common field. A one-bit indication in the HE-SIG-B common filed. If operation BW is 80 MHz, define 1-bit in the common field to indicate whether the middle 26-tone RU is used. This bit duplicates on common field-1 and field-2. If operation BW is 160 Mhz, define 1-bit in the SIG-B channel-1 common field to indicate lower RU, and 1-bit in the SIG-B channel-2 common field to indicate the upper 26-tone RU. FIG. 5 and FIG. 6 illustrate the indication of the middle 26-tone RU. "); at [0047] ("In another embodiment, two user specific fields for middle RU of lower and upper 80 MHz when operation BW is 160 MHz as shown in 620. In yet another embodiment, as shown in 630, two unused indices in the RA LUT are used to indicate whether the middle 26 tone RU for 80 Mhz is assigned.")

- Josiam at [0165] ("In this illustrative embodiment, the HE-SIG-B multiplexing scheme 2900 for an 80 MHz MU PPDU includes two channels 2915 and 2920 as illustrated in FIG. 29. Each HE-SIG- B channel 2915 and 2920 carries different information and the HE-SIG- B channels 2915 and 2920 are duplicated per 40 MHz i.e., HE-SIG-B Channel 1 2915 is carried in channel A & C of 80 MHz while HE-SIG-B Channel 2 2915 2920 is carried in B & D of 80 MHz as illustrated in FIG. 29. 80 MHz channel includes four 20 MHz segments identified as channels A, B, C and D in FIG. 29 and the multiplexing information used or required for decoding the PPDU for users scheduled in each of these segments have to be mapped to 2 HE-SIG-B channels duplicated per 40 MHz."); at [0190] ("Two 26 tone RUs are signaled using 1 bit separately. By convention, one in HE-SIG-B channel-1 3715 and the other in HE-SIG-B channel-2 3720. The common information portion 3705 in each of the HE-SIG- B channels 3715 and 3720 also includes 1 bit indicated if the central 26 tone RU is assigned to an user or not. By convention, this indication may be carried in HE-SIG-B channel-1 3715 after the RU arrangements for segments are indicated and encoded together. If the bit is set to 1, the per-user allocation information is carried at the end, after the user allocations for other segments are carried.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of

scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content channel. The first common portion may include the first indicator. The transmitter may identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Li at Abstract ("This disclosure describes methods, apparatus, and systems related to a high efficiency SIGNAL field in high efficiency wireless LAN access network. A device may determine at least one communication channel with one or more devices including a first device and a second device. The device may generate a high efficiency preamble in accordance with a high efficiency communication standard, the high efficiency preamble including, at least in part, a first high efficiency SIGNAL field and a second high efficiency SIGNAL field. The device may partition the second high efficiency SIGNAL fields into, at least in part, a common subfield, and one or more device specific subfields. The device may send the high efficiency preamble to at least one of the one or more devices.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers

to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a

> method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF) field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Lee, Wu, Josiam) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate indicating allocation of center 26-tone resource unit via a user field carried in a user specific field of the HE-SIG-B content channel 1, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Lee, Wu, Josiam), indicating allocation of center 26-tone resource unit via a user field carried in a user specific field of the HE-SIG-B content channel 1 well-known in the art by the time of the Asserted Patent's claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that "when the received wireless packet is transmitted in a total bandwidth of 160 MHz or 80+80 MHz, the total bandwidth includes a first 80 MHz bandwidth and a second 80 MHz bandwidth, a first C26 field carried in the HE-SIG-B content channel 1 indicates whether a user is allocated to a first center 26-tone resource unit in the first 80 MHz bandwidth, and a second C26 field carried in the HE-SIG-B content channel 2 indicates whether a user is allocated to a second center 26-tone resource unit in the second 80 MHz bandwidth." *See, e.g.*, Lee at [0332], [0334], [0338]- [0339]; Wu at [0043], [0047]; Josiam at [0188]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Lee, Wu, Josiam) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating allocation of 26-center tone resource unit using C26 field carried in the HE-SIG-B content for channel 1 and channel 2:

- Lee at [0332] ("The above embodiment may use additional bits, other than the 8 bits used in the RU allocation table shown in Table 1, to signal the allocation of the special center 26 RU (for example, 26-tone RU 1180 shown in FIG. 11) that is present in 80 MHz and 160 MHz PPDUs."); at [0334] ("Entries are provided in Table 2 to support indication of the allocation of the special center 26 RU in 80 MHz and 160 MHz, shown as column "S-RU" in Table 2. The NA in the S-RU column indicates that there is no assignment of the special center 26 RU. The special center 26 RU in 80 MHz is, for example, the 26-tone RU 1180 shown in FIG. 11."); at [0338] ("In another embodiment, states 83 to 165 in Table 3 are instead mapped to states 128 to 210, respectively. This is equivalent of having a separate bit indication for the special central 26-tone RU and using 7 bits to indicate the rest of the RU assignments in the 8 bit RU allocation unit."); at [0339] ("In embodiments where allocation state about the special center 26 RU is indicated using an RU allocation table value carried in an 8 bit field of RU allocation subfields of an HE-SIG-B1 field and an HE-SIG-B2 field, 8 bit fields of different RU allocation subfields may indicate the allocation state of the special center

26-tone RU for first and second 80 MHz bandwidths, respectively, of an 160 MHz transmission.")

- Wu at [0043] ("In another novel aspect, the middle 26-tone RU for 80 MHz and 160 MHz can be signaled by the common field. A one-bit indication in the HE-SIG-B common filed. If operation BW is 80 MHz, define 1-bit in the common field to indicate whether the middle 26-tone RU is used. This bit duplicates on common field-1 and field-2. If operation BW is 160 Mhz, define 1-bit in the SIG-B channel-1 common field to indicate lower RU, and 1-bit in the SIG-B channel-2 common field to indicate the upper 26-tone RU. FIG. 5 and FIG. 6 illustrate the indication of the middle 26-tone RU. "); at [0047] ("In another embodiment, two user specific fields for middle RU of lower and upper 80 MHz when operation BW is 160 MHz as shown in 620. In yet another embodiment, as shown in 630, two unused indices in the RA LUT are used to indicate whether the middle 26 tone RU for 80 Mhz is assigned.")

- Josiam at [0188] ("Various embodiments of the present disclosure provide for extending multiplexing support to a 160 MHz bandwidth allocation. In this illustrative embodiment, eight 20 MHz segments are mapped to 2 HE-SIG- B channels 3715 and 3720 that are duplicated per 40 MHz for a MU PPDU that spans 160 MHz. The 160 MHz tone plan is built as two concatenated 80 MHz tone plans that are not aligned with 20 MHz segments. Redefining channels A1, B1, C1, D1, A2, B2, C2 and D2 as segments in FIG. 36 to refer to a granularity of subcarriers corresponding to a 242 tones RUs and signal RU arrangements for smaller RU sizes when concatenated span the same space as the 242 tone RUs. The common information portion 3705 for HE-SIG-B channel 1 3715 includes common information for segments A1, C1, A2 and C2 that indicates the RU arrangement up to a granularity of 242 tone RUs in the said segments and the MU-MIMO resources as well as the number of users (if necessary). The common information portion 3705 for segments A1, C1, A2 and C2 are encoded together using a convolutional code. The per-user allocation information portion 3710 follows the common portion where the per-user information for the users whose data are in the RUs of segment A1 are first transmitted followed by the per-user information for the users whose data are in the RUs of segment C1 and then by A2 and C2. The numbers of per-user allocations are derived from the common information for each segment and the total number of per-user allocations is the sum of the allocations derived from the arrangement for each segment.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content channel. The first common portion may include the first indicator. The transmitter may

identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Li at Abstract ("This disclosure describes methods, apparatus, and systems related to a high efficiency SIGNAL field in high efficiency wireless LAN access network. A device may determine at least one communication channel with one or more devices including a first device and a second device. The device may generate a high efficiency preamble in accordance with a high efficiency communication standard, the high efficiency preamble including, at least in part, a first high efficiency SIGNAL field and a second high efficiency SIGNAL field. The device may partition the second high efficiency SIGNAL fields into, at least in part, a common subfield, and one or more device specific subfields. The device may send the high efficiency preamble to at least one of the one or more devices.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU size indicator in combination with the indicated bandwidth to determine what is the

size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Josiam at Abstract ("Methods and apparatuses for scheduling and indicating scheduling information in a wireless local area network (WLAN). A station (STA) includes a transceiver configured to receive a header for a protocol data unit and a controller configured to identify common information for a plurality of STAs that are scheduled in the WLAN from a common field in the header and to identify user-specific information for the STA from a user-specific field in the header that follows the common field. An access point (AP) includes a controller configured to include common information for a plurality STAs that are scheduled in the WLAN in a common field in a header of a protocol data unit, and to include user-specific information for the STAs in a user-specific field in the header that follows the common field. The AP also includes a transceiver configured to transmit the protocol data unit including the header.")

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that

are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF) field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Lee, Wu, Josiam) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate indicating allocation of 26-center tone resource unit using C26 field carried in the HE-SIG-B content for channel 1 and channel 2, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Lee, Wu, Josiam), indicating allocation of 26-center tone resource unit using C26 field carried in the HE-SIG-B content for channel 1 and channel 2 well-known in the art by the time of the Asserted Patent's

claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

As another example, it was well-known to one of skill in the art before the time of the '595 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that "a first C26 field carried in the HE-SIG-B content channel 1 indicates whether a user is allocated to a first center 26-tone resource unit in the first 80 MHz bandwidth, and a second C26 field carried in the HE-SIG-B content channel 2 indicates whether a user is allocated to a second center 26-tone resource unit in the second 80 MHz bandwidth." *See, e.g.*, Lee at [0332], [0334], [0338]- [0339]; Wu at [0043], [0047]; Josiam at [0188]. One of ordinary skill in the art would have been motivated to combine any one or more of the references provided in Exhibits D1-D16 with any one or more of the above exemplary cited references (Lee, Wu, Josiam) to improve the function and utility of the same, and such a combination would have been within that person's skill. For example, each of the these references describe techniques for indicating allocation of 26-center tone resource unit using C26 field carried in the HE-SIG-B content for channel 1 and channel 2:

- Lee at [0332] ("The above embodiment may use additional bits, other than the 8 bits used in the RU allocation table shown in Table 1, to signal the allocation of the special center 26 RU (for example, 26-tone RU 1180 shown in FIG. 11) that is present in 80 MHz and 160 MHz PPDUs."); at [0334] ("Entries are provided in Table 2 to support indication of the allocation of the special center 26 RU in 80 MHz and 160 MHz, shown as column "S-RU" in Table 2. The NA in the S-RU column indicates that there is no assignment of the special center 26 RU. The special center 26 RU in 80 MHz is, for example, the 26-tone RU 1180 shown in FIG. 11."); at [0338] ("In another embodiment, states 83 to 165 in Table 3 are instead mapped to states 128 to 210, respectively. This is equivalent of having a separate bit indication for the special central 26-tone RU and using 7 bits to indicate the rest of the RU assignments in the 8 bit RU allocation unit."); at [0339] ("In embodiments where allocation state about the special center 26 RU is indicated using an RU allocation table value carried in an 8 bit field of RU allocation subfields of an HE-SIG-B1 field and an HE-SIG-B2 field, 8 bit fields of

different RU allocation subfields may indicate the allocation state of the special center 26-tone RU for first and second 80 MHz bandwidths, respectively, of an 160 MHz transmission.")

- Wu at [0043] ("In another novel aspect, the middle 26-tone RU for 80 MHz and 160 MHz can be signaled by the common field. A one-bit indication in the HE-SIG-B common filed. If operation BW is 80 MHz, define 1-bit in the common field to indicate whether the middle 26-tone RU is used. This bit duplicates on common field-1 and field-2. If operation BW is 160 Mhz, define 1-bit in the SIG-B channel-1 common field to indicate lower RU, and 1-bit in the SIG-B channel-2 common field to indicate the upper 26-tone RU. FIG. 5 and FIG. 6 illustrate the indication of the middle 26-tone RU. "); at [0047] ("In another embodiment, two user specific fields for middle RU of lower and upper 80 MHz when operation BW is 160 MHz as shown in 620. In yet another embodiment, as shown in 630, two unused indices in the RA LUT are used to indicate whether the middle 26 tone RU for 80 Mhz is assigned.")

- Josiam at [0188] ("Various embodiments of the present disclosure provide for extending multiplexing support to a 160 MHz bandwidth allocation. In this illustrative embodiment, eight 20 MHz segments are mapped to 2 HE-SIG- B channels 3715 and 3720 that are duplicated per 40 MHz for a MU PPDU that spans 160 MHz. The 160 MHz tone plan is built as two concatenated 80 MHz tone plans that are not aligned with 20 MHz segments. Redefining channels A1, B1, C1, D1, A2, B2, C2 and D2 as segments in FIG. 36 to refer to a granularity of subcarriers corresponding to a 242 tones RUs and signal RU arrangements for smaller RU sizes when concatenated span the same space as the 242 tone RUs. The common information portion 3705 for HE-SIG-B channel 1 3715 includes common information for segments A1, C1, A2 and C2 that indicates the RU arrangement up to a granularity of 242 tone RUs in the said segments and the MU-MIMO resources as well as the number of users (if necessary). The common information portion 3705 for segments A1, C1, A2 and C2 are encoded together using a convolutional code. The per-user allocation information portion 3710 follows the common portion where the per-user information for the users whose data are in the RUs of segment A1 are first transmitted followed by the per-user information for the users whose data are in the RUs of segment C1 and then by A2 and C2. The numbers of per-user allocations are derived from the common information for each segment and the total number of per-user allocations is the sum of the allocations derived from the arrangement for each segment.")

And each of the remaining references provided in Exhibits D1-D16 seek ways of scheduling wireless resources:

- Bharadwaj 129 at Abstract ("Methods, apparatuses, and computer readable media for resource allocation signaling in a high efficiency wireless local area network (WLAN) are disclosed. A transmitter may identify a first indicator identifying a number of multi-user multiple-input/multiple-output (MU-MIMO) stations associated with a first resource unit (RU) in a first content channel of a transmission frame. The transmitter may generate a first common portion of a WLAN signaling field in the first content

channel. The first common portion may include the first indicator. The transmitter may identify a second indicator identifying an absence of MU-MIMO stations associated with a second RU in a second content channel of the transmission frame. The transmitter may generate a second common portion of the WLAN signaling field in the second content channel. The second common portion may include the second indicator. The transmitter may transmit the transmission frame including the WLAN signaling field.")

- Lee at Abstract ("A wireless device receives a frame including a first Resource Unit (RU) allocation subfield including resource information for a first frequency area and indicating a first number of user fields in a first channel that correspond to the first frequency area, and a second RU allocation subfield including resource information for a second frequency area and indicating of a second number of user fields in a second channel that correspond to the second frequency area. When the first and second frequency areas are a same RU, the wireless device determines, using both the RU allocation subfields, a number of users allocated to the same RU. A wireless device generates and transmits a frame including first and second RU allocation subfields as described above. When the first and second frequency area are a same RU, both the RU allocation subfields indicates a number of users allocated to the same RU.")

- Li at Abstract ("This disclosure describes methods, apparatus, and systems related to a high efficiency SIGNAL field in high efficiency wireless LAN access network. A device may determine at least one communication channel with one or more devices including a first device and a second device. The device may generate a high efficiency preamble in accordance with a high efficiency communication standard, the high efficiency preamble including, at least in part, a first high efficiency SIGNAL field and a second high efficiency SIGNAL field. The device may partition the second high efficiency SIGNAL fields into, at least in part, a common subfield, and one or more device specific subfields. The device may send the high efficiency preamble to at least one of the one or more devices.")

- Hedayat at Abstract ("An Access Point (AP) may allocate Resource Units (RUs) of a bandwidth of a Multi-User (MU) frame, including determining that an RU is not allocated to a station; determine a value of an RU Allocation Subfield according to the allocation of the RUs, the value of the RU Allocation Subfield indicating that the RU is not allocated; and generate a High Efficiency Signal B (HE-SIG-B) field including the RU Allocation Subfield in a common info field thereof. An AP may perform an MU transmission by transmitting a length to a station; determining identifiers each having the length; and transmitting an HE-SIG-B field including one of the identifiers to the station after transmitting the length. An AP may perform an MU transmission by allocating RUs and responding to receiving a frame from a station by transmitting a Multi-User Acknowledgement (MU-ACK) frame that includes information on the allocation of the RUs.")

- Bharadwaj 718 at Abstract ("Bits indicating the bandwidth (BW) over which the PPDU is being transmitted is already included in the first WLAN signaling field (e.g. an HE-SIG-A field), so that the receiving station has this information, and may use the RU

size indicator in combination with the indicated bandwidth to determine what is the size of the common block field in the transmitted PPDU frame and what is the minimum RU size to be allocated (e.g. 242 tones, 484 tones, etc.).")

- Chen at Abstract ("Systems, apparatus, and methods to provide an indication of frequency resource unit (RU) allocation from a wireless access point (AP) to one or more station devices (STA) are disclosed. The AP may be configured to generate a protocol data unit including a high efficiency wireless (HEW) preamble that indicates the RU allocation corresponding to each of the STA. The indication of the RU allocation for each of the STA, as disclosed herein, may be encoded in fewer bits than providing a bitmap of the RU allocation for each of the STA. A predetermined RU pattern may be used to map RU (e.g., 26 tone units, 52 tone units, etc.) to a RU allocation index. This RU allocation pattern may be efficiently communicated to each of the STAs in the HEW preamble of the protocol data unit.")

- Kim at [0008] ("Also provided is a method for transmitting bitmap information in a wireless system. In this method, traffic on a plurality of channels may be determined. Bandwidth for the packet may be selected based on traffic and available channel bandwidth. The bandwidth may be divisible into a maximum allowable number of bandwidth units. A bitmap may be generated indicating whether each bandwidth unit is being used. A packet comprising a bitmap may be transmitted on at least one channel. In particular, the order of the bandwidth units in the bitmap may be independent of the actual transmission of the bandwidth units.")

- 802.11ac at Section 22.3.4.8 (disclosing how VHT-SIG-B field is constructed per-user)

- Josiam at Abstract ("Methods and apparatuses for scheduling and indicating scheduling information in a wireless local area network (WLAN). A station (STA) includes a transceiver configured to receive a header for a protocol data unit and a controller configured to identify common information for a plurality of STAs that are scheduled in the WLAN from a common field in the header and to identify user-specific information for the STA from a user-specific field in the header that follows the common field. An access point (AP) includes a controller configured to include common information for a plurality STAs that are scheduled in the WLAN in a common field in a header of a protocol data unit, and to include user-specific information for the STAs in a user-specific field in the header that follows the common field. The AP also includes a transceiver configured to transmit the protocol data unit including the header.")

- Lim at Abstract ("A method for receiving a signal by a station in a wireless LAN system, according to an embodiment of the present invention, comprises the steps of: receiving one of a plurality of per channel SIG-Bs, comprised in a SIG-B field, via a first channel among the transmission bandwidth of a multi-user (MU) frame comprising SIG-B field and data; and receiving the data of the MU frame on a second channel differing from the first channel via which the per channel SIG-Bs have been received. Although any one of the plurality of per channel SIG-Bs is transmitted on the second channel, the data of the MU frame is received by means of the per channel SIG-Bs that

are transmitted on the first channel instead of the per channel SIG-Bs that are transmitted on the second channel.")

- Seok at Abstract ("Methods and apparatus for resource allocation for multiple user transmission in a High Efficiency WLAN (HEW) are described. An embodiment is a method for transmitting a Physical layer Protocol Data Unit (PPDU) by an access point (AP) to a plurality of stations (STAs). The method may include transmitting, to the plurality of STAs, a preamble including a High-Efficiency SIGNAL (HE-SIG) field, an HE-Short Training Field (HE-STF) field and an HE-Long Training Field (HE-LTF) field in the PPDU on a transmission channel; and transmitting, on the transmission channel, a data field including a group addressed frame transmitted in a first subchannel among a plurality of subchannels into which the transmission channel is divided.")

Combining the prior art identified in Exhibits D1-D16 with any one of the above exemplary references (Lee, Wu, Josiam) would have amounted to applying a known technique to a known device ready for improvement to yield predictable results. Furthermore, the prior art and these exemplary references are in the same field of endeavor (e.g., resource scheduling in wireless networks) and given the design needs (e.g., improving techniques for resource scheduling in wireless networks), combined with a finite number of identified, predictable solutions (e.g., expanding beyond existing techniques for resource scheduling in wireless networks), a POSITA would have been motivated to combine the teachings of these references.

Alternatively, each of the references provided in Exhibits D1-D16 alone renders this element obvious, in view of the knowledge and skill of a POSITA. That is, it would have been obvious in the view of one of ordinary skill in the art to add the above limitations to any one or more of the references provided in Exhibits D1-D16. A POSITA would have been motivated to incorporate indicating allocation of 26-center tone resource unit using C26 field carried in the HE-SIG-B content for channel 1 and channel 2, and such a combination would have been within that person's skill. As demonstrated in the exemplary references listed above (Lee, Wu, Josiam), indicating allocation of 26-center tone resource unit using C26 field carried in the HE-SIG-B content for channel 1 and channel 2 well-known in the art by the time of the Asserted Patent's

claimed invention and thus, adding it to any one or more of the references provided in Exhibits D1-D16 would have amounted to applying a known technique to a known device ready for improvement to yield predictable results.

In addition, the prior art also provided sets of finite, identified, predictable solutions for known problems that would have been obvious to those of ordinary skill to try with a reasonable expectation of success. For example, it would have been obvious to one of skill in the art at the time that the disclosures relating to HE-SIG-A and HE-SIG-B that these messages were used to provide resource scheduling parameters to user terminals.

The prior art references provide motivations to combine because they describe the field of the Asserted Patents, teach improvements, explain desired features, and even expressly state that one of skill in the art would be able to apply their teachings to related systems or methods. *See, e.g.*, Bharadwaj 129 at [0234], Lee [0530]-[0537], Li at [00p4], Hedayat 54:63-55:4, Bharadwaj 718 at [0193], Chen at [0136]-[0139], Kim at [0068], 802.11ac at 10-12.

Further, the prior art references provide motivations to combine because they explicitly suggest utilizing the teachings and disclosures of other references.

In accordance with these advances, the prior art could have been combined according to methods known to those of ordinary skill within the field of the ’595 patent to yield predictable results. For example, resource scheduling using a discontinuous channel could have been predictably achieved by one of ordinary skill at the time of the alleged invention. One of ordinary skill in the art would have been aware of these various applications, including methods for resource scheduling using a discontinuous channel. Those of ordinary skill in the art could have employed known techniques to improve similar prior art devices in the same way as claimed in the ’595 patent.

In addition, one of ordinary skill in the art would be motivated to combine the prior art references because the elements found in the Asserted Claims of the ’595 patent are well known in the art. Indeed, the listed inventors of the Asserted Patents admitted as much in the specification of the ’595 Patent. *See*, *e.g*, ’595 patent at 1:30-5:14.

Any reference or combination of references that anticipates or makes obvious an asserted independent claim also makes obvious any asserted claim dependent on that independent claim, as the element of each dependent ’595 patent Asserted Claim was known by a person of ordinary skill at the time of the alleged invention, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, Defendants contend that each Asserted Claim would have been obvious not only by the combinations described in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

In addition to the specific examples of motivation provided above, Defendants reserve the right to rely on the disclosures of the references listed in Appendix D for additional motivation to combine. The above-identified examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendants reserve the right to contend that the above-described motivations to combine apply to other combinations at the appropriate time, *i.e.*, in expert reports regarding invalidity.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix D with any other reference or references listed in Appendix D along with the knowledge of one of ordinary skill in the art to

arrive at the inventions claims in the ’595 patent. For example, and without limitation, the Asserted Claims of the ’595 patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

Patent No. or Title (Primary Inventor/Author)	**In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))**
Bharadwaj 129	• Asserted Patents Admitted Prior Art (APA) • Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, 802.11ac3, Lim, or Wu • Knowledge of a person of ordinary skill
Lee	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Lim, Wu, or 802.11ac • Knowledge of a person of ordinary skill
Li	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Lim, Wu, or 802.11ac • Knowledge of a person of ordinary skill
Hedayat	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Bharadwaj 718, Chen, Kim, Josiam, Lim, Wu, or 802.11ac • Knowledge of a person of ordinary skill
Bharadwaj 718	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Chen, Kim, Josiam, Lim, Wu, or 802.11ac • Knowledge of a person of ordinary skill
Chen	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Kim, Josiam, Lim, Wu, 802.11ac, 802.11-15 1304r1, 802.11-14 1437r1, 802.11-16 0045r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill
Kim	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Josiam, Lim, Wu, 802.11ac, 802.11-15 1304r1, 802.11-14 1437r1, 802.11-16 0045r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Josiam	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Lim, Wu, 802.11ac, 802.11-15 1304r1, 802.11-14 1437r1, 802.11-16 0045r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill
Lim	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Wu, 802.11ac, 802.11-15 1304r1, 802.11-14 1437r1, 802.11-16 0045r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill
Wu	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Lim, 802.11ac, 802.11-15 1304r1, 802.11-14 1437r1, 802.11-16 0045r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill
802.11ac	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Lim, Wu, 802.11-15 1304r1, 802.11-14 1437r1, 802.11-16 0045r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill
802.11-15 1304r1	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Lim, Wu, 802.11ac, 802.11-14 1437r1, 802.11-16 0045r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill
802.11-14 1437r1	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Lim, Wu, 802.11ac, 802.11-15 1304r1, 802.11-16 0045r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
802.11-16 0045r1	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Lim, Wu, 802.11ac, 802.11-15 1304r1, 802.11-14 1437r1, or 802.11-15 1066r0 • Knowledge of a person of ordinary skill
802.11-15 1066r0	• Asserted Patents Admitted Prior Art (APA) • Bharadwaj 129, Lee, Li, Hedayat, Bharadwaj 718, Chen, Kim, Josiam, Lim, Wu, 802.11ac, 802.11-15 1304r1, 802.11-14 1437r1, or 802.11-16 0045r1 • Knowledge of a person of ordinary skill

As mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. Moreover, the exemplary combinations are provided based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a *Markman* Order has not yet been issued in this case. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

5. U.S. Patent No. 11,116,035

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix E the prior art references that render obvious the Asserted Claims of the '035 patent and include below exemplary combinations showing the obviousness of the '035 patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix E, the limitation would have been obvious in light of the

disclosures within the reference and the knowledge of one of skill in the art at the time of the '035 patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix E, such reference may be combined with any other references listed in Appendix E for such element, thereby rendering the claims invalid for obviousness.

To the extent a finder of fact determines that a limitation of any of the '035 patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '035 patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a) Obviousness Rationale

For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix E along with the knowledge of one of ordinary skill in the art to meet the limitations of the '035 patent Asserted Claims. Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '035 patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and

in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

One or more combinations of the prior art references identified in Appendix E would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix E would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the

marketplace; the existence of a known problem for which there was an obvious solution encompassed by the ’035 patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix E is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Additionally, it would have been obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix E because all of these references relate to the same area of technology and/or are analogous art. The ’035 patent Asserted Claims are directed to switching of parameters for uplink multiuser transmission. *See e.g.*, ’035 patent at 12:35-62; 19: 35-42; FIGS. 6, 14, 15; claims 1 and 8. The prior art references generally relate to IEEE 802.11 wireless local area network technology. The references, like the ’035 patent, are also reasonably pertinent to wireless communications issues in the media access control (MAC) layer or issues related to uplink OFDMA or multiuser communications.

Similarly, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix E because all of these references are works of people in the same technical field. For example, many of the authors of the prior art references are members of the same IEEE 802.11ax High Efficiency (HE) working group. *See e.g.*, IEEE 802.11-16/0024r1 ("Stacey 0024") (identifying authors of prior art references, such as Stacey, Cariou, Merline, Jeongki Kim, Wentink). Moreover, one of ordinary skill in the art would have recognized that members of an IEEE working group frequently collaborate with, and build on, each other's work. Thus, one of ordinary skill in the art would have recognized that the works by people that are in the same IEEE working group are likely compatible or otherwise work harmoniously when combined.

The '035 patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the '035 patent Asserted Claims.

All of the '035 patent Asserted Claims are directed to switching of parameters for uplink multiuser transmission. Such technology, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, was widely known before the alleged priority date of the '035 Patent, as evidenced by the references in Appendix E. *See*, *e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for

Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 13-16, 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19, Claims 1, 3, 8, 12; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2017/0325264 ("Cherian 264") at [0006], [0021]-[0022], [0032], [0053]-[0065], [0067]-[0068], Claims 1, 3, 8, 12; US 2017/0223730 ("Jiang 730") at [0053]-[0057], [0063]-[0064], [0072], [0079], Figure 3, Figure 4, Figure 5, Figure 6.

One of ordinary skill in the art would have been motivated to combine any of the references in Appendix E because at the time of the alleged invention inefficiency associated with uplink multiuser (UL MU) transmissions in a wireless communication system was a common problem with a well-known solution. In particular, common problems (e.g., inefficiency) with conventional techniques for uplink multiuser transmission in a wireless communication system were known to persons of ordinary skill in the art and utilizing a different set of EDCA parameters for non-access-point stations engaged in uplink multiuser transmissions (e.g., that lowers channel access probability) was a well-known solution to achieve improved performance. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg.

6-8; US 9,585,166 (“Seok 166”) at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) at pg. 1-4; IEEE P802.11 802.11-15/0132r15 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) at pg. 36; IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) at pg. 46; IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) at pg. 13-16, 18, 20; IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) at pg. 2-3, 6-8; US 2017/0245261 (“Cariou 261”) at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 (“Merlin 500”) at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6; US 2018/0146476 A1 (Kim ’476) at [0083]-[0084]; US 2016/0128102 A1 (“Jauh ’102”) at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 (“Carious 572”) at [0121], Figure 16, Figure 17, Figure 18, Figure 19, Claims 1, 3, 8, 12; US 2011/0235596 (“Wentink 596”) at [0056]-[0058], Figure 6; US 2017/0325264 (“Cherian 264”) at [0006], [0021]-[0022], [0032], [0053]-[0065], [0067]-[0068], Claims 1, 3, 8, 12; US 2017/0223730 (“Jiang 730”) at [0053]-[0057], [0063]-[0064], [0072], [0079], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the ’035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, a wireless communication terminal that wirelessly communicates with a base wireless communication terminal. *See, e.g.*, “Proposed spec text for MU EDCA parameters,” Resolution for CID 9058 and 9075 (“Cariou 1180”) at pg. 7-8; US 9,585,166 (“Seok 166”) at 3:1-11, 3:27-38, 3:39-48, 3:48-55, 3:55-67, Figure 1; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in

IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 33-34, 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 43-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 12; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0009], Figure 1; 827 Provisional (This is cited as a see also in Caribou 261); US 2016/0198500 ("Merlin 500") at [0008]-[0018], [0031], [0036]-[0037], [0038]-[0040], [0044]-[0045], Figure 1, Figure 2; US 2018/0146476 A1 (Kim '476) at [0001]-[0005], [0007], [0014], [0016], [0035]-[0039], [0042], [0046]-[0050], [0054]-[0055], [0058], [0061], [0069]-[0071], [0114], Figure 1, Figure 2, Figure 3, Figure 4; US 2016/0128102 A1 ("Jauh '102") at Abstract, [0007], [0022], [0024]-[0026], [0027], Figure 1, Figure 2, Figure 3; US 2018/0352572 ("Carious 572") at [0026]-[0028], [0110], [0112], [0120], [0124], Figure 1, Figure 16, Figure 17, Figure 18, Figure 19; CN 102958185 ("Huawei 185"); US 2011/0235596 ("Wentink 596") at [0033], [0050]-[0053], Figure 1, Figure 4; US 2017/0325264 ("Cherian 264") at [0031]-[0032], Figure 1; 745 Provisional at [0025]-[0026] and FIG. 1 (This is cited as a see also in Cherian); US 2017/0223730 ("Jiang 730") at [0019], Figure 1.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a wireless communication terminal included a transceiver. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 7-8; US 9,585,166 ("Seok 166") at 3:27-38, 3:39-48, 3:48-55, 3:55-67, Claim 3, Figure 1; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks

("Takabi") at pg. 2-3; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 3-4, 33-36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 43-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 12; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0009], [0022]-[0046], [0056]-[0057], [0065]-[0066], Figure 1, Figure 4, Figure 5; US 2016/0198500 ("Merlin 500") at [0054]- [0055], [0118], Figure 1, Figure 2, Figure 3; US 2018/0146476 A1 (Kim '476) at [0114], Figure 15; US 2016/0128102 A1 ("Jauh '102") at [0025], Figure 1, Figure 2; US 2018/0352572 ("Carious 572") at [0132], [0161], [0168], [0205], Figure 20; US 2011/0235596 ("Wentink 596") at [0037]-[0047], Figure 2, Figure 3; US 2017/0325264 ("Cherian 264") at [0038], Figure 8; US 2017/0223730 ("Jiang 730") at [0028], Figure 1.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a wireless communication terminal included a processor. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 7-8; US 9,585,166 ("Seok 166") at 10:28-41, 3:27-38, 3:39-48, 3:48-55, 3:55-67, Claim 3, 10:28-35, Figure 1; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 3, 33-36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 43-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 12; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at

[0009], [0022]-[0046], [0057], [0065]-[0066], Figure 1, Figure 4, Figure 5; US 2016/0198500 ("Merlin 500") at [0050], [0053], [0055], [0117], [0119]-[0127], Figure 1, Figure 2, Figure 3, Figure 5, Figure 7; US 2018/0146476 A1 (Kim '476) at [0114], Figure 15; US 2016/0128102 A1 ("Jauh '102") at [0025], [0026], Figure 1, Figure 2; US 2018/0352572 ("Carious 572") at [0130]-[0135], [0139], [0160], [0161], [0166], [0167], [0168], Figure 20; US 2011/0235596 ("Wentink 596") at [0037]-[0047], [0071], Figure 2, Figure 3; US 2017/0325264 ("Cherian 264") at [0038], [0042]-[0043], Figure 2; US 2017/0223730 ("Jiang 730") at [0028], Figure 1.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to transmit, to a base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) using a transceiver. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:63-66, 5:5-9; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 3, 9, 28-29, 33-34, 36, 42-44; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 10, 17, 18, 43-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 12; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0015]-[0016], [0021], Figure 2, Figure 3; US 2016/0198500 ("Merlin 500") at Abstract, [0010], [0012], [0014], [0016], [0018], [0031], [0038], [0059], [0062]-[0064], [0067]-[0068], [0088]-[0090], [0094]-[0095], [0104]-[0105], [120], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7; US 2018/0146476 A1 (Kim '476) at [0069]-

[0071], [0083], [0087], [0090]-[0093], [0099]-[0110], Figure 5, Figure 6, Figure 10, Figure 13, Figure 14; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0029], [0032], [0034]-[0035], [0038]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0110]-[0112], [0120]-[0128], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2017/0325264 ("Cherian 264") at [0053]-[0056], [0060]-[0061], [0067]-[0072], [0076]-[0078], [0080]-[0085], Claims 1, 8, 9, 10, 11, 19, 20, 21, 27, 28, 29; US 2017/0223730 ("Jiang 730") at [0035], [0041]-[0045], [0060]-[0062], Figure 2, Figure 3.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 13-16, 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500

("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19, Claims 1, 3, 8, 12; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2017/0325264 ("Cherian 264") at [0006], [0021]-[0022], [0032], [0053]-[0065], [0067]-[0068], Claims 1, 3, 8, 12; US 2017/0223730 ("Jiang 730") at [0053]-[0057], [0063]-[0064], [0072], [0079], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends,. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 35; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 32, 27-28; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 17, 21; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-

[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim ’476) at [0083]-[0084]; US 2016/0128102 A1 (“Jauh ’102”) at [0039], Figure 7; US 2018/0352572 (“Carious 572”) at [0121], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 (“Wentink 596”) at [0059], Figure 6; US 2017/0325264 (“Cherian 264”) at [0056], [0061], [0067]-[0068], [0076], [0078]-[0082], Claim 11; US 2017/0223730 (“Jiang 730”) at [0039], [0058]-[0059], [0064], [0070], [0078], [0085]-[0087], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the ’035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, to when the MPDU included in the trigger-based PPDU requests the immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received. *See, e.g.*, “Proposed spec text for MU EDCA parameters,” Resolution for CID 9058 and 9075 (“Cariou 1180”) at pg. 6-8; US 9,585,166 (“Seok 166”) at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) at pg. 1-4; IEEE P802.11 802.11-15/0132r15 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) at pg. 35; IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) at pg. 32, 27-28; IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) at pg. 17, 21; IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) at pg. 2-3, 6-8; US 2017/0245261 (“Cariou 261”) at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 (“Merlin 500”) at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim ’476) at [0083]-[0084]; US 2016/0128102 A1 (“Jauh ’102”) at [0027]-[0038], [0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 8; US 2018/0352572

("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0059], Figure 6; US 2017/0325264 ("Cherian 264") at [0056], [0061], [0067]-[0068], [0076], [0078]-[0082], Claim 11; US 2017/0223730 ("Jiang 730") at [0039], [0058]-[0059], [0064], [0070], [0078], [0085]-[0087], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to when the second parameter set timer expires, terminate an application of the second parameter set. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 31, 33; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 17, 21; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0051]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8' US 2018/0352572 ("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2018/0352572 ("Carious 572") at [0056], [0061], [0067]-[0068], [0076], [0078]-[0082], Claim 11' US 2017/0223730 ("Jiang 730") at [0058], [0064], [0066],

[0088], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the ’035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, to access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set. *See, e.g.*, “Proposed spec text for MU EDCA parameters,” Resolution for CID 9058 and 9075 (“Cariou 1180”) at pg. 6-8; US 9,585,166 (“Seok 166”) at 1:20-24, 1:54-63, 2:13-18, 2:37-40, 4:19-26, 4:27-35, 4:36-41, 4:42-45, 4:49-52, 5:5-9, 5:9-16, 5:17-20, 5:21-26, 5:27-29, 5:30-35, 5:36-42, 5:43-46, 6:35-44, 6:44-49, 6:59-67, 8:3-9, Figure 2, Figure 3, Figure 4, Figure 5; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) at pg. 1-4; IEEE P802.11 802.11-15/0132r15 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) at pg. 36; IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) at pg. 44, 46; IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) at pg. 13, 15-16, 18, 20; IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) at pg. 2-3, 6-8; US 2017/0245261 (“Cariou 261”) at Abstract, [0019]-[0021], [0047], [0051]-[0055], [0057]-[0059], [0061]; US 2016/0198500 (“Merlin 500”) at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim ’476) at [0005], [0014], Figure 5, Figure 6, Figure 10, Figure 13, Figure 14; US 2016/0128102 A1 (“Jauh ’102”) at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 (“Carious 572”) at [0036]-[0048], Figure 2; US 2011/0235596 (“Wentink 596”) at [0053], [0056]-[0058], Figure 6; US 2018/0352572 (“Carious 572”) at [0053]-[0056], [0060]-[0061], [0067]-[0072], [0076]-[0078], [0080]-[0085], Claims 1, 8, 9, 10, 11, 19, 20, 27, 28, 29; US 2017/0223730

("Jiang 730") at [0058], [0063]-[0064], [0066], [0068], [0071], [0072], [0074], [0075], [0081], [0084], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the MPDU included in the trigger-based PPDU is a QoS data frame. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 8; US 9,585,166 ("Seok 166") at 5:9-26, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 31, 34-35, 42; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 10, 32, 27-28, 44-45; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 24; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 6; US 2017/0245261 ("Cariou 261") at [0015]-[0016], [0021], Figure 2, Figure 3; US 2016/0198500 ("Merlin 500") at [0081]-[0082], [0105]; US 2018/0146476 A1 (Kim '476) at [0069]-[0071], [0083], [0087], [0090]-[0093], [0099]-[0110], Figure 5, Figure 6, Figure 10, Figure 14; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0029]; US 2018/0352572 ("Carious 572") at [0110]-[0112], [0120]-[0128], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0058]; US 2018/0352572 ("Carious 572") at [0049], [0073]-[0075]; US 2017/0223730 ("Jiang 730") at [0035], [0041]-[0045], [0060]-[0062], Figure 2, Figure 3.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to receive a beacon frame from the base wireless communication terminal. *See, e.g.*,

"Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 1:39-41, 6:1-15, 7:14-22, 10:1-5, 10:4-41, Figure 3, Figure 4, Figure 7; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 19, 45, 52; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 6; US 2017/0245261 ("Cariou 261") at [0053], [0062]-[0063]; US 2016/0198500 ("Merlin 500") at [0076]-[0079]; US 2018/0146476 A1 (Kim '476) at [0054]-[0055]; US 2016/0128102 A1 ("Jauh '102") at [0028], [0033], Figure 3; US 2018/0352572 ("Carious 572") at [0046], [0057]; US 2011/0235596 ("Wentink 596") at [0049]; US 2017/0223730 ("Jiang 730") at [0059].

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to obtain information indicating a period of the second parameter set timer from the beacon frame. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 1:39-41, 6:1-15, 7:14-22, 10:1-5, 10:4-41, Figure 3, Figure 4, Figure 7; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 19, 45, 52; IEEE

802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 6; US 2017/0245261 ("Cariou 261") at [0053], [0062]-[0063]; US 2016/0198500 ("Merlin 500") at [0076]-[0079]; US 2018/0146476 A1 (Kim '476) at [0054]-[0055]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0046], [0057]; US 2011/0235596 ("Wentink 596") at [0049]; US 2018/0352572 ("Carious 572") at [0056], [0061], [0067]-[0068], [0076], [0078]-[0082], Claim 11; US 2017/0223730 ("Jiang 730") at [0059].

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to calculate a random integer value within a contention window (CW). *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:19-26, 4:27-35, 4:36-41, 4:42-45, 4:45-49, 4:49-52, 5:36-42, 5:51-60, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0012]-[0013], [0054]-[0055]; US 2016/0198500 ("Merlin 500") at [0075], [0077], [0098], [0101]; US 2018/0146476 A1 (Kim '476) at [0076]- [0077]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572

("Carious 572") at [0042]; US 2011/0235596 ("Wentink 596") at [0054], Figure 5; US 2018/0352572 ("Carious 572") at [0020], [0048]; US 2017/0223730 ("Jiang 730") at [0049].

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to set a backoff timer based on the random integer value. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 4:36-41, 4:45-49, 4:49-52, 4:52-57, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 32, 44; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0012]-[0013], [0054]-[0055]; US 2016/0198500 ("Merlin 500") at [0090], [0094]; US 2018/0146476 A1 (Kim '476) at [0078]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0042]-[0043]; US 2011/0235596 ("Wentink 596") at [0054], Figure 5; US 2018/0352572 ("Carious 572") at [0020], [0048]; US 2017/0223730 ("Jiang 730") at [0049].

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to access the channel based on the back off timer and a predetermined slot time. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou

1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 1:20-24, 1:45-54, 1:54-63, 1-2:63-3, 2:13-18, 4:13-18, 4:19-26, 4:27-35, 4:36-41, 4:42-45, 4:45-49, 4:49-52, 4:52-57, 5:5-9, 5:9-16, 5:17-20, 5:21-26, 5:27-29, 5:30-35, 5:36-42, 5:43-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 32, 45-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0012]-[0013], [0054]-[0055]; US 2016/0198500 ("Merlin 500") at [0075], [0077], [0090]-[0093], [0098], [0101], [0109]; US 2018/0146476 A1 (Kim '476) at [0076]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0042]-[0043]; US 2011/0235596 ("Wentink 596") at [0054], Figure 5; US 2018/0352572 ("Carious 572") at [0020], [0027], [0036], [0048]; US 2017/0223730 ("Jiang 730") at [0017], [0044], [0048]-[0051], [0053]-[0058], Figure 3.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW, or that if a value of the CW is greater than the maximum value (CWmax) of the CW according to a priority of the data to be transmitted, to set the value of the CW to the CWmax. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 4:36-41,

4:42-45, 4:45-49, 4:49-52, 4:52-57, 4:57-63, 5:5-9, 5:9-16, 5:17-20, 5:21-26, 5:27-29, 5:30-35, 5:36-42, 5:43-46; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0012]-[0013], [0054]-[0055]; US 2016/0198500 ("Merlin 500") at [0075], [0077], [0098], [0101]; US 2018/0146476 A1 (Kim '476) at [0076]-[0077]; US 2016/0128102 A1 ("Jauh '102") at [0034], [0036]- [0037], Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0040], [0041], [0044], [0056]; US 2011/0235596 ("Wentink 596") at [0054], Figure 5; US 2018/0352572 ("Carious 572") at [0077]-[0082]; US 2017/0223730 ("Jiang 730") at [0049], [0050], [0055], [0057].

In addition, the prior art also provided sets of finite, identified, predictable solutions for known problems that would have been obvious to those of ordinary skill to try with a reasonable expectation of success. For example, one of skill in the art at the time would have recognized that uplink frames transmitted by a non-access-point station to an access point could either (1) require an immediate response from the access point or (2) not require an immediate response from the access point. Given this finite choice, in stations that sets a second parameter timer upon receiving an immediate response from the access point, it would have been obvious to one of skill in the art at the time to try and modify such stations such that, if the transmitted frame does not require an immediate response from the access point, the stations do not wait for the immediate response

before setting the second parameter timer. Such a modification would have yielded the predictable result of the station being able to accommodate transmission of both types of frames for uplink multiuser communications.

In another example, one of ordinary skill in the art at the time would have recognized that, after transmitting a frame that does not require an immediate response, a finite number of time points for setting the second parameter timer existed: (1) after the transmission of the frame ends, or (2) after a predetermined amount of time. Given this finite choice, after transmitting a frame that does not require an immediate acknowledgement from an access point, it would have been obvious to one of skill in the art at the time to try and modify systems to set the second parameter timer after the transmission of the frame ends.

In yet another example, as noted above, common problems (e.g., inefficiency) with conventional techniques for uplink multiuser transmission in a wireless communication system were known to persons of ordinary skill in the art. One of ordinary skill in the art would have recognized that improving the communications efficiency in an uplink multiuser transmission would have required either (1) an access point to raise its priority/probability for accessing a channel, and/or (2) non-access-point station to be constrained in accessing the channel. *See e.g.*, IEEE 802.11-16/0998r1 ("Cariou 0998") ("To ensure overall improved HE STAs performance, we need to ensure that the access delay for trigger frame transmissions is short and there are no collisions. This can be achieved by the combination of: Increasing AP channel access. Decreasing STAs EDCA access when scheduled."). Given this finite number of solutions, it would have been obvious to one of ordinary skill in the art at the time to try and modify stations to reduce its probability of accessing the channel or otherwise constrain its channel access (e.g., using a different set of EDCA parameters) for uplink multiuser communications to improve

communications efficiency.

In yet another example, one of ordinary skill in the art would have recognized that a finite number of ways exist in implementing a different EDCA parameters for uplink multiuser transmission. One of ordinary skill in the art would have recognized the EDCA parameters could be applied (1) for a predetermined amount of time before reverting to the original or legacy EDCA parameters, or (2) until AP instructs the non-AP to revert back to the original or legacy EDCA parameters. Given this finite number of solutions, it would have been obvious to one of ordinary skill in the art at the time to try and modify stations to revert to the original or legacy EDCA parameters after a predetermined amount of time. A person of ordinary skill in the art would have recognized that a timer is a known technique for determining when a predetermined amount of time has passed. Moreover, a finite number of starting time for such a timer exists: (1) after receiving the trigger frame, (2) after sending out a responsive PPDU, or (3) after receiving an acknowledgement from the AP responding to the transmitted PPDU. Given this finite number of choices for starting the timer, it would have been obvious to one of ordinary skill in the art at the time to try and modify stations to start the timer after receiving an acknowledgement from the AP when the PPDU requests requires an immediate response and after sending out a responsive PPDU when the PPDU does not request an immediate response. Furthermore, one of ordinary skill in the art would have recognized that waiting for a response when an immediate response is requested provides the assurance that the AP is in the condition to receive uplink multiuser transmissions from non-AP. However, one of ordinary skill in the art would have also recognized that waiting for a response when an immediate response is not requested may cause the station to be in the uplink multiuser transmission mode longer than necessary because the start time for the timer is delayed.

In yet another example, one of ordinary skill in the art would have recognized that a finite number of ways exist to ensure that the contention window does not exceed the maximum value (i.e., CWmax). When doubling (or any other method of increasing the value in accordance with a back off procedure) a contention window value would result in a contention window value that exceeds CWmax, one of ordinary skill in the art would have recognized that, to prevent the contention window value from exceeding CWmax, the device would either (1) not double the current contention window value and keep the contention window value at the same level, or (2) set the contention window to be CWmax instead of doubling the contention window value. Given this finite number of solutions, it would have been obvious to one of ordinary skill in the art at the time to try and modify the devices to set the contention window to be CWmax if doubling the current contention window value would result in a value that exceeds CWmax. The prior art references provide motivations to combine because they describe the field of the Asserted Patents, teach improvements, explain desired features, and even expressly state that one of skill in the art would be able to apply their teachings to related systems or methods. *See, e.g.*, Seok 166 at 10:36-41 ("While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.").

Further, the prior art references provide motivations to combine because they explicitly suggest utilizing the teachings and disclosures of other references.

In accordance with these advances, the prior art could have been combined according to methods known to those of ordinary skill within the field of the '035 patent to yield predictable results. Those of ordinary skill in the art could have employed known techniques to improve

similar prior art devices in the same way as claimed in the ’035 patent.

For example, as noted above, one of ordinary skill in the art would have recognized that improving the communications efficiency in an uplink multiuser transmission would have required either (1) an access point to raise its priority access channel, and/or (2) non-access-point station to be constrained in accessing channel. *See e.g.*, IEEE 802.11-16/0998r1 (“Cariou 0998”) (“To ensure overall improved HE STAs performance, we need to ensure that the access delay for trigger frame transmissions is short and there are no collisions. This can be achieved by the combination of: Increasing AP channel access. Decreasing STAs EDCA access when scheduled.”). It was known that EDCA parameters could be used to either constrain or promote a station’s access to a channel. *See, e.g.*, IEEE 802.11-16/0963r3 (“Ma 0963”) (“AP broadcasts EDCA parameters to constrain associated STAs from accessing channel for a certain period.”). Thus, it would have been obvious to one of ordinary skill in that art that apply this known technique to constrain a station’s access to a channel during uplink multiuser communications to yield the predictable effect of improving communications efficiency.

In addition, one of ordinary skill in the art would be motivated to combine the prior art references because the elements found in the Asserted Claims of the ’035 patent are well known in the art. Indeed, the listed inventors of the Asserted Patents admitted as much in the specification of the ’035 Patent. *See* ’035 patent at 1:37-2:67.

Moreover, it would have been obvious to one of ordinary skill in the art at the time to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specifications, technical submissions, working group meeting presentations) with a system implementing an older IEEE standard such as IEEE 802.11ac or a draft standard. For example, one of ordinary skill in the art would have been

motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process with a real wireless communications hardware/device to yield a working wireless communication system with the improvements and benefits offered by the new standard. In another example, one of ordinary skill in the art would have been motivated to simply substitute an older version of a wireless module implemented on a wireless device/hardware with one implementing a newer version of the standard that addresses the shortcomings of the older standard. In yet another example, one of ordinary skill in the art would have been motivated to apply the known techniques disclosed in the documents submitted as part of the IEEE 802.11ax standard development process to an older wireless communications system implementing IEEE 802.11ac to yield the predictable results of improved wireless communication performance. Further, one of ordinary skill in the art would have been prompted by the teachings in the documents submitted as part of the IEEE 802.11ax standard development process to modify the wireless communications hardware/device to meet market demands for improved wireless performance.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (e.g., working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of a reference pertaining to hardware/devices (*e.g.*, non-access-point stations) for wireless communications (*e.g.*, wireless local area network (WLAN)). For instance, a person of ordinary skill would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process—which generally address narrow technical issues and solutions—with references disclosing WLAN devices and hardware more broadly (*e.g.*, devices with transceivers and configurable processors) to yield a blueprint for a working device that addresses the technical problem disclosed in the IEEE 802.11ax standard

development document. Such a combination amounts to combining known prior art elements according to known methods to yield predictable results. Further, to the extent any prior art WLAN devices/hardware documents disclose deficiencies or technical issues with the state of the art, one of ordinary skill in the art would have been prompted to combine these references with the teachings in documents submitted as part of the IEEE 802.11ax standard development process to meet market demands for improved wireless performance. This disclosure of deficiencies and/or technical issues would provide a teaching, suggestion, or motivation for a person of ordinary skill to modify the prior art reference based on the IEEE 802.11ax standard working documents.

In another example, a person of ordinary skill would have been motivated to combine teachings of a reference disclosing EDCA parameters set with teachings of a reference disclosing that EDCA parameters set that include CWmin and/or CWmax. Such a combination amounts to substitution of one known element (e.g., EDCA parameter set) for another (EDCA parameter set that includes CWmin and/or CWmax) to obtain predictable results of being able to leverage backoff procedures that use CWmin and/or CWmax. Likewise, a person of ordinary skill would have been motivated to combine teachings of a reference disclosing a backoff procedure that uses CWmin and/or CWmax with a reference disclosing that, when doubling the contention window value would resulting in a value that exceeds CWmax, the contention window value is maintained at or set to CWmax, rather than letting the contention window value exceed CWmax. This amounts to use of known technique (i.e., maintaining the contention window value at CWmax if doubling the current value would exceed CWmax) to improve similar method (i.e., contention window backoff procedure) in the same way.

In yet another example, a person of ordinary skill would have been motivated to combine teachings of a reference disclosing transmission of PPDUs with teachings of a reference disclosing

that a PPDU can include a QoS data frame. Such a combination amounts to substitution of one known element (e.g., PPDU) for another (PPDU that includes a QoS Data Frame) to obtain predictable results of being transmit data with Quality-of-Service considerations and/or enable QoS features in an 802.11 network.It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of another document submitted as part of IEEE 802.11ax standard development process. For instance, considering the common underlying technical subject matter of the IEEE 802.11ax standard development documents, it would be obvious to one of ordinary skill to try combining the teachings of multiple documents. In doing so, a person of ordinary skill would have a reasonable expectation of success. Moreover, given the common goals and design incentives among authors of IEEE 802.11ax standard development documents (*e.g.*, improving WLAN device performance), a person of ordinary skill would find it obvious to combine the technical solutions disclosed in multiple IEEE 802.11ax standard development documents. Further, given the additive nature of the IEEE standard development process, a person of ordinary skill would have understood that various IEEE 802.11ax standard development documents could be combined to create a cohesive solution. Thus, a person of ordinary skill would have a reasonable expectation of success in combining the teachings in these documents.

Any reference or combination of references that anticipates or makes obvious an asserted independent claim also makes obvious any asserted claim dependent on that independent claim, as the element of each dependent ’035 patent Asserted Claim was known by a person of ordinary skill at the time of the alleged invention, at least partially based on, but not limited by, the claim

constructions implicit in Plaintiff's infringement contentions, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, Defendants contend that each Asserted Claim would have been obvious not only by the combinations described in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

In addition to the specific examples of motivation provided above, Defendants reserve the right to rely on the disclosures of the references listed in Appendix E for additional motivation to combine. The above-identified examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendants reserve the right to contend that the above-described motivations to combine apply to other combinations at the appropriate time, *i.e.*, in expert reports regarding invalidity.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix E with any other reference or references listed in Appendix E along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '035 patent. For example, and without limitation, the Asserted Claims of the '035 patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180")	• US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 9,585,166 (“Seok 166”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0245261 (“Cariou 261”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0198500 (“Merlin 500”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2018/0146476 A1 (Kim '476)	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0128102 A1 (“Jauh ’102”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2018/0352572 (“Carious 572”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

CN 102958185 (“Huawei 185”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”) • IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
	window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2011/0235596 (“Wentink 596”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0325264 (“Cherian 264”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0223730 (“Jiang 730”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-2012 and/or 802.11ac Specification	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-2012 and/or 802.11-2016 Specification	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0208625 (“Choi 625”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0048048 (“Seok 048”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0202023 (“Zhou 023”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425)	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 & 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2018/0034595 ("Kim 595")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 & 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")

As mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. Moreover, the exemplary combinations are provided based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a *Markman* Order has not yet been issued in this case. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

6. U.S. Patent No. 11,516,879

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix F the prior art references that render obvious the Asserted Claims of the '879 patent and include below exemplary combinations showing the obviousness of the '879 patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix F, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of skill in the art at the time of the '879 patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix F, such reference may be combined with any other references listed in Appendix F for such element, thereby rendering the claims invalid for obviousness.

To the extent a finder of fact determines that a limitation of any of the '879 patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '879 patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known

methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a) Obviousness Rationale

For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix F along with the knowledge of one of ordinary skill in the art to meet the limitations of the '879 patent Asserted Claims. Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '879 patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

One or more combinations of the prior art references identified in Appendix F would have

been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix F would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '879 patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix F is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or

products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Additionally, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix F because all of these references relate to the same area of technology and/or are from analogous art. The '879 patent Asserted Claims are directed to switching of parameters for uplink multiuser transmission. '879 patent at 12:35-62; 19:35-43l; FIG. 6, 14, and 15. The references, like the '879 patent, are also reasonably pertinent to wireless communications issues in the MAC layer or issues related to uplink OFDMA or multiuser communications.

Similarly, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix F because all of these references are works by people in the same technical field. For example, many of the authors of the prior art references are members of the same IEEE 802.11ax High Efficiency (HE) working group. *See e.g.*, IEEE 802.11-16/0024r1 ("Stacey 0024") (identifying authors of prior art references, such as Stacey, Cariou, Merline, Jeongki Kim, Wentink). Moreover, one of ordinary skill in the art would have recognized that members of an IEEE working group frequently collaborate with, and build on, each other's work. Thus, one of ordinary skill in the art would have recognized that the works of the same IEEE working group are likely compatible or otherwise work harmoniously when combined.

The '879 patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art,

the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the '879 patent Asserted Claims.

All of the '879 patent Asserted Claims are directed to switching of parameters for uplink multiuser transmission. Such technology, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, was widely known before the alleged priority date of the '879 Patent, as evidenced by the references in Appendix F. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 13-16, 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19, Claims 1, 3, 8, 12; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2017/0325264 ("Cherian 264") at [0006], [0021]-[0022], [0032],

[0053]-[0065], [0067]-[0068], Claims 1, 3, 8, 12; US 2017/0223730 ("Jiang 730") at [0053]-[0057], [0063]-[0064], [0072], [0079], Figure 3, Figure 4, Figure 5, Figure 6.

One of ordinary skill in the art would have been motivated to combine any of the references in Appendix F because at the time of the alleged invention inefficiency associated with uplink multiuser (UL MU) transmissions in a wireless communication system was a common problem with a well-known solution. In particular, common problems (e.g., inefficiency) with conventional techniques for uplink multiuser transmission in a wireless communication system were known to persons of ordinary skill in the art and utilizing a different set of EDCA parameters for non-access-point stations engaged in uplink multiuser transmissions (e.g., that lowers channel access probability) was a well-known solution to achieve improved performance. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 13-16, 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0121],

Figure 16, Figure 17, Figure 18, Figure 19, Claims 1, 3, 8, 12; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2017/0325264 ("Cherian 264") at [0006], [0021]-[0022], [0032], [0053]-[0065], [0067]-[0068], Claims 1, 3, 8, 12; US 2017/0223730 ("Jiang 730") at [0053]-[0057], [0063]-[0064], [0072], [0079], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, a wireless communication terminal that wirelessly communicates with a base wireless communication terminal. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 7-8; US 9,585,166 ("Seok 166") at 3:1-11, 3:27-38, 3:39-48, 3:48-55, 3:55-67, Figure 1; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 33-34, 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 43-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 12; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0009], Figure 1; 827 Provisional (This is cited as a see also in Caribou 261); US 2016/0198500 ("Merlin 500") at [0008]-[0018], [0031], [0036]-[0037], [0038]-[0040], [0044]-[0045], Figure 1, Figure 2; US 2018/0146476 A1 (Kim '476) at [0001]-[0005], [0007], [0014], [0016], [0035]-[0039], [0042], [0046]-[0050], [0054]-[0055], [0058], [0061], [0069]-[0071], [0114], Figure 1, Figure 2, Figure 3, Figure 4; US 2016/0128102 A1 ("Jauh '102") at Abstract, [0007], [0022], [0024]-[0026], [0027], Figure 1, Figure 2, Figure 3; US 2018/0352572 ("Carious 572") at [0026]-[0028], [0110], [0112], [0120], [0124], Figure 1, Figure 16, Figure 17, Figure 18,

Figure 19; CN 102958185 (“Huawei 185”); US 2011/0235596 (“Wentink 596”) at [0033], [0050]-[0053], Figure 1, Figure 4; US 2017/0325264 (“Cherian 264”) at [0031]-[0032], Figure 1; 745 Provisional at [0025]-[0026] and FIG. 1 (This is cited as a see also in Cherian); US 2017/0223730 (“Jiang 730”) at [0019], Figure 1.

It was well-known to one of skill in the art before the time of the ’035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that a wireless communication terminal included a transceiver. *See, e.g.,* “Proposed spec text for MU EDCA parameters,” Resolution for CID 9058 and 9075 (“Cariou 1180”) at pg. 7-8; US 9,585,166 (“Seok 166”) at 3:27-38, 3:39-48, 3:48-55, 3:55-67, Claim 3, Figure 1; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) at pg. 2-3; IEEE P802.11 802.11-15/0132r15 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) at pg. 3-4, 33-36; IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) at pg. 43-46; IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) at pg. 12; IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) at pg. 2-3, 6-8; US 2017/0245261 (“Cariou 261”) at [0009], [0022]-[0046], [0056]-[0057], [0065]-[0066], Figure 1, Figure 4, Figure 5; US 2016/0198500 (“Merlin 500”) at [0054]- [0055], [0118], Figure 1, Figure 2, Figure 3; US 2018/0146476 A1 (Kim ’476) at [0114], Figure 15; US 2016/0128102 A1 (“Jauh ’102”) at [0025], Figure 1, Figure 2; US 2018/0352572 (“Carious 572”) at [0132], [0161], [0168], [0205], Figure 20; US 2011/0235596 (“Wentink 596”) at [0037]-[0047], Figure 2, Figure 3; US 2017/0325264 (“Cherian 264”) at [0038], Figure 8; US 2017/0223730 (“Jiang 730”) at [0028], Figure 1.

It was well-known to one of skill in the art before the time of the ’035 patent, at least

partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a wireless communication terminal included a processor. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 7-8; US 9,585,166 ("Seok 166") at 10:28-41, 3:27-38, 3:39-48, 3:48-55, 3:55-67, Claim 3, 10:28-35, Figure 1; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 3, 33-36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 43-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 12; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0009], [0022]-[0046], [0057], [0065]-[0066], Figure 1, Figure 4, Figure 5; US 2016/0198500 ("Merlin 500") at [0050], [0053], [0055], [0117], [0119]-[0127], Figure 1, Figure 2, Figure 3, Figure 5, Figure 7; US 2018/0146476 A1 (Kim '476) at [0114], Figure 15; US 2016/0128102 A1 ("Jauh '102") at [0025], [0026], Figure 1, Figure 2; US 2018/0352572 ("Carious 572") at [0130]-[0135], [0139], [0160], [0161], [0166], [0167], [0168], Figure 20; US 2011/0235596 ("Wentink 596") at [0037]-[0047], [0071], Figure 2, Figure 3; US 2017/0325264 ("Cherian 264") at [0038], [0042]-[0043], Figure 2; US 2017/0223730 ("Jiang 730") at [0028], Figure 1.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to transmit, to a base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) using a transceiver. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok

166") at 4:63-66, 5:5-9; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 3, 9, 28-29, 33-34, 36, 42-44; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 10, 17, 18, 43-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 12; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0015]-[0016], [0021], Figure 2, Figure 3; US 2016/0198500 ("Merlin 500") at Abstract, [0010], [0012], [0014], [0016], [0018], [0031], [0038], [0059], [0062]-[0064], [0067]-[0068], [0088]-[0090], [0094]-[0095], [0104]-[0105], [120], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7; US 2018/0146476 A1 (Kim '476) at [0069]-[0071], [0083], [0087], [0090]-[0093], [0099]-[0110], Figure 5, Figure 6, Figure 10, Figure 13, Figure 14; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0029], [0032], [0034]-[0035], [0038]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0110]-[0112], [0120]-[0128], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2017/0325264 ("Cherian 264") at [0053]-[0056], [0060]-[0061], [0067]-[0072], [0076]-[0078], [0080]-[0085], Claims 1, 8, 9, 10, 11, 19, 20, 21, 27, 28, 29; US 2017/0223730 ("Jiang 730") at [0035], [0041]-[0045], [0060]-[0062], Figure 2, Figure 3.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless

communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 13-16, 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19, Claims 1, 3, 8, 12; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2017/0325264 ("Cherian 264") at [0006], [0021]-[0022], [0032], [0053]-[0065], [0067]-[0068], Claims 1, 3, 8, 12; US 2017/0223730 ("Jiang 730") at [0053]-[0057], [0063]-[0064], [0072], [0079], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the

MPDU when the transmission of the trigger-based PPDU ends,. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 35; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 32, 27-28; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 17, 21; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0039], Figure 7; US 2018/0352572 ("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0059], Figure 6; US 2017/0325264 ("Cherian 264") at [0056], [0061], [0067]-[0068], [0076], [0078]-[0082], Claim 11; US 2017/0223730 ("Jiang 730") at [0039], [0058]-[0059], [0064], [0070], [0078], [0085]-[0087], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to when the MPDU included in the trigger-based PPDU requests the immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-

35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 35; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 32, 27-28; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 17, 21; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0054]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0038], [0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 8; US 2018/0352572 ("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0059], Figure 6; US 2017/0325264 ("Cherian 264") at [0056], [0061], [0067]-[0068], [0076], [0078]-[0082], Claim 11; US 2017/0223730 ("Jiang 730") at [0039], [0058]-[0059], [0064], [0070], [0078], [0085]-[0087], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to when the second parameter set timer expires, terminate an application of the second parameter set. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 5:9-16, 5:36-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs

Specification Framework for TGax" ("Stacey 0132") at pg. 31, 33; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 17, 21; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0051]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0083]-[0084]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8' US 2018/0352572 ("Carious 572") at [0121], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0056]-[0058], Figure 6; US 2018/0352572 ("Carious 572") at [0056], [0061], [0067]-[0068], [0076], [0078]-[0082], Claim 11' US 2017/0223730 ("Jiang 730") at [0058], [0064], [0066], [0088], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set. *See*, *e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 1:20-24, 1:54-63, 2:13-18, 2:37-40, 4:19-26, 4:27-35, 4:36-41, 4:42-45, 4:49-52, 5:5-9, 5:9-16, 5:17-20, 5:21-26, 5:27-29, 5:30-35, 5:36-42, 5:43-46, 6:35-44, 6:44-49, 6:59-67, 8:3-9, Figure 2, Figure 3, Figure 4, Figure 5; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax"

("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 44, 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 13, 15-16, 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at Abstract, [0019]-[0021], [0047], [0051]-[0055], [0057]-[0059], [0061]; US 2016/0198500 ("Merlin 500") at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim '476) at [0005], [0014], Figure 5, Figure 6, Figure 10, Figure 13, Figure 14; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0036]-[0048], Figure 2; US 2011/0235596 ("Wentink 596") at [0053], [0056]-[0058], Figure 6; US 2018/0352572 ("Carious 572") at [0053]-[0056], [0060]-[0061], [0067]-[0072], [0076]-[0078], [0080]-[0085], Claims 1, 8, 9, 10, 11, 19, 20, 27, 28, 29; US 2017/0223730 ("Jiang 730") at [0058], [0063]-[0064], [0066], [0068], [0071], [0072], [0074], [0075], [0081], [0084], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the MPDU included in the trigger-based PPDU is a QoS data frame. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 8; US 9,585,166 ("Seok 166") at 5:9-26, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 31, 34-35, 42; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 10, 32, 27-28, 44-45; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou

0998") at pg. 24; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 6; US 2017/0245261 ("Cariou 261") at [0015]-[0016], [0021], Figure 2, Figure 3; US 2016/0198500 ("Merlin 500") at [0081]-[0082], [0105]; US 2018/0146476 A1 (Kim '476) at [0069]-[0071], [0083], [0087], [0090]-[0093], [0099]-[0110], Figure 5, Figure 6, Figure 10, Figure 14; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0029]; US 2018/0352572 ("Carious 572") at [0110]-[0112], [0120]-[0128], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 ("Wentink 596") at [0058]; US 2018/0352572 ("Carious 572") at [0049], [0073]-[0075]; US 2017/0223730 ("Jiang 730") at [0035], [0041]-[0045], [0060]-[0062], Figure 2, Figure 3.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to receive a beacon frame from the base wireless communication terminal. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 1:39-41, 6:1-15, 7:14-22, 10:1-5, 10:4-41, Figure 3, Figure 4, Figure 7; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 19, 45, 52; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 6; US 2017/0245261 ("Cariou 261") at [0053], [0062]-[0063]; US 2016/0198500 ("Merlin 500") at [0076]-[0079]; US 2018/0146476 A1 (Kim '476) at [0054]-[0055]; US 2016/0128102 A1 ("Jauh '102") at [0028], [0033], Figure 3; US 2018/0352572 ("Carious 572") at [0046], [0057]; US 2011/0235596 ("Wentink 596") at [0049];

US 2017/0223730 (“Jiang 730”) at [0059].

It was well-known to one of skill in the art before the time of the ’035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, to obtain information indicating a period of the second parameter set timer from the beacon frame. *See, e.g.,* “Proposed spec text for MU EDCA parameters,” Resolution for CID 9058 and 9075 (“Cariou 1180”) at pg. 6-8; US 9,585,166 (“Seok 166”) at 1:39-41, 6:1-15, 7:14-22, 10:1-5, 10:4-41, Figure 3, Figure 4, Figure 7; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) at pg. 1-4; IEEE P802.11 802.11-15/0132r15 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) at pg. 36; IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) at pg. 19, 45, 52; IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) at pg. 18, 20; IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) at pg. 6; US 2017/0245261 (“Cariou 261”) at [0053], [0062]-[0063]; US 2016/0198500 (“Merlin 500”) at [0076]-[0079]; US 2018/0146476 A1 (Kim ’476) at [0054]-[0055]; US 2016/0128102 A1 (“Jauh ’102”) at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 (“Carious 572”) at [0046], [0057]; US 2011/0235596 (“Wentink 596”) at [0049]; US 2018/0352572 (“Carious 572”) at [0056], [0061], [0067]-[0068], [0076], [0078]-[0082], Claim 11; US 2017/0223730 (“Jiang 730”) at [0059].

It was well-known to one of skill in the art before the time of the ’035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, to calculate a random integer value within a contention window (CW). *See, e.g.,* “Proposed spec text for MU EDCA parameters,” Resolution for CID 9058 and 9075 (“Cariou

1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:19-26, 4:27-35, 4:36-41, 4:42-45, 4:45-49, 4:49-52, 5:36-42, 5:51-60, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0012]-[0013], [0054]-[0055]; US 2016/0198500 ("Merlin 500") at [0075], [0077], [0098], [0101]; US 2018/0146476 A1 (Kim '476) at [0076]- [0077]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0042]; US 2011/0235596 ("Wentink 596") at [0054], Figure 5; US 2018/0352572 ("Carious 572") at [0020], [0048]; US 2017/0223730 ("Jiang 730") at [0049]; and [more]

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to set a backoff timer based on the random integer value. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:27-35, 4:36-41, 4:45-49, 4:49-52, 4:52-57, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed

TGax draft specification" ("Stacey 0024") at pg. 32, 44; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0012]-[0013], [0054]-[0055]; US 2016/0198500 ("Merlin 500") at [0090], [0094]; US 2018/0146476 A1 (Kim '476) at [0078]; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 ("Carious 572") at [0042]-[0043]; US 2011/0235596 ("Wentink 596") at [0054], Figure 5; US 2018/0352572 ("Carious 572") at [0020], [0048]; US 2017/0223730 ("Jiang 730") at [0049].

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to access the channel based on the back off timer and a predetermined slot time. *See, e.g.*, "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 1:20-24, 1:45-54, 1:54-63, 1-2:63-3, 2:13-18, 4:13-18, 4:19-26, 4:27-35, 4:36-41, 4:42-45, 4:45-49, 4:49-52, 4:52-57, 5:5-9, 5:9-16, 5:17-20, 5:21-26, 5:27-29, 5:30-35, 5:36-42, 5:43-46, Figure 2; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 36; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 32, 45-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 18, 20; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0012]-[0013], [0054]-[0055]; US 2016/0198500 ("Merlin 500") at [0075], [0077], [0090]-[0093], [0098], [0101], [0109]; US 2018/0146476 A1 (Kim '476) at

[0076]; US 2016/0128102 A1 (“Jauh ’102”) at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 (“Carious 572”) at [0042]-[0043]; US 2011/0235596 (“Wentink 596”) at [0054], Figure 5; US 2018/0352572 (“Carious 572”) at [0020], [0027], [0036], [0048]; US 2017/0223730 (“Jiang 730”) at [0017], [0044], [0048]-[0051], [0053]-[0058], Figure 3.

It was well-known to one of skill in the art before the time of the ’035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW, or that if a value of the CW is greater than the maximum value (CWmax) of the CW according to a priority of the data to be transmitted, to set the value of the CW to the CWmax. *See, e.g.*, “Proposed spec text for MU EDCA parameters,” Resolution for CID 9058 and 9075 (“Cariou 1180”) at pg. 6-8; US 9,585,166 (“Seok 166”) at 4:27-35, 4:36-41, 4:42-45, 4:45-49, 4:49-52, 4:52-57, 4:57-63, 5:5-9, 5:9-16, 5:17-20, 5:21-26, 5:27-29, 5:30-35, 5:36-42, 5:43-46; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) at pg. 1-4; IEEE P802.11 802.11-15/0132r15 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) at pg. 36; IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) at pg. 46; IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) at pg. 18, 20; IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) at pg. 2-3, 6-8; US 2017/0245261 (“Cariou 261”) at [0012]-[0013], [0054]-[0055]; US 2016/0198500 (“Merlin 500”) at [0075], [0077], [0098], [0101]; US 2018/0146476 A1 (Kim ’476) at [0076]-[0077]; US 2016/0128102 A1 (“Jauh ’102”) at [0034], [0036]- [0037], Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 (“Carious 572”) at [0040],

[0041], [0044], [0056]; US 2011/0235596 (“Wentink 596”) at [0054], Figure 5; US 2018/0352572 (“Carious 572”) at [0077]-[0082]; US 2017/0223730 (“Jiang 730”) at [0049], [0050], [0055], [0057].

It was well-known to one of skill in the art before the time of the ’035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, to transmit the data through the channel. *See, e.g.*, “Proposed spec text for MU EDCA parameters,” Resolution for CID 9058 and 9075 (“Cariou 1180”) at pg. 6-8; US 9,585,166 (“Seok 166”) at 1:20-24, 1:54-63, 2:13-18, 2:37-40, 4:19-26, 4:27-35, 4:36-41, 4:42-45, 4:49-52, 5:5-9, 5:9-16, 5:17-20, 5:21-26, 5:27-29, 5:30-35, 5:36-42, 5:43-46, 6:35-44, 6:44-49, 6:59-67, 8:3-9, Figure 2, Figure 3, Figure 4, Figure 5; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) at pg. 1-4; IEEE P802.11 802.11-15/0132r15 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) at pg. 36; IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) at pg. 44, 46; IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) at pg. 13, 15-16, 18, 20; IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) at pg. 2-3, 6-8; US 2017/0245261 (“Cariou 261”) at Abstract, [0019]-[0021], [0047], [0051]-[0055], [0057]-[0059], [0061]; US 2016/0198500 (“Merlin 500”) at [0066]-[0078], [0083]-[0087], [0090]-[0093], [0100]-[0103], Figure 5, Figure 6; US 2018/0146476 A1 (Kim ’476) at [0005], [0014], Figure 5, Figure 6, Figure 10, Figure 13, Figure 14; US 2016/0128102 A1 (“Jauh ’102”) at [0027]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US 2018/0352572 (“Carious 572”) at [0036]-[0048], Figure 2; US 2011/0235596 (“Wentink 596”) at [0053], [0056]-[0058], Figure 6; US 2018/0352572 (“Carious 572”) at [0053]-[0056], [0060]-[0061], [0067]-[0072], [0076]-[0078],

[0080]-[0085], Claims 1, 8, 9, 10, 11, 19, 20, 27, 28, 29; US 2017/0223730 ("Jiang 730") at [0058], [0063]-[0064], [0066], [0068], [0071], [0072], [0074], [0075], [0081], [0084], Figure 3, Figure 4, Figure 5, Figure 6.

It was well-known to one of skill in the art before the time of the '035 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, to receive, from the base wireless communication terminal, a trigger frame using the transceiver, wherein the trigger frame triggers a orthogonal frequency division multiple access (OFDMA) uplink transmission of the wireless communication terminal. *See, e.g.,* "Proposed spec text for MU EDCA parameters," Resolution for CID 9058 and 9075 ("Cariou 1180") at pg. 6-8; US 9,585,166 ("Seok 166") at 4:63-66, 5:5-9; Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") at pg. 1-4; IEEE P802.11 802.11-15/0132r15 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") at pg. 3, 9, 28-29, 33-34, 36, 42-44; IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") at pg. 10, 17, 18, 43-46; IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") at pg. 12; IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") at pg. 2-3, 6-8; US 2017/0245261 ("Cariou 261") at [0015]-[0016], [0021], Figure 2, Figure 3; US 2016/0198500 ("Merlin 500") at Abstract, [0010], [0012], [0014], [0016], [0018], [0031], [0038], [0059], [0062]-[0064], [0067]-[0068], [0088]-[0090], [0094]-[0095], [0104]-[0105], [120], Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7; US 2018/0146476 A1 (Kim '476) at [0069]-[0071], [0083], [0087], [0090]-[0093], [0099]-[0110], Figure 5, Figure 6, Figure 10, Figure 13, Figure 14; US 2016/0128102 A1 ("Jauh '102") at [0027]-[0029], [0032], [0034]-[0035], [0038]-[0040], Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8; US

2018/0352572 (“Carious 572”) at [0110]-[0112], [0120]-[0128], Figure 16, Figure 17, Figure 18, Figure 19; US 2011/0235596 (“Wentink 596”) at [0056]-[0058], Figure 6; US 2017/0325264 (“Cherian 264”) at [0053]-[0056], [0060]-[0061], [0067]-[0072], [0076]-[0078], [0080]-[0085], Claims 1, 8, 9, 10, 11, 19, 20, 21, 27, 28, 29; US 2017/0223730 (“Jiang 730”) at [0035], [0041]-[0045], [0060]-[0062], Figure 2, Figure 3.

In addition, the prior art also provided sets of finite, identified, predictable solutions for known problems that would have been obvious to those of ordinary skill to try with a reasonable expectation of success. For example, one of skill in the art at the time would have recognized that uplink frames transmitted by a non-access-point station to an access point could either (1) require an immediate response from the access point or (2) not require an immediate response from the access point. Given this finite choice, in stations that sets a second parameter timer upon receiving an immediate response from the access point, it would have been obvious to one of skill in the art at the time to try and modify such stations such that, if the transmitted frame does not require an immediate response from the access point, the stations do not wait for the immediate response before setting the second parameter timer. Such a modification would have yielded the predictable result of the station being able to accommodate transmission of both types of frames for uplink multiuser communications.

In another example, one of ordinary skill in the art at the time would have recognized that, after transmitting a frame that does not require an immediate response, a finite number of time points for setting the second parameter timer existed: (1) after the transmission of the frame ends, or (2) after a predetermined amount of time. Given this finite choice, after transmitting a frame that does not require an immediate acknowledgement from an access point, it would have been obvious to one of skill in the art at the time to try and modify systems to set the second parameter

timer after the transmission of the frame ends.

In yet another example, as noted above, common problems (e.g., inefficiency) with conventional techniques for uplink multiuser transmission in a wireless communication system were known to persons of ordinary skill in the art. One of ordinary skill in the art would have recognized that improving the communications efficiency in an uplink multiuser transmission would have required either (1) an access point to raise its priority/probability for accessing a channel, and/or (2) non-access-point station to be constrained in accessing the channel. *See e.g.*, IEEE 802.11-16/0998r1 ("Cariou 0998") ("To ensure overall improved HE STAs performance, we need to ensure that the access delay for trigger frame transmissions is short and there are no collisions. This can be achieved by the combination of: Increasing AP channel access. Decreasing STAs EDCA access when scheduled."). Given this finite number of solutions, it would have been obvious to one of ordinary skill in the art at the time to try and modify stations to reduce its probability of accessing the channel or otherwise constrain its channel access (e.g., using a different set of EDCA parameters) for uplink multiuser communications to improve communications efficiency.

In yet another example, one of ordinary skill in the art would have recognized that a finite number of ways exist in implementing a different EDCA parameters for uplink multiuser transmission. One of ordinary skill in the art would have recognized the EDCA parameters could be applied (1) for a predetermined amount of time before reverting to the original or legacy EDCA parameters, or (2) until AP instructs the non-AP to revert back to the original or legacy EDCA parameters. Given this finite number of solutions, it would have been obvious to one of ordinary skill in the art at the time to try and modify stations to revert to the original or legacy EDCA parameters after a predetermined amount of time. A person of ordinary skill in the art would have

recognized that a timer is a known technique for determining when a predetermined amount of time has passed. Moreover, a finite number of starting time for such a timer exists: (1) after receiving the trigger frame, (2) after sending out a responsive PPDU, or (3) after receiving an acknowledgement from the AP responding to the transmitted PPDU. Given this finite number of choices for starting the timer, it would have been obvious to one of ordinary skill in the art at the time to try and modify stations to start the timer after receiving an acknowledgement from the AP when the PPDU requests requires an immediate response and after sending out a responsive PPDU when the PPDU does not request an immediate response. Furthermore, one of ordinary skill in the art would have recognized that waiting for a response when an immediate response is requested provides the assurance that the AP is in the condition to receive uplink multiuser transmissions from non-AP. However, one of ordinary skill in the art would have also recognized that waiting for a response when an immediate response is not requested may cause the station to be in the uplink multiuser transmission mode longer than necessary because the start time for the timer is delayed.

In yet another example, one of ordinary skill in the art would have recognized that a finite number of ways exist to ensure that the contention window does not exceed the maximum value (i.e., CWmax). When doubling (or any other method of increasing the value in accordance with a back off procedure) a contention window value would result in a contention window value that exceeds CWmax, one of ordinary skill in the art would have recognized that, to prevent the contention window value from exceeding CWmax, the device would either (1) not double the current contention window value and keep the contention window value at the same level, or (2) set the contention window to be CWmax instead of doubling the contention window value. Given this finite number of solutions, it would have been obvious to one of ordinary skill in the art at the

time to try and modify the devices to set the contention window to be CWmax if doubling the current contention window value would result in a value that exceeds CWmax.

The prior art references provide motivations to combine because they describe the field of the Asserted Patents, teach improvements, explain desired features, and even expressly state that one of skill in the art would be able to apply their teachings to related systems or methods. *See, e.g.*, *Seok 166* at 10:36-41 ("While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.").

Further, the prior art references provide motivations to combine because they explicitly suggest utilizing the teachings and disclosures of other references.

In accordance with these advances, the prior art could have been combined according to methods known to those of ordinary skill within the field of the '879 patent to yield predictable results. Those of ordinary skill in the art could have employed known techniques to improve similar prior art devices in the same way as claimed in the '879 patent.

For example, as noted above, one of ordinary skill in the art would have recognized that improving the communications efficiency in an uplink multiuser transmission would have required either (1) an access point to raise its priority access channel, and/or (2) non-access-point station to be constrained in accessing channel. *See e.g.*, IEEE 802.11-16/0998r1 ("Cariou 0998") ("To ensure overall improved HE STAs performance, we need to ensure that the access delay for trigger frame transmissions is short and there are no collisions. This can be achieved by the combination of: Increasing AP channel access. Decreasing STAs EDCA access when scheduled."). It was known that EDCA parameters could be used to either constrain or promote a station's access to a

channel. *See, e.g.*, IEEE 802.11-16/0963r3 ("Ma 0963") ("AP broadcasts EDCA parameters to constrain associated STAs from accessing channel for a certain period."). Thus, it would have been obvious to one of ordinary skill in that art that apply this known technique to constrain a station's access to a channel during uplink multiuser communications to yield the predictable effect of improving communications efficiency.

In addition, one of ordinary skill in the art would be motivated to combine the prior art references because the elements found in the Asserted Claims of the '879 patent are well known in the art. Indeed, the listed inventors of the Asserted Patents admitted as much in the specification of the '879 Patent. *See* '879 patent at 1:37-2:67.

Moreover, it would have been obvious to one of ordinary skill in the art at the time to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specifications, technical submissions, working group meeting presentations) with a system implementing an older IEEE standard such as IEEE 802.11ac or a draft standard. For example, one of ordinary skill in the art would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process with a real wireless communications hardware/device to yield a working wireless communication system with the improvements and benefits offered by the new standard. In another example, one of ordinary skill in the art would have been motivated to simply substitute an older version of a wireless module implemented on a wireless device/hardware with one implementing a newer version of the standard that addresses the shortcomings of the older standard. In yet another example, one of ordinary skill in the art would have been motivated to apply the known techniques disclosed in the documents submitted as part of the IEEE 802.11ax standard development process to an older wireless communications system implementing IEEE 802.11ac

to yield the predictable results of improved wireless communication performance. Further, one of ordinary skill in the art would have been prompted by the teachings in the documents submitted as part of the IEEE 802.11ax standard development process to modify the wireless communications hardware/device to meet market demands for improved wireless performance.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (e.g., working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of a reference pertaining to hardware/devices (*e.g.*, non-access-point stations) for wireless communications (*e.g.*, wireless local area network (WLAN)). For instance, a person of ordinary skill would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process—which generally address narrow technical issues and solutions—with references disclosing WLAN devices and hardware more broadly (*e.g.*, devices with transceivers and configurable processors) to yield a blueprint for a working device that addresses the technical problem disclosed in the IEEE 802.11ax standard development document. Such a combination amounts to combining known prior art elements according to known methods to yield predictable results. Further, to the extent any prior art WLAN devices/hardware documents disclose deficiencies or technical issues with the state of the art, one of ordinary skill in the art would have been prompted to combine these references with the teachings in documents submitted as part of the IEEE 802.11ax standard development process to meet market demands for improved wireless performance. This disclosure of deficiencies and/or technical issues would provide a teaching, suggestion, or motivation for a person of ordinary skill to modify the prior art reference based on the IEEE 802.11ax standard working documents.

In another example, a person of ordinary skill would have been motivated to combine

teachings of a reference disclosing EDCA parameters set with teachings of a reference disclosing that EDCA parameters set that include CWmin and/or CWmax. Such a combination amounts to substitution of one known element (e.g., EDCA parameter set) for another (EDCA parameter set that includes CWmin and/or CWmax) to obtain predictable results of being able to leverage backoff procedures that use CWmin and/or CWmax. Likewise, a person of ordinary skill would have been motivated to combine teachings of a reference disclosing a backoff procedure that uses CWmin and/or CWmax with a reference disclosing that, when doubling the contention window value would resulting in a value that exceeds CWmax, the contention window value is maintained at or set to CWmax, rather than letting the contention window value exceed CWmax. This amounts to use of known technique (i.e., maintaining the contention window value at CWmax if doubling the current value would exceed CWmax) to improve similar method (i.e., contention window backoff procedure) in the same way.

In yet another example, a person of ordinary skill would have been motivated to combine teachings of a reference disclosing transmission of PPDUs with teachings of a reference disclosing that a PPDU can include a QoS data frame. Such a combination amounts to substitution of one known element (e.g., PPDU) for another (PPDU that includes a QoS Data Frame) to obtain predictable results of being transmit data with Quality-of-Service considerations and/or enable QoS features in an 802.11 network

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of another document submitted as part of IEEE 802.11ax standard development process. For instance, considering the common underlying technical subject matter

of the IEEE 802.11ax standard development documents, it would be obvious to one of ordinary skill to try combining the teachings of multiple documents. In doing so, a person of ordinary skill would have a reasonable expectation of success. Moreover, given the common goals and design incentives among authors of IEEE 802.11ax standard development documents (*e.g.*, improving WLAN device performance), a person of ordinary skill would find it obvious to combine the technical solutions disclosed in multiple IEEE 802.11ax standard development documents. Further, given the additive nature of the IEEE standard development process, a person of ordinary skill would have understood that various IEEE 802.11ax standard development documents could be combined to create a cohesive solution. Thus, a person of ordinary skill would have a reasonable expectation of success in combining the teachings in these documents.

Any reference or combination of references that anticipates or makes obvious an asserted independent claim also makes obvious any asserted claim dependent on that independent claim, as the element of each dependent '879 patent Asserted Claim was known by a person of ordinary skill at the time of the alleged invention, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, Defendants contend that each Asserted Claim would have been obvious not only by the combinations described in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

In addition to the specific examples of motivation provided above, Defendants reserve the right to rely on the disclosures of the references listed in Appendix F for additional motivation to combine. The above-identified examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible

combination to which the motivation may apply. Defendants reserve the right to contend that the above-described motivations to combine apply to other combinations at the appropriate time, *i.e.*, in expert reports regarding invalidity.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix F with any other reference or references listed in Appendix F along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '879 patent. For example, and without limitation, the Asserted Claims of the '879 patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180")	• US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or • 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424") •

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 9,585,166 (“Seok 166”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”) •

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0245261 (“Cariou 261”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0198500 (“Merlin 500”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2018/0146476 A1 (Kim '476)	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0128102 A1 (“Jauh ’102”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2018/0352572 (“Carious 572”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

CN 102958185 (“Huawei 185”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
	Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2011/0235596 (“Wentink 596”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0325264 (“Cherian 264”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0223730 (“Jiang 730”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-2012 and/or 802.11ac-2013 Specification	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-2012 and/or 802.11-2016 Specification	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0208625 (“Choi 625”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11acSpecification • IEEE 802.11-2012 and/or 802.11-2016 Specification • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0048048 (“Seok 048”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0202023 (“Zhou 023”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • US 2018/0034595 (“Kim 595”) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425)	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2018/0034595 (“Kim 595”)	• IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”) • US 9,585,166 (“Seok 166”) • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”) • IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”) • IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”) • IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”) • US 2017/0245261 (“Cariou 261”) • US 2016/0198500 (“Merlin 500”) • US 2018/0146476 A1 (Kim ’476) • US 2016/0128102 A1 (“Jauh ’102”) • US 2018/0352572 (“Carious 572”) • CN 102958185 (“Huawei 185”) • US 2011/0235596 (“Wentink 596”) • US 2017/0325264 (“Cherian 264”) • US 2017/0223730 (“Jiang 730”) • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 (“Choi 625”) • IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”) • US 2017/0048048 (“Seok 048”) • US 2017/0202023 (“Zhou 023”) • IEEE 802.11-16/1425r2 “Clarification on applying MU EDCA parameter set” (“Ahn 1425) • IEEE 802.11-16/0616r2 “Block Ack Generation and Selection Rules” (“Asterjadhi 0616”) • IEEE 802.11-16/1424r1 “Issue on the CWmax value in MU EDCA” (“Ahn 1424”)

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")	• IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180") • US 9,585,166 ("Seok 166") • Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi") • IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132") • IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998") • IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963") • US 2017/0245261 ("Cariou 261") • US 2016/0198500 ("Merlin 500") • US 2018/0146476 A1 (Kim '476) • US 2016/0128102 A1 ("Jauh '102") • US 2018/0352572 ("Carious 572") • CN 102958185 ("Huawei 185") • US 2011/0235596 ("Wentink 596") • US 2017/0325264 ("Cherian 264") • US 2017/0223730 ("Jiang 730") • IEEE 802.11-2012 and/or 802.11ac Specification • IEEE 802.11-2012 and/or 802.11-2016 Specification • US 2017/0208625 ("Choi 625") • IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535") • US 2017/0048048 ("Seok 048") • US 2017/0202023 ("Zhou 023") • IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) • US 2018/0034595 ("Kim 595") • IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")

As mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. Moreover, the exemplary combinations are provided based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a *Markman* Order has not yet been issued in this case. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

7. U.S. Patent No. 11,129,163

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix G the prior art references that render obvious the Asserted Claims of the '163 patent and include below exemplary combinations showing the obviousness of the '163 patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix G, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of skill in the art at the time of the '163 patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix G, such reference may be combined with any other references listed in Appendix G for such element, thereby rendering the claims invalid for obviousness.

To the extent a finder of fact determines that a limitation of any of the '163 patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '163 patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known

methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a) Obviousness Rationale

For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix G along with the knowledge of one of ordinary skill in the art to meet the limitations of the '163 patent Asserted Claims. Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '163 patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

One or more combinations of the prior art references identified in Appendix G would have

been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix G would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '163 patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix G is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or

products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Additionally, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix G because all of these references relate to the same area of technology and/or are from analogous art. The '163 patent Asserted Claims are generally directed to disallowing processes that are based on BSS color. *See, e.g.*, '163 patent at 3:60-64, 21:16-23, 21:41-47, 51:13-18, 51:28-33, 51:54-60, cl. 1, cl. 9. The prior art references generally relate to 802.11 WLAN technology. The references, like the '163 patent, are also reasonably pertinent to wireless communications issues in the PHY and MAC layers or issues related to overlapping basic service sets or BSS color. A person of ordinary skill would have understood that these related or analogous references can generally be combined to yield predictable results. Additionally, a person of ordinary skill would have found it obvious to leverage solutions to one WLAN technical problem in order to solve a different, but analogous, WLAN technical problem. Moreover, the technical complexity of WLAN technology would have motivated a person of ordinary skill to search for and consult references from within the field before considering references from outside the technical field. A person of ordinary skill would have motivated to combine these related or analogous art to provide benefits of each reference.

Similarly, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix G because all of these references are works by people in the same technical field. For example, many of the authors of the prior art references are members of the

same IEEE 802.11ax High Efficiency (HE) working group. *See e.g.,* IEEE 802.11-16/0024r1 ("Stacey 0024") (identifying authors of prior art references, such as Stacey, Cariou, Merline, Jeongki Kim, Wentink). Moreover, one of ordinary skill in the art would have recognized that members of an IEEE working group frequently collaborate with, and build on, each other's work. Thus, one of ordinary skill in the art would have recognized that the works of the same IEEE working group are likely compatible or otherwise work harmoniously when combined.

The '163 patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the '163 patent Asserted Claims.

All of the '163 patent Asserted Claims are directed to disallowing processes that are based on BSS color. Such technology, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, was widely known before the alleged priority date of the '163 Patent, as evidenced by the references in Appendix G. *See, e.g.*, Lee 731 at Abstract, [0007]-[0010], [0012]-[0014], [0016], [0017], [0045]-[0047], [0051], [0055], [0058]-[0061], [0064], [0064], [0065], [0067]-[0069], [0071]-[0080], [0082]-[0086], [0088]-[0090], Figure 2, Figure 3, Figure 5, Figure 7, Figure 8; Lee 858 at [7]-[10], [12]-[14], [16], [17], [45]-[47], [51], [56], [61]-[64], [67], [68], [71]-[73], [75]-[79], [81]-[85], [88]-[92], [94]-[96], Figure 2, Figure 3, Figure 5, Figure 6, Figure 8; Stacey 0024 at 28, 29, 35, 24, 46, 48-49; Ko 0042 at 2-8; Khorov at 2-5; Seok 397 at Abstract, [0012]-[0014], [0023], [0073], [0078], [0079], [0089], [0090], [0101], [0157], [0188], [0189], [0195], [0240], [0241], [0283]- [0285], [0296], [0311],

Figure1, Figure 4, Figure 5, Figure 7, Figure 8, Figure 12, Figure 15; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 2:2-8, 10:1-13, 12:18-24, 12:44-13:47, 15:14-18, 15:39-53, 15:60-65, 16:18-26, 16:33-40, 16:58-64, 17:44-52, 17:62-65, 19:2-10, 20:22-51, 23:40-45; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0070], [0072], [0075], [0083]-[0087], [0091], [0097], [0100], [0105]-[0107], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0071], [0072], [0078], [0106], [0108]-[0112]; Park 352 at [0044], [0075], [0076], [0103], [0104], [0107], [0119]- [0121], [0134], [0159], [0161], [0173].

One of ordinary skill in the art would have been motivated to combine any of the references in Appendix G because, at the time of the alleged invention, BSS color collisions were a common problem with a well-known solution. In particular, common problems (*i.e.*, BSS color collisions) with conventional techniques for OBSS wireless communication were known to persons of ordinary skill in the art. *See, e.g.*, Khorov at 5 ("In .11ax, the size is increased at least up to 6 bits to reduce error probability [36], since BSS colors of two neighboring BSS can collide."); Zhou 258 at Abstract ("For example, the BSSs may use the same value for X-bit color indicators which results in a color collision if the BSSs are neighbor BSSs."); Ko 0396 at 2 ("Due to the lack of BSS color values, there may be the case that neighboring BSSs use the same BSS color value . . . This case is referred as 'BSS color collision' hereinafter."); Kim 387 at [0006] ("However, since the number of bits for representing BSS color information used by the STA to distinguish whether the received frame is intended for the STA is limited, it may cause not only a BSS color collision with a neighboring BSS but also malfunction of the STA."); Itagaki 817 at [0073] ("[T]he COLOR

field includes 3 bits, and there are only 8 possible choices . . . Therefore, BSS COLOR overlapping between BSSes (OBSSes) having overlapping communication ranges"). BSS color collision is a subset of contention-related issues that commonly arise in wireless communications (including, but not limited to, Wi-Fi) and of which a POSITA would have been aware at the time of the alleged invention. *See, e.g.*, Nelson 066 at [0003] ("[A] collision can occur on the radio channel when two or more transmitter devices transmit on the radio channel simultaneously."). A POSITA would have understood that in the event of a BSS color collision, use of BSS color may be an ineffective means for classifying PPDUs as either inter-BSS or intra-BSS. A POSITA would have been aware that in the event of identifier contention/collision generally, an obvious solution is to disable or disallow use of the identifier. In particular, disabling and/or disallowing BSS color use was well-known at the time of the alleged invention. *See, e.g.*, Lee 731 at Abstract (disclosing a "coloring disable bit"); Barriac 887 at [0098] ("APs can selectively allow or disallow reuse of the wireless medium based on a 'BSS distance.'"). Thus, a POSITA would have found it obvious to disable/disallow BSS color use in the event of a BSS color collision. Doing so would have amounted to (1) combining prior art elements (*i.e.*, BSS color collision and disabling/disallowing BSS color use) according to known methods to yield predictable results, (2) applying a known technique (*i.e.*, disabling or disallowing use of BSS color) to a known device ready for improvement (*i.e.*, a Wi-Fi device experiencing a BSS color collision) to yield predictable results. It would also have been obvious to a POSITA to try disabling BSS color use in the event of a BSS color collision, as use of other identifiers (*e.g.*, MAC address) to classify PPDUs was well-known at the time.

Before the time of the '163 patent, wireless communication terminals were well known to one of skill in the art. *See, e.g.*, Lee 731 at Abstract, [0005], [0007], [0008], [0010]-[0014], [0032]-

[0036], [0039]- [0041], [0062]-[0065], [0067]-[0073], [0076]-[0080], [0082]-[0086], [0088]-[0090], [0092]-[0097], Figure 1, Figure 2, Figure 7, Figure 8; Lee 858 at Abstract, [5], [7], [8], [10]-[14], [32]-[36], [39]-[41], [65]-[68], [71]-[77], [81]-[85], [88]-[92], [94]-[96], [98]-[103], Figure 1, Figure 2, Figure 7, Figure 8; Stacey 0024 at 6-7, 11-12, 15-17, 22, 40-42, 45-52; Ko 0042 at 2-8, 10; Khorov at 1-5; Seok 397 at Abstract, [0005], [0007], [0008], [0012], [0019], [0045]-[0047], [0075], [0076], [0080], [0125], [0400]- [0402], cl. 1, Figure 1, Figure 5; Barriac 368 at 1:54-61, 10:17-23, 10:31-42, 10:64-11:15, 11:16-23, 11:53-60, 11:61-12:9, 12:32-42, 12:43-55, 12:56-62, 13:13-27, 27:4-18; Noh 485 at 4:34-50, 5:58-60, 6:31-40, 10:20-33, 11:14-23, 26:37-46; Zhou 258 at [0003], [0004], [0033], [0033], [0086], [0091], Figure 9, Figure 10, Figure 11A, Figure 11B, Figure 12A, Figure 12B; Oteri 787 at Abstract, [0002], [0027], [0028], [0036], [0047], [0048], [0050], [0051], [0053]-[0055], [0060], [0061], [0128], Figure 1A, Figure 1B; Park 352 at [0004], [0010], [0011], [0030], [0037], [0038], Claim 1, Claim 6, Figure , Figure 15.

It was well-known to one of skill in the art before the time of the ’163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that wireless communication terminals may include a transceiver. *See*, *e.g.*, Lee 731 at Abstract, [0002], [0007]-[0011], [0013], [0014], [0032], [0033], [0035], [0036], [0065], [0067]-[0069], [0073], [0076]-[0080], [0082]-[0086], [0088]- [0090], [0092], [0093], Figure 1, Figure 2, Figure 7, Figure 8; Lee 858 at Abstract, [2]-[11], [13], [14], [32], [33], [35], [36], [68], [71]-[73], [77], [81]-[85], [88]-[92], [94]-[96], [98], [99], Figure 1, Figure 2, Figure 7, Figure 8; Stacey 0024 at 38, 39, 55-60, 93, 124; Ko 0042 at 2-5, 7; Khorov at 1-5; Seok 397 at [0006], [0013], [0047], [0051], [0052], [0073], [0078], [0080], [0082], [0101], [0157], [0178], [0237], [0301], [0313], [0314], Figure 1, Figure 4, Figure 5, Figure 7, Figure 8; Barriac 368 at 3:24-34; 3:38-52, 6:61-7:3, 7:33-41, 10:57-63, 12:32-42, 12:43-55, 23:42-49, 24:60-67, 25:10-17, 25:24-31; Noh 485 at 5:58-

60, 6:1-6, 6:7-10, 6:44-54, 7:7-12, 7:24-29, 7:60-8:3, 8:10-17, 8:60-9:3, 9:4-20, 11:30-41, 11:42-56, 11:57-63, 12:49-55, 15:19-53, 15:54-16:40, 18:6-24; Zhou 258 at [0070], [0086], [0090], [0091], [0092], [0100], [0107], Figure 9, Figure 10, Figure 11A, Figure 11B, Figure 12A, Figure 12B; Oteri 787 at [0028], [0029], [0037]-[0039], [0042], [0046], [0053], [0128], Figure 1A, Figure 1B; Park 352 at Abstract, [0005]-[0007], [0010], [0011], [0038], Figure 1, Figure 15.

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that wireless communication terminals may include a processor. *See*, *e.g.*, Lee 731 at [0008], [0092], [0093], [0095]-[0097], Figure 2, Figure; Lee 858 at [8], [98], [99], [101], [102], [103], Figure 2, Figure 8; Stacey 0024 at 26, 40, 102, 108, 117, 120-121; Ko 0042 at 2-5, 7; Khorov at 1-5; Seok 397 at Abstract, [0006], [0013], [0020], [0021], [0047]-[0051], [0055], [0056], [0058], [0060], [0062], [0064]-[0066], [0069], [0071], [0072], [0284], Figure 1- Figure 3; Barriac 368 at 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 6:61-7:3, 7:7-20, 7:21-32 [0034], 7:33-41, 11:61-12:9, 12:10-20, 12:21-31, 12:43-55, 13:4-13, 23:33-41, 23:50-55, 24:60-67, 25:1-9, 25:18-23, 26:13-28; Noh 485 at 5:58-60, 6:55-60, 6:61-7:6, 7:7-12, 6:44-54, 26:20-30, 26:37-46; Zhou 258 at [0009], [0086], [0091], [0099], [0100], [0101], [0104], [0105], [0107], [0108], [0109], [0134], [0135], [0136], Figure 9, Figure 10, Figure 11A, Figure 11B, Figure 12A, Figure 12B; Oteri 787 at [0038], [0039], [0043]-[0046], [0053]-[0055], [0059], [0128], Figure 1A, Figure 1B; Park 352 at [0011], [0187]-[0198], Figure 1, Figure 15.

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a processor may be configured to receive a physical layer convergence procedure ("PLCP") processing data unit ("PPDU"). *See*, *e.g.*, Lee 731 at Abstract, [0007]-[0010], [0012]-

[0014], [0016], [0017], [0045]-[0047], [0051], [0055], [0058]-[0061], [0064], [0064], [0065], [0067]-[0069], [0071]-[0080], [0082]-[0086], [0088]-[0090], Figure 2, Figure 3, Figure 5, Figure 7, Figure 8; Lee 858 at [7]-[10], [12]-[14], [16], [17], [45]-[47], [51], [56], [61]-[64], [67], [68], [71]-[73], [75]-[79], [81]-[85], [88]-[92], [94]-[96], Figure 2, Figure 3, Figure 5, Figure 6, Figure 8; Stacey 0024 at 28, 29, 35, 24, 46, 48-49; Ko 0042 at 2-8; Khorov at 2-5; Seok 397 at Abstract, [0012]-[0014], [0023], [0073], [0078], [0079], [0089], [0090], [0101], [0157], [0188], [0189], [0195], [0240], [0241], [0283]- [0285], [0296], [0311], Figure1, Figure 4, Figure 5, Figure 7, Figure 8, Figure 12, Figure 15; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 2:2-8, 10:1-13, 12:18-24, 12:44-13:47, 15:14-18, 15:39-53, 15:60-65, 16:18-26, 16:33-40, 16:58-64, 17:44-52, 17:62-65, 19:2-10, 20:22-51, 23:40-45; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0070], [0072], [0075], [0083]-[0087], [0091], [0097], [0100], [0105]-[0107], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0071], [0072], [0078], [0106], [0108]-[0112]; Park 352 at [0044], [0075], [0076], [0103], [0104], [0107], [0119]- [0121], [0134], [0159], [0161], [0173].

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a processor may be configured not to use a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed. *See, e.g.*, Lee 731 at Abstract, [0007]-[0010], [0012]-[0014], [0016], [0017], [0045]-[0047], [0051], [0055], [0058]-[0061], [0064], [0064], [0065], [0067]-[0069], [0071]-[0080], [0082]-[0086], [0088]-

[0090], Figure 2, Figure 3, Figure 5, Figure 7, Figure 8; Lee 858 at [7]-[10], [12]-[14], [16], [17], [45]-[47], [51], [56], [61]-[64], [67], [68], [71]-[73], [75]-[79], [81]-[85], [88]-[92], [94]-[96], Figure 2, Figure 3, Figure 5, Figure 6, Figure 8; Stacey 0024 at 28, 29, 35, 24, 46, 48-49; Ko 0042 at 2-8; Khorov at 2-5; Seok 397 at Abstract, [0012]-[0014], [0023], [0073], [0078], [0079], [0089], [0090], [0101], [0157], [0188], [0189], [0195], [0240], [0241], [0283]- [0285], [0296], [0311], Figure1, Figure 4, Figure 5, Figure 7, Figure 8, Figure 12, Figure 15; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 2:2-8, 10:1-13, 12:18-24, 12:44-13:47, 15:14-18, 15:39-53, 15:60-65, 16:18-26, 16:33-40, 16:58-64, 17:44-52, 17:62-65, 19:2-10, 20:22-51, 23:40-45; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0070], [0072], [0075], [0083]-[0087], [0091], [0097], [0100], [0105]-[0107], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0071], [0072], [0078], [0106], [0108]-[0112]; Park 352 at [0044], [0075], [0076], [0103], [0104], [0107], [0119]- [0121], [0134], [0159], [0161], [0173]. For reasons described above, it would have been obvious to incorporate disabling or disallowing BSS color use (*e.g.*, in the event of a detected BSS color collision).

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that BSS color is an identifier of a BSS. *See, e.g.*, Lee 731 at Abstract, [0007]-[0014], [0017], [0034], [0037], [0038], [0040], [0041], [0062]-[0064], [0067]- [0068], [0071]- [0075], [0082], [0083], [0085], [0089], Figure 1, Figure 2, Figure 8; Lee 858 at Abstract, [7]-[14], [17], [34], [37]-[38], [40], [41], [65]-[67], [71]-[72], [75]-[70], [88], [89], [91], [95], Figure 1, Figure 2,

Figure 8; Stacey 0024 at 24, 46, 49; Ko 0042 at 2-8; Khorov at 2, 4-5; Seok 397 at Abstract, [0012]-[0014], [0283]- [0285], [0296], [0311], [0354]; Barriac 368 at 2:60-69, 3:11-23, 4:8-16, 5:1-10, 6:1-10, 13:45-61, 20:53-62, 20:63-21:5, 21:6-23, 23:17-24; Noh 485 at 15:39-53, 15:60-65, 16:18-26, 17:44-52, 17:62-65, 19:2-10, 20:22-51, 23:40-45; Zhou 258 at [0003], [0004], [0005], [0006], [0044], [0049], [0067]; Oteri 787 at Abstract, [0003], [0071], [0072], [0078], [0106], [0108]-[0112]; Park 352 at [0044], [0103], [0104], [0107], [0119], [0120], [0159], [0161], [0173].

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that signaling information can be transmitted from a base wireless communication terminal to which a receiving wireless communication terminal is associated. *See, e.g.*, Lee 731 at [0034]-[0036], [0040], [0041], [0062], [0063], [0065], [0067], [0069], Figure 1, Figure 2, Figure 7, Figure 8; Lee 858 at [34], [35], [36], [40], [41], [65], [66], [68], [71], [73], Figure 1, Figure 2, Figure 7, Figure 8; Stacey 0024 at 24, 46, 48-49, 54-55, 78-80, 80-85, 85-91; Ko 0042 at 2-5, 7; Khorov at 1-5; Seok 397 at [0187], [0189], [0230], [0232], [0240], [0241], [0243], [0283]- [0285], [0343], [0345], [0346], [0369], Figure 22; Barriac 368 at 13:13-27, 16:14-43, 20:29-38, 20:39-50, 21:6-23 21:48-58; Noh 485 at 12:44-49, 14:59-65, 16:4-8, 16:9-17, 16:27-32, 16:53-57, 17:34-36, 22:9-21, 22:31-43, 23:1-4, 23:9-21, 25:29-31; Zhou 258 at [0004], [0006], [0016], [0049], [0051], [0066], [0070], [0078], [0085], [0087], [0088], [0093], [0118]; Oteri 787 at [0040], [0051], [0054], [0081], [0082], [0086], [0088], [0117]; Park 352 at [0039], [0061], [0065], [0066], [0075], [0078], [0103], [0181].

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a processor can be configured not to set an Intra-BSS Network Allocation Vector

(NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed. *See, e.g.*, Lee 731 at [0052]-[0055], [0057], [0070]-[0073], [0076]-[0080], [0082], [0084], [0086], [0088], Figure 5; Lee 858 at [53]-[57], [74]-[77], [81]-[85], [88], [90], [92], [94], Figure 5; Stacey 0024 at 26-27, 32, 37-38, 42-43, 46-47, 49; Ko 0042 at 2; Khorov at 1-5; Seok 397 at [0081], [0083], [0085]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 1:18-22, 1:57-2:8, 2:34-38, 11:24-29, 11:42-56, 13:55-14:9, 14:23-32, 15:54-59, 15:66-16:8, 16:18-26; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049], [0050], [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0106], [0112]; Park 352 at [0137]-[0139], [0178]-[0180]. Moreover, a POSITA would have understood that setting an inter- or intra-BSS NAV requires classifying a PPDU as either inter or intra-BSS. *See, e.g.*, Stacey 0024 at 39-40. Thus, it would have been obvious to a POSITA that when BSS color cannot, or should not, be used (*e.g.*, in the event of a BSS color collision), then BSS color cannot, or should not, be used for setting an inter- or intra-BSS NAV. This amounts to combining prior art elements according to known methods to yield predictable results. Moreover, the references disclosing both the BSS color collision scenario and inter-/intra-BSS NAV would have provided a POSITA with a teaching, suggestion, or motivation to combine one with the other.

It was well-known to one of skill in the art before the time of the ’163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement

contentions, that an Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU. *See, e.g.*, Lee 731 at [0052]-[0055], [0057], [0063], [0064], [0082], [0084], [0086], [0088], [0090], Figure 5; Lee 858 at [53]-[57], [66], [67], [88], [89], [92], [94], [96], Figure 5; Stacey 0024 at 26-27, 32, 37-38, 42-43, 46-47, 49; Ko 0042 at 2, 4, 7-8, 10; Khorov at 1-5; Seok 397 at [0081], [0083], [0085]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 1:57-2:8, 2:34-38,13:55-14:9, 15:54-59, 15:66-16:8, 16:18-26; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]- [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0106], [0112]; Park '352 at [0098], [0102], [0104], [0118], [0122], [0137]-[0139], [0178]-[0180].

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU. *See, e.g.*, Lee 731 at [0052], [0053], [0054]-[0056], [0063]-[0064], [0082], [0084], [0086], [0088], [0090], Figure 5; Lee 858 at [0053]-[0057], [66], [67], [88], [90], [92], [94], [96], Figure 5; Stacey 0024 at 26-27, 32, 37-38, 42-43, 46-47, 49; Ko 0042 at 3, 4, 7; Khorov at 1-5; Seok 397 at [0081], [0083], [0085]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-

47; Noh 485 at 1:57-2:8, 2:34-38, 13:55-14:9, 15:54-59, 15:66-16:8, 16:33-40, 17:5-10; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0106], [0112]; Park '352 at [0098], [0102], [0104], [0118], [0122], [0137]-[0139], [0178]-[0180].

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a PPDU can include a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field. *See, e.g.*, Lee 731 at [0035], [0052], [0053], [0054]-[0056], [0065], [0070]-[0073], [0076]-[0080], [0082], [0084], [0086], [0088], [0090], Figure 5, Figure 7; Lee 858") at [35], [53], [54], [55]-[57], [68], [74]-[77], [81]-[85], [88], [90], [92], [94], [96], Figure 5, Figure 7; Stacey 0024 at 37-38, 80, 81, 82; Ko 0042 at 2, 4, 5, 7, 10; Khorov at 1-5; Seok 397 at [0081], [0083], [0085], [0095], [0105]- [0107], [0253], [0259], [0261], [0262]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 2:57-59, 16:18-26, 21:28-32, 21:42-53, 18:43-48; Zhou 258 at [0005], [0006], [0017], [0044], [0045], [0046], [0049], [0050], [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0080], [0083], [0090], [0096], [0120], [0121]; Park '352 at [0060], [0138], [0139], [0143], [0145], [0152]- [0153], [0155], [0196], Claim 2, Claim 7.

It was well-known to one of skill in the art before the time of the '163 patent, at least

partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV. *See, e.g.*, Lee 731 at [0052]-[0056], [0063], Figure 5; Lee 858 at [53]-[57], [66], [67], Figure 5; Stacey 0024 at 37-38, 80, 81, 82; Ko 0042 at 2, 4, 5, 7, 10; Khorov at 1-5; Seok 397") at [0081], [0083], [0085], [0095], [0105]- [0107], [0253], [0259], [0261], [0262]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258") at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0080], [0083], [0090], [0096], [0106], [0112], [0120], [0121]; Park '352 at [0137]-[0139], [0178]-[0180], [0196], Claim 2, Claim 7.

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV. *See, e.g.*, Lee 731 at [0052]-[0056], [0063], [0064], Figure 5; Lee 858 at [53]-[57], [66], [67], Figure 5; Stacey 0024 at 37-38, 80, 81, 82; Ko 0042 at 2, 4, 5, 7, 10; Khorov at 1-5; Seok 397 at [0081], [0083], [0085], [0095], [0105]- [0107], [0253], [0259], [0261], [0262]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0005], [0006], [0017], [0044]- [0046], [0049]- [0051], [0054],

[0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0080], [0083], [0090], [0096], [0106], [0112], [0120], [0121]; Park '352 at [0060], [0137]-[0139], [0143], [0145], [0152], [0153], [0155], [0178]-[0180].

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the processor can be configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame. *See, e.g.*, Lee 731 at [0035], [0052]- [0056], [0062]-[0065], Figure 5, Figure 7; Lee 858 at [35], [53]-][57], [65]-[68], Figure 5, Figure 7; Stacey 0024 at 37-38, 80, 81, 82; Ko 0042 at 2, 4, 5, 7, 10; Khorov at 1-5; Seok 397 at [0081], [0083], [0085], [0095], [0105]- [0107], [0253], [0259], [0261], [0262]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049], [0050], [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787") at [0052], [0061], [0071], [0078], [0080], [0083], [0090], [0096], [0106], [0112], [0120], [0121]; Park '352 at [0060], [0137]-[0139], [0143], [0145], [0152], [0153], [0155], [0178]-[0180].

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the processor can be configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color

collision has occurred. *See, e.g.*, Lee 731 at [0062]-[0064]; Lee 858 at [65]-[67]; Stacey 0024 at 32, 41, 46, 48-49; Ko 0042 at 4, 6, 8; Khorov at 1, 2, 4, 5; Seok 397 at [0023], [0073], [0078], [0079], [0284], [0327], [0329], [0354], [0356], [0359], Figure 4, Figure 5; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0057], [0071], [0072], [0078], [0106], [0108]- [0112]; Park '352 at [0046], [0081], [0083], [0103], [0104], [0107], [0111], [0116], [0117], [0119], [0127], [0132], [0134], [0140], [0173]. Moreover, a POSITA would have understood that a BSS color collision scenario is one reason to disallow/disable BSS color use. *See, e.g.*, Khorov at 5 ("In .11ax, the size is increased at least up to 6 bits to reduce error probability [36], since BSS colors of two neighboring BSS can collide."); Zhou 258 at Abstract ("For example, the BSSs may use the same value for X-bit color indicators which results in a color collision if the BSSs are neighbor BSSs."); Ko 0396 at 2 ("Due to the lack of BSS color values, there may be the case that neighboring BSSs use the same BSS color value . . . This case is referred as 'BSS color collision' hereinafter."); Kim 387 at [0006] ("However, since the number of bits for representing BSS color information used by the STA to distinguish whether the received frame is intended for the STA is limited, it may cause not only a BSS color collision with a neighboring BSS but also malfunction of the STA."); Itagaki 817 at [0073] ("[T]he COLOR field includes 3 bits, and there are only 8 possible choices . . . Therefore, BSS COLOR overlapping between BSSes (OBSSes) having overlapping communication ranges"). A POSITA would further have understood that, in

the event of a BSS color collision, an AP would ideally update the BSS color to rectify the color collision. *See, e.g.*, Itagaki 817 at [0192]. Thus, a POSITA would have found it obvious to configure a device to signal when a BSS color collision is detected. *See, e.g., id.*, Zhou 258 at [0005], [0017]-[0018]. This amounts to combining prior art elements according to known methods to yield predictable results.

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a BSS color collision represents that different BSSs correspond to one BSS color. *See, e.g.*, Lee 731 at [0062]-[0064]; Lee 858 at [65]-[67]; Stacey 0024 at 32, 41, 46, 48-49; Ko 0042 at 2, 4, 5, 6, 8; Khorov at 1, 2, 4, 5; Seok 397 at [0023], [0073], [0078], [0079], [0284], [0327], [0329], [0354], [0356], [0359], Figure 4, Figure 5; Barriac 368 at Abstract 2:60-67, 3:11-23, 4:8-16, 5:1-10, 15:38-67, 21:6-23; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0057], [0071], [0072], [0078], [0106], [0108]- [0112]; Park '352 at [0046], [0081], [0083], [0103], [0104], [0107], [0111], [0116], [0117], [0119], [0127], [0132], [0134], [0140], [0173].

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the processor can be configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame. *See, e.g.*, Lee 731 at [0035], [0052], [0062]-[0065], [0082], [0090], Figure 7; Lee 858 at [35], [65]-[68], [88], [96]; Stacey 0024 at pg. 32, 41, 46, 48-49; Ko 0042 at pg. 4, 6, 7, 8; Khorov at pg. 2, 4, 5; Seok 397 at

[0023], [0073], [0078], [0079], [0217], [0240], [0241], [0284], [0327], [0329], [354], [356], [359], Figure 4, Figure 5; Barriac 368 at 13:45-61; Zhou 258 at [0016], [0070], [0078], [0080], [0096], [0103], [0119]; Oteri 787 at [0071]; Park '352 at [0037], [0043], [0075], [0120], [0139], [0143], [0153], [0159], [0166], [0174]. A POSITA would have understood that a MAC address is a unique identifier for a BSS and thus would have found it obvious to use MAC address to determine whether a BSS color collision has occurred. *See, e.g.*, Zhou 258 at [0016]. This amounts to combining prior art elements according to known methods to yield predictable results.

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that an operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU. *See, e.g.*, Lee 731 at [0070]-[0073], [0076]- [0080], [0082], [0084], [0086], [0088], [0090]; Lee 858 at [74]-[77], [81]-[85], [88], [90], [92], [94], [96], Figure 7; Stacey 0024 at pg. 35, 36-37, 48-50; Ko 0042 at pg. 2, 5, 6, 8; Khorov at pg. 1-5; Seok 397 at [0096], [0235], [0236], [0284], cl 18, Table II; Barriac 368 at Abstract 2:11-20 , 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7 , 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0003], [0004], [0048]- [0050], [0084]; Oteri 787 at [0072], [0078], [0106], [0107]; Park '352 at [0004], [0005], [0007], [0012], [0058]-[0062], [0064], [0071], [0083], [0107], [0110], [0113], [0114], [0123], [0124], [0131], [0135]-[0140], [0147], [0148], [0155], [0163], [0196], Figure 6, Figure 8, Figure 9, Figure 10. Moreover, a POSITA would have understood that setting entering/not entering a doze state may require classifying a PPDU as either inter or intra-BSS. *See, e.g.*, Stacey 0024 at 50-51. Thus, it would have been obvious to a POSITA that when

BSS color cannot, or should not, be used (*e.g.*, in the event of a BSS color collision), then BSS color cannot, or should not, be used for deciding whether to enter a doze state. This amounts to combining prior art elements according to known methods to yield predictable results. Moreover, the references disclosing both the BSS color collision scenario and doze state power save operations would have provided a POSITA with a teaching, suggestion, or motivation to combine one with the other.

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU. *See, e.g.*, Lee 731 at [0070]-[0073], [0076]- [0080], [0084], [0086], [0088], [0090]; Lee 858 at [74]-[77], [82]-[84], [88], [90], [92], [94], [96]; Stacey 0024 at pg. 35, 36-37, 48-50; Ko 0042 at pg. 2, 5, 6, 8; Khorov at pg. 1-5; Seok 397 at [0096], [0235], [0236], [0284], cl 18, Table II; Barriac 368 at Abstract 2:11-20 , 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7 , 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0003], [0004], [0048]- [0050], [0084]; Oteri 787 at [0072], [0078], [0106], [0107]; Park '352 at [0004], [0005], [0007], [0012], [0058]-[0062], [0064], [0068], [0071], [0083], [0107], [0110], [0113], [0114], [0123], [0124], [0131], [0135]-[0140], [0147], [0148], [0155], [0163], [0196], Figure 6, Figure 8, Figure 9, Figure 10.

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a processor can be configured not to perform a spatial reuse operation when the

BSS color indicated by the signaling field of the PPDU is a predetermined value. *See, e.g.*, Lee 731 at [0070]-[0073], [0076]-[0080], [0082], [0084], [0086], [0088], [0090]; Lee 858 at [74]-[77], [81]-[85], [90], [92], [94], [96]; Stacey 0024 at pg. 46-47, 48-49; Ko 0042 at pg. 2, 4, 6; Khorov at pg. 1-5; Seok 397 at [0265], [0280], [0292], [0311], [0324], [0351], [0379], [0380], [0381], [0384]-[0387], [0389]- [0393], [0395], [0396], Figure 22, Figure 23, Figure 24, Figure 25; Barriac 368 at Abstract 2:11-20 , 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7 , 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0003]; Oteri 787 at [0071], [0078], [0107]; Park '352 at [0103], [0104], [0107], [0119], [0173]. Moreover, a POSITA would have understood that performing spatial reuse may require classifying a PPDU as either inter or intra-BSS. *See, e.g.*, Stacey 0024 at 48-50. Thus, it would have been obvious to a POSITA that when BSS color cannot, or should not, be used (*e.g.*, in the event of a BSS color collision), then BSS color cannot, or should not, be used for spatial reuse. This amounts to combining prior art elements according to known methods to yield predictable results. Moreover, the references disclosing both the BSS color collision scenario and spatial reuse operations would have provided a POSITA with a teaching, suggestion, or motivation to combine one with the other. Moreover, a POSITA would have found it obvious that a predetermined BSS color value could signal when certain operations (including spatial reuse operations) based on BSS color are disallowed. *See, e.g.*, Stacey 0024 at 26.

It was well-known to one of skill in the art before the time of the '163 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that predetermined value of BSS color indicated by the signaling field can be 0. *See, e.g.*, Lee 731 at [0070]-[0073], [0076]-[0080], [0082], [0084], [0086], [0088], [0090]; Stacey 0024

at pg. 46-47, 48-49; Ko 0042 at pg. 2, 4, 6; Khorov at pg. 1-5; Seok 397 at [0265], [0280], [0292], [0311], [0324], [0351], [0379], [0380], [0381], [0384]-[0387], [0389]- [0393], [0395], [0396]; Barriac 368 at Abstract 2:11-20 , 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7 , 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0003]; Oteri 787 at [0071], [0078], [0107]; Park '352 at [0103], [0104], [0107], [0119], [0173]. Moreover, a POSITA would have found it obvious that a predetermined BSS color value of 0 could signal when certain operations (including spatial reuse operations) based on BSS color are disallowed. *See, e.g.*, Stacey 0024 at 26.

In addition, the prior art also provided sets of finite, identified, predictable solutions for known problems that would have been obvious to those of ordinary skill to try with a reasonable expectation of success. For example, it would have been obvious to one of skill in the art at the time that the disclosures relating to disabling/disallowing operations based on BSS color (*e.g.*, spatial reuse and NAV setting) could be applied to mitigate the effects of a BSS color collision.

The prior art references provide motivations to combine because they describe the field of the Asserted Patents, teach improvements, explain desired features, and even expressly state that one of skill in the art would be able to apply their teachings to related systems or methods. *See, e.g.*, Lee 731 at [0098] ("[T]hose skilled in the art will appreciate that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention described in the appended claims"); Lee 858 at [104] ("[A] person skilled in the art will understand that the skilled person in the art can modify and change the present invention in various ways within the scope of the ideas and scope of the present invention described in the scope of the patent claims as described below"); Seok 397 at [0044] ("As those skilled in the art would realize,

the described embodiments may be modified in various different ways, without departing from the spirit or scope of the invention").

Further, the prior art references provide motivations to combine because they explicitly suggest utilizing the teachings and disclosures of other references.

In accordance with these advances, the prior art could have been combined according to methods known to those of ordinary skill within the field of the '163 patent to yield predictable results. For example, it was known that an increase in density of Wi-Fi networks could cause a BSS color collision scenario or similar contention issues. *See, e.g.*, Zhou 258 at [0005] ("Systems, methods, and apparatuses for detection and resolution of basic service set (BSS) reduced version identifier collisions are described"); Ko 0042 at 6 ("Due to the lack of BSS color values, the probability of BSS color collision increases in dense environment"); *see also* Ex. G1-G24 at cl. 4, 5. It was further known that (1) use of BSS color could be disabled/disallowed and (2) certain processes/operations based on BSS color could be disabled/disallowed. *See, e.g.*, Lee 731 at Abstract ("[T]he frame includes a coloring disable bit, and when the coloring disable bit indicates that the frame is a multiuser transmission-related trigger frame, the STA does not perform a change of the CCA level without regard to information indicated by the coloring bit."); Barriac 368 at 2:12-15 ("The method includes determining, at an access point, whether to allow reuse of the wireless medium by one or more stations in a basic service set (BSS)"); *see also* Ex. G1-G24 at cl. [1c]. Those of ordinary skill in the art could have employed known techniques to improve similar prior art devices in the same way as claimed in the '163 patent.

In addition, one of ordinary skill in the art would be motivated to combine the prior art references because the elements found in the Asserted Claims of the '163 patent are well known in the art. Indeed, the listed inventors of the Asserted Patents admitted as much in the specification

of the ’163 Patent. *See, e.g.*, ’163 patent at 1:33-2:58.

Moreover, it would have been obvious to one of ordinary skill in the art at the time to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specifications, technical submissions, working group meeting presentations) with a system implementing an older IEEE 802.11ac standard. For example, one of ordinary skill in the art would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process with a real wireless communications hardware/device to yield a working wireless communication system with the improvements and benefits offered by the new standard. In another example, one of ordinary skill in the art would have been motivated to simply substitute an older version of a wireless module implemented on a wireless device/hardware with one implementing a newer version of the standard that addresses the shortcomings of the older standard. In yet another example, one of ordinary skill in the art would have been motivated to apply the known techniques disclosed in the documents submitted as part of the IEEE 802.11ax standard development process to an older wireless communications system implementing IEEE 802.11ax to yield the predictable results of improved wireless communication performance. Further, one of ordinary skill in the art would have been prompted by the teachings in the documents submitted as part of the IEEE 802.11ax standard development process to modify the wireless communications hardware/device to meet market demands for improved wireless performance.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (e.g., working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of a reference pertaining to hardware/devices (*e.g.*, non-access-point

stations) for wireless communications (*e.g.*, wireless local area network (WLAN)). For instance, a person of ordinary skill would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process—which generally address narrow technical issues and solutions—with references disclosing WLAN devices and hardware more broadly (*e.g.*, devices with transceivers and configurable processors) to yield a blueprint for a working device that addresses the technical problem disclosed in the IEEE 802.11ax standard development document. Such a combination amounts to combining known prior art elements according to known methods to yield predictable results. Further, to the extent any prior art WLAN devices/hardware documents disclose deficiencies or technical issues with the state of the art, one of ordinary skill in the art would have been prompted to combine these references with the teachings in documents submitted as part of the IEEE 802.11ax standard development process to meet market demands for improved wireless performance. This disclosure of deficiencies and/or technical issues would provide a teaching, suggestion, or motivation for a person of ordinary skill to modify the prior art reference based on the IEEE 802.11ax standard working documents.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of another document submitted as part of IEEE 802.11ax standard development process. For instance, considering the common underlying technical subject matter of the IEEE 802.11ax standard development documents, it would be obvious to one of ordinary skill to try combining the teachings of multiple documents. In doing so, a person of ordinary skill would have a reasonable expectation of success. Moreover, given the common goals and design incentives among authors of IEEE 802.11ax standard development documents (*e.g.*, improving

WLAN device performance), a person of ordinary skill would find it obvious to combine the technical solutions disclosed in multiple IEEE 802.11ax standard development documents. Further, given the additive nature of the IEEE standard development process, a person of ordinary skill would have understood that various IEEE 802.11ax standard development documents could be combined to create a cohesive solution. A person of ordinary skill would have a reasonable expectation of success in combining the teachings in these documents.

Any reference or combination of references that anticipates or makes obvious an asserted independent claim also makes obvious any asserted claim dependent on that independent claim, as the element of each dependent '163 patent Asserted Claim was known by a person of ordinary skill at the time of the alleged invention, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, Defendants contend that each Asserted Claim would have been obvious not only by the combinations described in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

In addition to the specific examples of motivation provided above, Defendants reserve the right to rely on the disclosures of the references listed in Appendix G for additional motivation to combine. The above-identified examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendants reserve the right to contend that the above-described motivations to combine apply to other combinations at the appropriate time, *i.e.*, in expert reports regarding invalidity.

For at least the reasons described above, it would have been obvious to one of ordinary

skill in the art to combine each prior art reference listed in Appendix G with any other reference or references listed in Appendix G along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the ’163 patent. For example, and without limitation, the Asserted Claims of the ’163 patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0223731 ("Lee 731")	• Asserted Patents Admitted Prior Art (APA) • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
WO 2016/021858 ("Lee 858")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Evgeny Khorov et al., *IEEE 802.11ax: How to Build High Efficiency WLANs*, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0249397 ("Seok 397")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 10,666,368 ("Barriac 368")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 10,321,485 ("Noh 485")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0345258 ("Zhou 258")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2021/0243787 ("Oteri 787")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0127352 ("Park 352")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
WO 2017/031640 ("Du 640")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0188306 ("Park 306")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2015/0124744 ("Zhu 744")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0078887 ("Barriac 887")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0330663 ("Zhou 663")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
EP 2986066A ("Nelson 066")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2019/082387 ("Kim 387")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/330685 ("Asterjadhi 685")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/257817 ("Itagaki 817")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE Std 802.11-2012 ("802.11-2012")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE Std 802.11ac ("802.11ac")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE Std 802.11ax/D1.0	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Systems implementing IEEE 802.11ac	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Knowledge of a person of ordinary skill

As mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. Moreover, the exemplary combinations are provided based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the

scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a *Markman* Order has not yet been issued in this case. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

8. U.S. Patent No. 11,700,597

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix H the prior art references that render obvious the Asserted Claims of the '597 patent and include below exemplary combinations showing the obviousness of the '597 patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix H, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of skill in the art at the time of the '597 patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix H, such reference may be combined with any other references listed in Appendix H for such element, thereby rendering the claims invalid for obviousness.

To the extent a finder of fact determines that a limitation of any of the '597 patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '597 patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a) Obviousness Rationale

For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix H along with the knowledge of one of ordinary skill in the art to meet the limitations of the '597 patent Asserted Claims. Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '597 patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

One or more combinations of the prior art references identified in Appendix H would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known,

equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix H would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '597 patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix H is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified

predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Additionally, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix H because all of these references relate to the same area of technology and/or are from analogous art. The '597 patent Asserted Claims are directed to disallowing processes that are based on BSS color. *See, e.g.*, '597 patent at 4:34-38, 21:28-32, 21:40-44, 51:22-27; 51:37-42, cl. 1, cl. 9. The prior art references generally relate to 802.11 WLAN technology. The references, like the '597 patent, are also reasonably pertinent to wireless communications issues in the PHY and MAC layers or issues related to overlapping basic service sets or BSS color. A person of ordinary skill would have understood that these related or analogous references can generally be combined to yield predictable results. Additionally, a person of ordinary skill would have found it obvious to leverage solutions to one WLAN technical problem in order to solve a different, but analogous, WLAN technical problem. Moreover, the technical complexity of WLAN technology would have motivated a person of ordinary skill to search for and consult references from within the field before considering references from outside the technical field. A person of ordinary skill would have motivated to combine these related or analogous art to provide benefits of each reference.

Similarly, it would be obvious to one of skill in the art to consult and/or combine any of the prior art listed in Appendix H because all of these references are works by people in the same technical field. For example, many of the authors of the prior art references are members of the same IEEE 802.11ax High Efficiency (HE) working group. *See e.g.,* IEEE 802.11-16/0024r1 ("Stacey 0024") (identifying authors of prior art references, such as Stacey, Cariou, Merline,

Jeongki Kim, Wentink). Moreover, one of ordinary skill in the art would have recognized that members of an IEEE working group frequently collaborate with, and build on, each other's work. Thus, one of ordinary skill in the art would have recognized that the works of the same IEEE working group are likely compatible or otherwise work harmoniously when combined.

The '597 patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the '597 patent Asserted Claims.

All of the '597 patent Asserted Claims are directed to disallowing processes that are based on BSS color. Such technology, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, was widely known before the alleged priority date of the '597 Patent, as evidenced by the references in Appendix H. *See, e.g.*, Lee 731 at Abstract, [0007]-[0010], [0012]-[0014], [0016], [0017], [0045]-[0047], [0051], [0055], [0058]-[0061], [0064], [0064], [0065], [0067]-[0069], [0071]-[0080], [0082]-[0086], [0088]-[0090], Figure 2, Figure 3, Figure 5, Figure 7, Figure 8; Lee 858 at [7]-[10], [12]-[14], [16], [17], [45]-[47], [51], [56], [61]-[64], [67], [68], [71]-[73], [75]-[79], [81]-[85], [88]-[92], [94]-[96], Figure 2, Figure 3, Figure 5, Figure 6, Figure 8; Stacey 0024 at 28, 29, 35, 24, 46, 48-49; Ko 0042 at 2-8; Khorov at 2-5; Seok 397 at Abstract, [0012]-[0014], [0023], [0073], [0078], [0079], [0089], [0090], [0101], [0157], [0188], [0189], [0195], [0240], [0241], [0283]- [0285], [0296], [0311], Figure1, Figure 4, Figure 5, Figure 7, Figure 8, Figure 12, Figure 15; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9,

6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 2:2-8, 10:1-13, 12:18-24, 12:44-13:47, 15:14-18, 15:39-53, 15:60-65, 16:18-26, 16:33-40, 16:58-64, 17:44-52, 17:62-65, 19:2-10, 20:22-51, 23:40-45; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0070], [0072], [0075], [0083]-[0087], [0091], [0097], [0100], [0105]-[0107], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0071], [0072], [0078], [0106], [0108]-[0112]; Park 352 at [0044], [0075], [0076], [0103], [0104], [0107], [0119]- [0121], [0134], [0159], [0161], [0173].

One of ordinary skill in the art would have been motivated to combine any of the references in Appendix H because, at the time of the alleged invention, BSS color collisions were a common problem with a well-known solution. In particular, common problems (*i.e.*, BSS color collisions) with conventional techniques for OBSS wireless communication were known to persons of ordinary skill in the art. *See, e.g.*, Khorov at 5 ("In .11ax, the size is increased at least up to 6 bits to reduce error probability [36], since BSS colors of two neighboring BSS can collide."); Zhou 258 at Abstract ("For example, the BSSs may use the same value for X-bit color indicators which results in a color collision if the BSSs are neighbor BSSs."); Ko 0396 at 2 ("Due to the lack of BSS color values, there may be the case that neighboring BSSs use the same BSS color value . . . This case is referred as 'BSS color collision' hereinafter."); Kim 387 at [0006] ("However, since the number of bits for representing BSS color information used by the STA to distinguish whether the received frame is intended for the STA is limited, it may cause not only a BSS color collision with a neighboring BSS but also malfunction of the STA."); Itagaki 817 at [0073] ("[T]he COLOR field includes 3 bits, and there are only 8 possible choices . . . Therefore, BSS COLOR overlapping between BSSes (OBSSes) having overlapping communication ranges"). BSS color collision is a

subset of contention-related issues that commonly arise in wireless communications (including, but not limited to, Wi-Fi) and of which a POSITA would have been aware at the time of the alleged invention. *See, e.g.*, Nelson 066 at [0003] ("[A] collision can occur on the radio channel when two or more transmitter devices transmit on the radio channel simultaneously."). A POSITA would have understood that in the event of a BSS color collision, use of BSS color may be an ineffective means for classifying PPDUs as either inter-BSS or intra-BSS. A POSITA would have been aware that in the event of identifier contention/collision generally, an obvious solution is to disable or disallow use of the identifier. In particular, disabling and/or disallowing BSS color use was well-known at the time of the alleged invention. *See, e.g.*, Lee 731 at Abstract (disclosing a "coloring disable bit"); Barriac 887 at [0098] ("APs can selectively allow or disallow reuse of the wireless medium based on a 'BSS distance.'"). Thus, a POSITA would have found it obvious to disable/disallow BSS color use in the event of a BSS color collision. Doing so would have amounted to (1) combining prior art elements (*i.e.*, BSS color collision and disabling/disallowing BSS color use) according to known methods to yield predictable results, (2) applying a known technique (*i.e.*, disabling or disallowing use of BSS color) to a known device ready for improvement (*i.e.*, a Wi-Fi device experiencing a BSS color collision) to yield predictable results. It would also have been obvious to a POSITA to try disabling BSS color use in the event of a BSS color collision, as use of other identifiers (e.g., MAC address) to classify PPDUs was well-known at the time.

Before the time of the '597 patent, wireless communication terminals were well known to one of skill in the art. *See, e.g.*, Lee 731 at Abstract, [0005], [0007], [0008], [0010]-[0014], [0032]-[0036], [0039]- [0041], [0062]-[0065], [0067]-[0073], [0076]-[0080], [0082]-[0086], [0088]-[0090], [0092]-[0097], Figure 1, Figure 2, Figure 7, Figure 8; Lee 858 at Abstract, [5], [7], [8],

[10]-[14], [32]-[36], [39]-[41], [65]-[68], [71]-[77], [81]-[85], [88]-[92], [94]-[96], [98]-[103], Figure 1, Figure 2, Figure 7, Figure 8; Stacey 0024 at 6-7, 11-12, 15-17, 22, 40-42, 45-52; Ko 0042 at 2-8, 10; Khorov at 1-5; Seok 397 at Abstract, [0005], [0007], [0008], [0012], [0019], [0045]-[0047], [0075], [0076], [0080], [0125], [0400]- [0402], cl. 1, Figure 1, Figure 5; Barriac 368 at 1:54-61, 10:17-23, 10:31-42, 10:64-11:15, 11:16-23, 11:53-60, 11:61-12:9, 12:32-42, 12:43-55, 12:56-62, 13:13-27, 27:4-18; Noh 485 at 4:34-50, 5:58-60, 6:31-40, 10:20-33, 11:14-23, 26:37-46; Zhou 258 at [0003], [0004], [0033], [0033], [0086], [0091], Figure 9, Figure 10, Figure 11A, Figure 11B, Figure 12A, Figure 12B; Oteri 787 at Abstract, [0002], [0027], [0028], [0036], [0047], [0048], [0050], [0051], [0053]-[0055], [0060], [0061], [0128], Figure 1A, Figure 1B; Park 352 at [0004], [0010], [0011], [0030], [0037], [0038], Claim 1, Claim 6, Figure , Figure 15.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that wireless communication terminals may include a transceiver. *See, e.g.*, Lee 731 at Abstract, [0002], [0007]-[0011], [0013], [0014], [0032], [0033], [0035], [0036], [0065], [0067]-[0069], [0073], [0076]-[0080], [0082]-[0086], [0088]- [0090], [0092], [0093], Figure 1, Figure 2, Figure 7, Figure 8; Lee 858 at Abstract, [2]-[11], [13], [14], [32], [33], [35], [36], [68], [71]-[73], [77], [81]-[85], [88]-[92], [94]-[96], [98], [99], Figure 1, Figure 2, Figure 7, Figure 8; Stacey 0024 at 38, 39, 55-60, 93, 124; Ko 0042 at 2-5, 7; Khorov at 1-5; Seok 397 at [0006], [0013], [0047], [0051], [0052], [0073], [0078], [0080], [0082], [0101], [0157], [0178], [0237], [0301], [0313], [0314], Figure 1, Figure 4, Figure 5, Figure 7, Figure 8; Barriac 368 at 3:24-34; 3:38-52, 6:61-7:3, 7:33-41, 10:57-63, 12:32-42, 12:43-55, 23:42-49, 24:60-67, 25:10-17, 25:24-31; Noh 485 at 5:58-60, 6:1-6, 6:7-10, 6:44-54, 7:7-12, 7:24-29, 7:60-8:3, 8:10-17, 8:60-9:3, 9:4-20, 11:30-41, 11:42-56, 11:57-63, 12:49-55, 15:19-53, 15:54-16:40, 18:6-24; Zhou 258 at [0070], [0086], [0090],

[0091], [0092], [0100], [0107], Figure 9, Figure 10, Figure 11A, Figure 11B, Figure 12A, Figure 12B; Oteri 787 at [0028], [0029], [0037]-[0039], [0042], [0046], [0053], [0128], Figure 1A, Figure 1B; Park 352 at Abstract, [0005]-[0007], [0010], [0011], [0038], Figure 1, Figure 15.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that wireless communication terminals may include a processor. *See, e.g.*, Lee 731 at [0008], [0092], [0093], [0095]-[0097], Figure 2, Figure; Lee 858 at [8], [98], [99], [101], [102], [103], Figure 2, Figure 8; Stacey 0024 at 26, 40, 102, 108, 117, 120-121; Ko 0042 at 2-5, 7; Khorov at 1-5; Seok 397 at Abstract, [0006], [0013], [0020], [0021], [0047]-[0051], [0055], [0056], [0058], [0060], [0062], [0064]-[0066], [0069], [0071], [0072], [0284], Figure 1- Figure 3; Barriac 368 at 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 6:61-7:3, 7:7-20, 7:21-32 [0034], 7:33-41, 11:61-12:9, 12:10-20, 12:21-31, 12:43-55, 13:4-13, 23:33-41, 23:50-55, 24:60-67, 25:1-9, 25:18-23, 26:13-28; Noh 485 at 5:58-60, 6:55-60, 6:61-7:6, 7:7-12, 6:44-54, 26:20-30, 26:37-46; Zhou 258 at [0009], [0086], [0091], [0099], [0100], [0101], [0104], [0105], [0107], [0108], [0109], [0134], [0135], [0136], Figure 9, Figure 10, Figure 11A, Figure 11B, Figure 12A, Figure 12B; Oteri 787 at [0038], [0039], [0043]-[0046], [0053]-[0055], [0059], [0128], Figure 1A, Figure 1B; Park 352 at [0011], [0187]-[0198], Figure 1, Figure 15.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a processor may be configured to receive a physical layer convergence procedure ("PLCP") processing data unit ("PPDU"). *See, e.g.*, Lee 731 at Abstract, [0007]-[0010], [0012]-[0014], [0016], [0017], [0045]-[0047], [0051], [0055], [0058]-[0061], [0064], [0064], [0065], [0067]-[0069], [0071]-[0080], [0082]-[0086], [0088]-[0090], Figure 2, Figure 3, Figure 5, Figure

7, Figure 8; Lee 858 at [7]-[10], [12]-[14], [16], [17], [45]-[47], [51], [56], [61]-[64], [67], [68], [71]-[73], [75]-[79], [81]-[85], [88]-[92], [94]-[96], Figure 2, Figure 3, Figure 5, Figure 6, Figure 8; Stacey 0024 at 28, 29, 35, 24, 46, 48-49; Ko 0042 at 2-8; Khorov at 2-5; Seok 397 at Abstract, [0012]-[0014], [0023], [0073], [0078], [0079], [0089], [0090], [0101], [0157], [0188], [0189], [0195], [0240], [0241], [0283]- [0285], [0296], [0311], Figure1, Figure 4, Figure 5, Figure 7, Figure 8, Figure 12, Figure 15; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 2:2-8, 10:1-13, 12:18-24, 12:44-13:47, 15:14-18, 15:39-53, 15:60-65, 16:18-26, 16:33-40, 16:58-64, 17:44-52, 17:62-65, 19:2-10, 20:22-51, 23:40-45; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0070], [0072], [0075], [0083]-[0087], [0091], [0097], [0100], [0105]-[0107], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0071], [0072], [0078], [0106], [0108]-[0112]; Park 352 at [0044], [0075], [0076], [0103], [0104], [0107], [0119]- [0121], [0134], [0159], [0161], [0173].

It was well-known to one of skill in the art before the time of the ’597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that a processor may be configured not to use a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed. *See*, *e.g.*, Lee 731 at Abstract, [0007]-[0010], [0012]-[0014], [0016], [0017], [0045]-[0047], [0051], [0055], [0058]-[0061], [0064], [0064], [0065], [0067]-[0069], [0071]-[0080], [0082]-[0086], [0088]-[0090], Figure 2, Figure 3, Figure 5, Figure 7, Figure 8; Lee 858 at [7]-[10], [12]-[14], [16], [17], [45]-[47], [51], [56], [61]-[64], [67], [68], [71]-[73], [75]-[79], [81]-[85], [88]-[92], [94]-[96],

Figure 2, Figure 3, Figure 5, Figure 6, Figure 8; Stacey 0024 at 28, 29, 35, 24, 46, 48-49; Ko 0042 at 2-8; Khorov at 2-5; Seok 397 at Abstract, [0012]-[0014], [0023], [0073], [0078], [0079], [0089], [0090], [0101], [0157], [0188], [0189], [0195], [0240], [0241], [0283]- [0285], [0296], [0311], Figure1, Figure 4, Figure 5, Figure 7, Figure 8, Figure 12, Figure 15; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 2:2-8, 10:1-13, 12:18-24, 12:44-13:47, 15:14-18, 15:39-53, 15:60-65, 16:18-26, 16:33-40, 16:58-64, 17:44-52, 17:62-65, 19:2-10, 20:22-51, 23:40-45; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0070], [0072], [0075], [0083]-[0087], [0091], [0097], [0100], [0105]-[0107], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0071], [0072], [0078], [0106], [0108]-[0112]; Park 352 at [0044], [0075], [0076], [0103], [0104], [0107], [0119]- [0121], [0134], [0159], [0161], [0173]. For reasons described above, it would have been obvious to incorporate disabling or disallowing BSS color use (*e.g.*, in the event of a detected BSS color collision).

It was well-known to one of skill in the art before the time of the ’597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that BSS color is an identifier of a BSS. *See*, *e.g.*, Lee 731 at Abstract, [0007]-[0014], [0017], [0034], [0037], [0038], [0040], [0041], [0062]-[0064], [0067]- [0068], [0071]- [0075], [0082], [0083], [0085], [0089], Figure 1, Figure 2, Figure 8; Lee 858 at Abstract, [7]-[14], [17], [34], [37]-[38], [40], [41], [65]-[67], [71]-[72], [75]-[70], [88], [89], [91], [95], Figure 1, Figure 2, Figure 8; Stacey 0024 at 24, 46, 49; Ko 0042 at 2-8; Khorov at 2, 4-5; Seok 397 at Abstract, [0012]-[0014], [0283]- [0285], [0296], [0311], [0354]; Barriac 368 at 2:60-69, 3:11-23, 4:8-16, 5:1-10,

6:1-10, 13:45-61, 20:53-62, 20:63-21:5, 21:6-23, 23:17-24; Noh 485 at 15:39-53, 15:60-65, 16:18-26, 17:44-52, 17:62-65, 19:2-10, 20:22-51, 23:40-45; Zhou 258 at [0003], [0004], [0005], [0006], [0044], [0049], [0067]; Oteri 787 at Abstract, [0003], [0071], [0072], [0078], [0106], [0108]-[0112]; Park 352 at [0044], [0103], [0104], [0107], [0119], [0120], [0159], [0161], [0173].

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that signaling information can be transmitted from a base wireless communication terminal to which a receiving wireless communication terminal is associated. *See, e.g.*, Lee 731 at [0034]-[0036], [0040], [0041], [0062], [0063], [0065], [0067], [0069], Figure 1, Figure 2, Figure 7, Figure 8; Lee 858 at [34], [35], [36], [40], [41], [65], [66], [68], [71], [73], Figure 1, Figure 2, Figure 7, Figure 8; Stacey 0024 at 24, 46, 48-49, 54-55, 78-80, 80-85, 85-91; Ko 0042 at 2-5, 7; Khorov at 1-5; Seok 397 at [0187], [0189], [0230], [0232], [0240], [0241], [0243], [0283]- [0285], [0343], [0345], [0346], [0369], Figure 22; Barriac 368 at 13:13-27, 16:14-43, 20:29-38, 20:39-50, 21:6-23 21:48-58; Noh 485 at 12:44-49, 14:59-65, 16:4-8, 16:9-17, 16:27-32, 16:53-57, 17:34-36, 22:9-21, 22:31-43, 23:1-4, 23:9-21, 25:29-31; Zhou 258 at [0004], [0006], [0016], [0049], [0051], [0066], [0070], [0078], [0085], [0087], [0088], [0093], [0118]; Oteri 787 at [0040], [0051], [0054], [0081], [0082], [0086], [0088], [0117]; Park 352 at [0039], [0061], [0065], [0066], [0075], [0078], [0103], [0181].

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a processor can be configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed. *See, e.g.*, Lee 731

at [0052]-[0055], [0057], [0070]-[0073], [0076]-[0080], [0082], [0084], [0086], [0088], Figure 5; Lee 858 at [53]-[57], [74]-[77], [81]-[85], [88], [90], [92], [94], Figure 5; Stacey 0024 at 26-27, 32, 37-38, 42-43, 46-47, 49; Ko 0042 at 2; Khorov at 1-5; Seok 397 at [0081], [0083], [0085]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 1:18-22, 1:57-2:8, 2:34-38, 11:24-29, 11:42-56, 13:55-14:9, 14:23-32, 15:54-59, 15:66-16:8, 16:18-26; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049], [0050], [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0106], [0112]; Park 352 at [0137]-[0139], [0178]-[0180]. Moreover, a POSITA would have understood that setting an inter- or intra-BSS NAV requires classifying a PPDU as either inter or intra-BSS. *See, e.g.*, Stacey 0024 at 39-40. Thus, it would have been obvious to a POSITA that when BSS color cannot, or should not, be used (*e.g.*, in the event of a BSS color collision), then BSS color cannot, or should not, be used for setting an inter- or intra-BSS NAV. This amounts to combining prior art elements according to known methods to yield predictable results. Moreover, the references disclosing both the BSS color collision scenario and inter-/intra-BSS NAV would have provided a POSITA with a teaching, suggestion, or motivation to combine one with the other.

It was well-known to one of skill in the art before the time of the ’597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that an Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU. *See, e.g.*, Lee 731 at [0052]-[0055], [0057], [0063], [0064], [0082],

[0084], [0086], [0088], [0090], Figure 5; Lee 858 at [53]-[57], [66], [67], [88], [89], [92], [94], [96], Figure 5; Stacey 0024 at 26-27, 32, 37-38, 42-43, 46-47, 49; Ko 0042 at 2, 4, 7-8, 10; Khorov at 1-5; Seok 397 at [0081], [0083], [0085]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 1:57-2:8, 2:34-38,13:55-14:9, 15:54-59, 15:66-16:8, 16:18-26; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]- [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0106], [0112]; Park '352 at [0098], [0102], [0104], [0118], [0122], [0137]-[0139], [0178]-[0180].

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU. *See, e.g.*, Lee 731 at [0052], [0053], [0054]-[0056], [0063]-[0064], [0082], [0084], [0086], [0088], [0090], Figure 5; Lee 858 at [0053]-[0057], [66], [67], [88], [90], [92], [94], [96], Figure 5; Stacey 0024 at 26-27, 32, 37-38, 42-43, 46-47, 49; Ko 0042 at 3, 4, 7; Khorov at 1-5; Seok 397 at [0081], [0083], [0085]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 1:57-2:8, 2:34-38, 13:55-14:9, 15:54-59, 15:66-16:8, 16:33-40, 17:5-10; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0072],

[0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0106], [0112]; Park ’352 at [0098], [0102], [0104], [0118], [0122], [0137]-[0139], [0178]-[0180].

It was well-known to one of skill in the art before the time of the ’597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that a PPDU can include a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field. *See, e.g.*, Lee 731 at [0035], [0052], [0053], [0054]-[0056], [0065], [0070]-[0073], [0076]-[0080], [0082], [0084], [0086], [0088], [0090], Figure 5, Figure 7; Lee 858”) at [35], [53], [54], [55]-[57], [68], [74]-[77], [81]-[85], [88], [90], [92], [94], [96], Figure 5, Figure 7; Stacey 0024 at 37-38, 80, 81, 82; Ko 0042 at 2, 4, 5, 7, 10; Khorov at 1-5; Seok 397 at [0081], [0083], [0085], [0095], [0105]- [0107], [0253], [0259], [0261], [0262]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Noh 485 at 2:57-59, 16:18-26, 21:28-32, 21:42-53, 18:43-48; Zhou 258 at [0005], [0006], [0017], [0044], [0045], [0046], [0049], [0050], [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0080], [0083], [0090], [0096], [0120], [0121]; Park ’352 at [0060], [0138], [0139], [0143], [0145], [0152]- [0153], [0155], [0196], Claim 2, Claim 7.

It was well-known to one of skill in the art before the time of the ’597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that the TXOP Duration field indicates information used for setting the Intra-BSS

NAV and the Basic NAV. *See, e.g.*, Lee 731 at [0052]-[0056], [0063], Figure 5; Lee 858 at [53]-[57], [66], [67], Figure 5; Stacey 0024 at 37-38, 80, 81, 82; Ko 0042 at 2, 4, 5, 7, 10; Khorov at 1-5; Seok 397") at [0081], [0083], [0085], [0095], [0105]- [0107], [0253], [0259], [0261], [0262]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258") at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0080], [0083], [0090], [0096], [0106], [0112], [0120], [0121]; Park '352 at [0137]-[0139], [0178]-[0180], [0196], Claim 2, Claim 7.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV. *See, e.g.*, Lee 731 at [0052]-[0056], [0063], [0064], Figure 5; Lee 858 at [53]-[57], [66], [67], Figure 5; Stacey 0024 at 37-38, 80, 81, 82; Ko 0042 at 2, 4, 5, 7, 10; Khorov at 1-5; Seok 397 at [0081], [0083], [0085], [0095], [0105]- [0107], [0253], [0259], [0261], [0262]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0005], [0006], [0017], [0044]- [0046], [0049]- [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at [0052], [0061], [0071], [0078], [0080], [0083],

[0090], [0096], [0106], [0112], [0120], [0121]; Park ’352 at [0060], [0137]-[0139], [0143], [0145], [0152], [0153], [0155], [0178]-[0180].

It was well-known to one of skill in the art before the time of the ’597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that the processor can be configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame. *See, e.g.*, Lee 731 at [0035], [0052]- [0056], [0062]-[0065], Figure 5, Figure 7; Lee 858 at [35], [53]-][57], [65]-[68], Figure 5, Figure 7; Stacey 0024 at 37-38, 80, 81, 82; Ko 0042 at 2, 4, 5, 7, 10; Khorov at 1-5; Seok 397 at [0081], [0083], [0085], [0095], [0105]- [0107], [0253], [0259], [0261], [0262]; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049], [0050], [0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787”) at [0052], [0061], [0071], [0078], [0080], [0083], [0090], [0096], [0106], [0112], [0120], [0121]; Park ’352 at [0060], [0137]-[0139], [0143], [0145], [0152], [0153], [0155], [0178]-[0180].

It was well-known to one of skill in the art before the time of the ’597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff’s infringement contentions, that the processor can be configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred. *See, e.g.*, Lee 731 at [0062]-[0064]; Lee 858 at [65]-[67]; Stacey 0024 at 32, 41, 46, 48-49; Ko 0042 at 4, 6, 8; Khorov at 1, 2, 4, 5; Seok 397 at [0023], [0073], [0078],

[0079], [0284], [0327], [0329], [0354], [0356], [0359], Figure 4, Figure 5; Barriac 368 at Abstract, 2:11-20, 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7, 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0057], [0071], [0072], [0078], [0106], [0108]- [0112]; Park '352 at [0046], [0081], [0083], [0103], [0104], [0107], [0111], [0116], [0117], [0119], [0127], [0132], [0134], [0140], [0173]. Moreover, a POSITA would have understood that a BSS color collision scenario is one reason to disallow/disable BSS color use. *See, e.g.*, Khorov at 5 ("In .11ax, the size is increased at least up to 6 bits to reduce error probability [36], since BSS colors of two neighboring BSS can collide."); Zhou 258 at Abstract ("For example, the BSSs may use the same value for X-bit color indicators which results in a color collision if the BSSs are neighbor BSSs."); Ko 0396 at 2 ("Due to the lack of BSS color values, there may be the case that neighboring BSSs use the same BSS color value . . . This case is referred as 'BSS color collision' hereinafter."); Kim 387 at [0006] ("However, since the number of bits for representing BSS color information used by the STA to distinguish whether the received frame is intended for the STA is limited, it may cause not only a BSS color collision with a neighboring BSS but also malfunction of the STA."); Itagaki 817 at [0073] ("[T]he COLOR field includes 3 bits, and there are only 8 possible choices . . . Therefore, BSS COLOR overlapping between BSSes (OBSSes) having overlapping communication ranges"). A POSITA would further have understood that, in the event of a BSS color collision, an AP would ideally update the BSS color to rectify the color collision. *See, e.g.*, Itagaki 817 at [0192]. Thus, a POSITA would have found it obvious to

configure a device to signal when a BSS color collision is detected. *See, e.g., id.*, Zhou 258 at [0005], [0017]-[0018]. This amounts to combining prior art elements according to known methods to yield predictable results.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a BSS color collision represents that different BSSs correspond to one BSS color. *See, e.g.*, Lee 731 at [0062]-[0064]; Lee 858 at [65]-[67]; Stacey 0024 at 32, 41, 46, 48-49; Ko 0042 at 2, 4, 5, 6, 8; Khorov at 1, 2, 4, 5; Seok 397 at [0023], [0073], [0078], [0079], [0284], [0327], [0329], [0354], [0356], [0359], Figure 4, Figure 5; Barriac 368 at Abstract 2:60-67, 3:11-23, 4:8-16, 5:1-10, 15:38-67, 21:6-23; Zhou 258 at [0005], [0006], [0017], [0044]-[0046], [0049]-[0051], [0054], [0056], [0065], [0069], [0072], [0075], [0083], [0086], [0091], [0100], [0105], [0106], [0109], [0110], [0113], [0117], [0121], [0125]; Oteri 787 at Abstract, [0003], [0040], [0051], [0057], [0071], [0072], [0078], [0106], [0108]- [0112]; Park '352 at [0046], [0081], [0083], [0103], [0104], [0107], [0111], [0116], [0117], [0119], [0127], [0132], [0134], [0140], [0173].

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the processor can be configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame. *See, e.g.*, Lee 731 at [0035], [0052], [0062]-[0065], [0082], [0090], Figure 7; Lee 858 at [35], [65]-[68], [88], [96]; Stacey 0024 at pg. 32, 41, 46, 48-49; Ko 0042 at pg. 4, 6, 7, 8; Khorov at pg. 2, 4, 5; Seok 397 at [0023], [0073], [0078], [0079], [0217], [0240], [0241], [0284], [0327], [0329], [354], [356], [359], Figure 4, Figure 5; Barriac 368 at 13:45-61; Zhou 258 at [0016], [0070], [0078], [0080], [0096],

[0103], [0119]; Oteri 787 at [0071]; Park '352 at [0037], [0043], [0075], [0120], [0139], [0143], [0153], [0159], [0166], [0174]. A POSITA would have understood that a MAC address is a unique identifier for a BSS and thus would have found it obvious to use MAC address to determine whether a BSS color collision has occurred. *See, e.g.*, Zhou 258 at [0016]. This amounts to combining prior art elements according to known methods to yield predictable results.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that an operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU. *See, e.g.*, Lee 731 at [0070]-[0073], [0076]- [0080], [0082], [0084], [0086], [0088], [0090]; Lee 858 at [74]-[77], [81]-[85], [88], [90], [92], [94], [96], Figure 7; Stacey 0024 at pg. 35, 36-37, 48-50; Ko 0042 at pg. 2, 5, 6, 8; Khorov at pg. 1-5; Seok 397 at [0096], [0235], [0236], [0284], cl 18, Table II; Barriac 368 at Abstract 2:11-20 , 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7 , 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0003], [0004], [0048]- [0050], [0084]; Oteri 787 at [0072], [0078], [0106], [0107]; Park '352 at [0004], [0005], [0007], [0012], [0058]-[0062], [0064], [0071], [0083], [0107], [0110], [0113], [0114], [0123], [0124], [0131], [0135]-[0140], [0147], [0148], [0155], [0163], [0196], Figure 6, Figure 8, Figure 9, Figure 10. Moreover, a POSITA would have understood that setting entering/not entering a doze state may require classifying a PPDU as either inter or intra-BSS. *See, e.g.*, Stacey 0024 at 50-51. Thus, it would have been obvious to a POSITA that when BSS color cannot, or should not, be used (*e.g.*, in the event of a BSS color collision), then BSS color cannot, or should not, be used for deciding whether to enter a doze state. This amounts to

combining prior art elements according to known methods to yield predictable results. Moreover, the references disclosing both the BSS color collision scenario and doze state power save operations would have provided a POSITA with a teaching, suggestion, or motivation to combine one with the other.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU. *See, e.g.*, Lee 731 at [0070]-[0073], [0076]- [0080], [0084], [0086], [0088], [0090]; Lee 858 at [74]-[77], [82]-[84], [88], [90], [92], [94], [96]; Stacey 0024 at pg. 35, 36-37, 48-50; Ko 0042 at pg. 2, 5, 6, 8; Khorov at pg. 1-5; Seok 397 at [0096], [0235], [0236], [0284], cl 18, Table II; Barriac 368 at Abstract 2:11-20 , 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7 , 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0003], [0004], [0048]- [0050], [0084]; Oteri 787 at [0072], [0078], [0106], [0107]; Park '352 at [0004], [0005], [0007], [0012], [0058]-[0062], [0064], [0068], [0071], [0083], [0107], [0110], [0113], [0114], [0123], [0124], [0131], [0135]-[0140], [0147], [0148], [0155], [0163], [0196], Figure 6, Figure 8, Figure 9, Figure 10.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that a processor can be configured not to perform a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value. *See, e.g.*, Lee 731 at [0070]-[0073], [0076]-[0080], [0082], [0084], [0086], [0088], [0090]; Lee 858 at [74]-[77],

[81]-[85], [90], [92], [94], [96]; Stacey 0024 at pg. 46-47, 48-49; Ko 0042 at pg. 2, 4, 6; Khorov at pg. 1-5; Seok 397 at [0265], [0280], [0292], [0311], [0324], [0351], [0379], [0380], [0381], [0384]-[0387], [0389]- [0393], [0395], [0396], Figure 22, Figure 23, Figure 24, Figure 25; Barriac 368 at Abstract 2:11-20 , 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7 , 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0003]; Oteri 787 at [0071], [0078], [0107]; Park '352 at [0103], [0104], [0107], [0119], [0173]. Moreover, a POSITA would have understood that performing spatial reuse may require classifying a PPDU as either inter or intra-BSS. *See, e.g.*, Stacey 0024 at 48-50. Thus, it would have been obvious to a POSITA that when BSS color cannot, or should not, be used (*e.g.*, in the event of a BSS color collision), then BSS color cannot, or should not, be used for spatial reuse. This amounts to combining prior art elements according to known methods to yield predictable results. Moreover, the references disclosing both the BSS color collision scenario and spatial reuse operations would have provided a POSITA with a teaching, suggestion, or motivation to combine one with the other. Moreover, a POSITA would have found it obvious that a predetermined BSS color value could signal when certain operations (including spatial reuse operations) based on BSS color are disallowed. *See, e.g.*, Stacey 0024 at 26.

It was well-known to one of skill in the art before the time of the '597 patent, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, that predetermined value of BSS color indicated by the signaling field can be 0. *See, e.g.*, Lee 731 at [0070]-[0073], [0076]-[0080], [0082], [0084], [0086], [0088], [0090]; Stacey 0024 at pg. 46-47, 48-49; Ko 0042 at pg. 2, 4, 6; Khorov at pg. 1-5; Seok 397 at [0265], [0280], [0292], [0311], [0324], [0351], [0379], [0380], [0381], [0384]-[0387], [0389]- [0393], [0395], [0396];

Barriac 368 at Abstract 2:11-20 , 2:51-59, 2:60-67, 3:11-23, 3:24-34, 3:38-52, 3:65-4:7 , 4:8-16, 4:59-67, 5:1-10, 5:57-67, 6:1-9, 6:35-49, 6:57-60, 6:61-7:3, 7:7-20, 7:21-32, 7:33-41, 7:42-47, 8:7-18, 8:28-33, 8:65-9:9, 9:20-25, 11:61-12:9, 12:43-55, 13:13-27, 13:28-61, 15:8-37, 17:4-18, 17:19-27, 19:40-47; Zhou 258 at [0003]; Oteri 787 at [0071], [0078], [0107]; Park '352 at [0103], [0104], [0107], [0119], [0173]. Moreover, a POSITA would have found it obvious that a predetermined BSS color value of 0 could signal when certain operations (including spatial reuse operations) based on BSS color are disallowed. *See, e.g.*, Stacey 0024 at 26.

In addition, the prior art also provided sets of finite, identified, predictable solutions for known problems that would have been obvious to those of ordinary skill to try with a reasonable expectation of success. For example, it would have been obvious to one of skill in the art at the time that the disclosures relating to disabling/disallowing operations based on BSS color (*e.g.*, spatial reuse and NAV setting) could be applied to mitigate the effects of a BSS color collision.

The prior art references provide motivations to combine because they describe the field of the Asserted Patents, teach improvements, explain desired features, and even expressly state that one of skill in the art would be able to apply their teachings to related systems or methods. *See, e.g.*, Lee 731 at [0098] ("[T]hose skilled in the art will appreciate that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention described in the appended claims"); Lee 858 at [104] ("[A] person skilled in the art will understand that the skilled person in the art can modify and change the present invention in various ways within the scope of the ideas and scope of the present invention described in the scope of the patent claims as described below"); Seok 397 at [0044] ("As those skilled in the art would realize, the described embodiments may be modified in various different ways, without departing from the spirit or scope of the invention").

Further, the prior art references provide motivations to combine because they explicitly suggest utilizing the teachings and disclosures of other references.

In accordance with these advances, the prior art could have been combined according to methods known to those of ordinary skill within the field of the '597 patent to yield predictable results. For example, it was known that an increase in density of Wi-Fi networks could cause a BSS color collision scenario or similar contention issues. *See, e.g.*, Zhou 258 at [0005] ("Systems, methods, and apparatuses for detection and resolution of basic service set (BSS) reduced version identifier collisions are described"); Ko 0042 at 6 ("Due to the lack of BSS color values, the probability of BSS color collision increases in dense environment"); *see also* Ex. G1-G24 at cl. 4, 5. It was further known that (1) use of BSS color could be disabled/disallowed and (2) certain processes/operations based on BSS color could be disallowed. *See, e.g.*, Lee 731 at Abstract ("[T]he frame includes a coloring disable bit, and when the coloring disable bit indicates that the frame is a multiuser transmission-related trigger frame, the STA does not perform a change of the CCA level without regard to information indicated by the coloring bit."); Barriac 368 at 2:12-15 ("The method includes determining, at an access point, whether to allow reuse of the wireless medium by one or more stations in a basic service set (BSS)"); *see also* Ex. G1-G24 at cl. [1c]. Those of ordinary skill in the art could have employed known techniques to improve similar prior art devices in the same way as claimed in the '597 patent.

In addition, one of ordinary skill in the art would be motivated to combine the prior art references because the elements found in the Asserted Claims of the '597 patent are well known in the art. Indeed, the listed inventors of the Asserted Patents admitted as much in the specification of the '597 Patent. *See, e.g.,* '597 patent at 1:36-2:68.

Moreover, it would have been obvious to one of ordinary skill in the art at the time to

combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specifications, technical submissions, working group meeting presentations) with a system implementing an older IEEE 802.11ac standard. For example, one of ordinary skill in the art would have been motivated to combine the teachings of a document submitted as part of the IEEE 802.11ax standard development process with a real wireless communications hardware/device to yield a working wireless communication system with the improvements and benefits offered by the new standard. In another example, one of ordinary skill in the art would have been motivated to simply substitute an older version of a wireless module implemented on a wireless device/hardware with one implementing a newer version of the standard that addresses the shortcomings of the older standard. In yet another example, one of ordinary skill in the art would have been motivated to apply the known techniques disclosed in the documents submitted as part of the IEEE 802.11ax standard development process to an older wireless communications system implementing IEEE 802.11ax to yield the predictable results of improved wireless communication performance. Further, one of ordinary skill in the art would have been prompted by the teachings in the documents submitted as part of the IEEE 802.11ax standard development process to modify the wireless communications hardware/device to meet market demands for improved wireless performance.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (e.g., working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of a reference pertaining to hardware/devices (*e.g.*, non-access-point stations) for wireless communications (*e.g.*, wireless local area network (WLAN)). For instance, a person of ordinary skill would have been motivated to combine the teachings of a document

submitted as part of the IEEE 802.11ax standard development process—which generally address narrow technical issues and solutions—with references disclosing WLAN devices and hardware more broadly (*e.g.*, devices with transceivers and configurable processors) to yield a blueprint for a working device that addresses the technical problem disclosed in the IEEE 802.11ax standard development document. Such a combination amounts to combining known prior art elements according to known methods to yield predictable results. Further, to the extent any prior art WLAN devices/hardware documents disclose deficiencies or technical issues with the state of the art, one of ordinary skill in the art would have been prompted to combine these references with the teachings in documents submitted as part of the IEEE 802.11ax standard development process to meet market demands for improved wireless performance. This disclosure of deficiencies and/or technical issues would provide a teaching, suggestion, or motivation for a person of ordinary skill to modify the prior art reference based on the IEEE 802.11ax standard working documents.

It would have been obvious to one of ordinary skill in the art at the time to combine teachings of a document submitted as part of IEEE 802.11ax standard development process (*e.g.*, working group documents, draft specification, technical submissions, working group meeting presentations) with teachings of another document submitted as part of IEEE 802.11ax standard development process. For instance, considering the common underlying technical subject matter of the IEEE 802.11ax standard development documents, it would be obvious to one of ordinary skill to try combining the teachings of multiple documents. In doing so, a person of ordinary skill would have a reasonable expectation of success. Moreover, given the common goals and design incentives among authors of IEEE 802.11ax standard development documents (*e.g.*, improving WLAN device performance), a person of ordinary skill would find it obvious to combine the technical solutions disclosed in multiple IEEE 802.11ax standard development documents.

Further, given the additive nature of the IEEE standard development process, a person of ordinary skill would have understood that various IEEE 802.11ax standard development documents could be combined to create a cohesive solution. A person of ordinary skill would have a reasonable expectation of success in combining the teachings in these documents.

Any reference or combination of references that anticipates or makes obvious an asserted independent claim also makes obvious any asserted claim dependent on that independent claim, as the element of each dependent '597 patent Asserted Claim was known by a person of ordinary skill at the time of the alleged invention, at least partially based on, but not limited by, the claim constructions implicit in Plaintiff's infringement contentions, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, Defendants contend that each Asserted Claim would have been obvious not only by the combinations described in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

In addition to the specific examples of motivation provided above, Defendants reserve the right to rely on the disclosures of the references listed in Appendix H for additional motivation to combine. The above-identified examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendants reserve the right to contend that the above-described motivations to combine apply to other combinations at the appropriate time, *i.e.*, in expert reports regarding invalidity.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix H with any other reference or references listed in Appendix H along with the knowledge of one of ordinary skill in the art to

arrive at the inventions claims in the ’597 patent. For example, and without limitation, the Asserted Claims of the ’597 patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

Patent No. or Title (Primary Inventor/Author)	**In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))**
US 2017/0223731 (“Lee 731”)	• Asserted Patents Admitted Prior Art (APA) • WO 2016/021858 (“Lee 858”) • IEEE P802.11 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”) • IEEE 802.11-16/0042r2 “BSS Color Settings for a Multiple BSSID Set” (“Ko 0042”) • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int’l Conf. on Eng’g & Telecomm. 14-19 (2015) (“Khorov”) • US 2016/0249397 (“Seok 397”) • US 10,666,368 (“Barriac 368”) • US 10,321,485 (“Noh 485”) • US 2016/0345258 (“Zhou 258”) • US 2021/0243787 (“Oteri 787”) • US 2017/0127352 (“Park 352”) • US 2017/0188306 (“Park 306”) • US 2015/0124744 (“Zhu 744”) • WO 2017/031640 (“Du 640”) • US 2017/0078887 (“Barriac 887”) • IEEE 802.11-16/0396r0 “Issues on BSS Color Collision” (“Ko 0396”) • US 2016/0330663 (“Zhou 663”) • EP 2986066A (“Nelson 066”) • US 2019/082387 (“Kim 387”) • US 2016/330685 (“Asterjadhi 685”) • US 2017/257817 (“Itagaki 817”) • IEEE Std 802.11-2012 (“802.11-2012”) • IEEE Std 802.11ac (“802.11ac”) • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
WO 2016/021858 ("Lee 858")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Evgeny Khorov et al., *IEEE 802.11ax: How to Build High Efficiency WLANs*, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0249397 ("Seok 397")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 10,666,368 ("Barriac 368")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 10,321,485 ("Noh 485")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0345258 ("Zhou 258")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2021/0243787 ("Oteri 787")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0127352 ("Park 352")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
WO 2017/031640 ("Du 640")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0188306 ("Park 306")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2015/0124744 ("Zhu 744")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/0078887 ("Barriac 887")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/0330663 ("Zhou 663")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
EP 2986066A ("Nelson 066")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2019/082387 ("Kim 387")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2016/330685 ("Asterjadhi 685")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
US 2017/257817 ("Itagaki 817")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE Std 802.11-2012 ("802.11-2012")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE Std 802.11ac ("Wi-Fi 5")	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ax/D1.0 • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
IEEE Std 802.11ax/D1.0	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • Systems implementing IEEE 802.11ac • Knowledge of a person of ordinary skill

Patent No. or Title (Primary Inventor/Author)	In Combination with One or More of: (Patent No. or Title (Primary Inventor/Author))
Systems implementing IEEE 802.11ac	• Asserted Patents Admitted Prior Art (APA) • US 2017/0223731 ("Lee 731") • WO 2016/021858 ("Lee 858") • IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024") • IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") • Evgeny Khorov et al., IEEE 802.11ax: How to Build High Efficiency WLANs, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov") • US 2016/0249397 ("Seok 397") • US 10,666,368 ("Barriac 368") • US 10,321,485 ("Noh 485") • US 2016/0345258 ("Zhou 258") • US 2021/0243787 ("Oteri 787") • US 2017/0127352 ("Park 352") • US 2017/0188306 ("Park 306") • US 2015/0124744 ("Zhu 744") • WO 2017/031640 ("Du 640") • US 2017/0078887 ("Barriac 887") • IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396") • US 2016/0330663 ("Zhou 663") • EP 2986066A ("Nelson 066") • US 2019/082387 ("Kim 387") • US 2016/330685 ("Asterjadhi 685") • US 2017/257817 ("Itagaki 817") • IEEE Std 802.11-2012 ("802.11-2012") • IEEE Std 802.11ac ("802.11ac") • IEEE Std 802.11ax/D1.0 • Knowledge of a person of ordinary skill

As mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. Moreover, the exemplary combinations are provided based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a

Markman Order has not yet been issued in this case. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

C. Improper Inventorship

The Asserted Patents, including all Asserted Claims, are invalid for failure to comply with 35 U.S.C. §§ 101, 115, 282, on the grounds that the purported inventors did not themselves invent the subject matter sought to be patented, resulting in improper inventorship. Specifically, the inventors of Asserted Patents derived their purported inventions from others, and/or one or more joint inventors who conceived significant parts of the purported inventions were not named as inventors on the Asserted Patents.

1. U.S. Patent No. 10,313,077

The '077 patent, including all asserted claims therein, are invalid on the grounds that the inventors of the '077 patent derived their purported inventions from others. Table 3-A provides an identification, by the name of the person(s), from whom the purported invention was derived, and the circumstances of derivation are explained below.

Table 3-A: Prior Art under § 102 for the '077 patent

No.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RA-1	Bharadwaj 202	• Arjun Bharadwaj • Bin Tian
RA-2	Cao 067	• Rui Cao • Xiayu Zheng • Hongyuan Zhang
RA-3	802.11-15/0810	• Hongyuan Zhang • Arjun Bharadwaj • Rui Cao • Others listed on 802.11-15/0810

No.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RA-4	Yu 012	• Heejung Yu • Daewon Lee • Young Hoon Kwon • Sungho Moon • Yujin Noh
RA-6	Lin 929	• Meilu Lin • Yun Liu
RA-8	Cao 476	• Rui Cao • Xiayu Zheng • Hongyuan Zhang

For example, Juhyung Son (a.k.a. John Son, Ju-Hyung Son)—an inventor of the '077 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" ("TGax") meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the submissions, frameworks, and draft standards for IEEE 802.11ax being discussed, considered, and voted upon at those meetings, including technical submissions by non-Wilus contributors such as 802.11-15/0810. Juhyung Son derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '077 patent.

Further, for example, Jinsam Kwak—an inventor of the '077 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May

2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the submissions, frameworks, and draft standards for IEEE 802.11ax being discussed, considered, and voted upon at those meetings, including technical submissions by non-Wilus contributors such as 802.11-15/0810. Jinsam Kwak derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '077 patent.

Further, for example, Geonjung Ko—an inventor of the '077 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the submissions, frameworks, and draft standards for IEEE 802.11ax being discussed, considered, and voted upon at those meetings, including technical submissions by non-Wilus contributors such as 802.11-15/0810. Geonjung Ko derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '077 patent.

Further, many of the inventors of the prior art references listed in Table 3-A above were members of Task Group AX. *See e.g.*, 802.11-15/0810 (identifying as task group members, *e.g.*,

Hongyuan Zhang, Rui Cao, Arjun Bharadwaj, and Bin Tian, who are authors/inventors of the prior art listed above in Table 3-A). Thus, by virtue of their attendance at the Task Group AX meetings, Juhyung Son, Jin Sam Kwak, and/or Geonjung Ko were aware of the subject matter of the prior art references listed in Table 3-A and what was discussed at those meetings, and derived this information in connection with filing a patent application that led to the '077 patent.

Moreover, the listed inventors Juhyung Son, Jin Sam Kwak, and/or Geonjung Ko frequently collaborated with other WILUS employees and Yonsei University employees, such as Minseok Noh, Jinsoo Ahn, Ronny Yongho Kim, Hanseul Hong, Kukil Lim, Jinho Lee, Young-Chai Ko, Yongho Seok *See e.g.,* IEEE 11-16-1425, "Clarification on applying MU EDCA parameter set," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1425-02-00ax-clarification-on-applying-mu-edca-parameter-set.pptx; IEEE 11-16-1424, "Issue on the CWmax value in MU EDCA," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1424-02-00ax-issue-on-the-cwmax-value-in-mu-edca.pptx; IEEE 11-14-0838, "Discussion on dual-link STR in IEEE 802.11ax," https://mentor.ieee.org/802.11/dcn/14/11-14-0838-01-00ax-discussion-on-dual-link-str-in-ieee-802-11ax.pptx; IEEE 11-16-0352, "Consideration on MU initial link setup," https://mentor.ieee.org/802.11/dcn/16/11-16-0352-01-00ax-considerations-on-mu-initial-link-setup.pptx; IEEE 11-16-0641, "Regarding HE fragmentation," https://mentor.ieee.org/802.11/dcn/16/11-16-0641-02-00ax-regarding-he-fragmentation.pptx; IEEE 11-16-0916," TID value of ALL ACK signaling," https://mentor.ieee.org/802.11/dcn/16/11-16-0917-01-00ax-text-for-tid-value-of-all-ack-signaling.docx; IEEE 11-16-1426, "DL/UL indication in MU-RTS," https://mentor.ieee.org/802.11/dcn/16/11-16-1426-00-00ax-dl-ul-indication-in-mu-rts.pptx. By virtue of their collaborations, one or more of the listed inventors

was aware of the claimed subject matter invented by these collaborators, and derived this information in connection with filing a patent application that led to the ’077 patent.

To the extent that the ’077 patent includes patentable subject matter with respect to any Asserted Claims, the ’077 patent fails to name all inventors. As an example, the subject matter of one or more of the Asserted Claims of the ’077 patent, at least as the claims are apparently being interpreted by Wilus, was disclosed in IEEE 802.11-15/0810r0 “HE PHY Padding and Packet Extension” (“802.11-15/0810”). This prior art reference was authored by several of the authors of other prior art references in Table 3-A, such as Arjun Bharadwaj, Hongyuan Zhang, and Rui Cao. As demonstrated in the accompanying charts, IEEE 802.11-15/0810r0 discloses at least one claim element of the Asserted Claims of the ’077 patent. IEEE 802.11-15/0810r0 demonstrates that other authors are inventors of the subject matter of the ’077 patent, despite not being listed as a named inventor thereon. *See* Ex. A-03.

Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

2. U.S. Patent No. 11,159,210

The ’210 patent, including all asserted claims therein, are invalid on the grounds that the inventors of the ’210 patent derived their purported inventions from others. Table 3-B provides an identification, by the name of the person(s), from whom the purported invention was derived, and the circumstances of derivation are explained below.

Table 3-B: Prior Art under § 102 for the ’210 patent

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RB-1	Bharadwaj 136	• Arjun Bharadwaj • Bin Tian • Lochan Verma • Sameer Vermani

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RB-2	Lim 066	• Dongguk Lim • Jinsoo Choi • Hangyu Cho • Eunsung Park • Wookbong Lee
RB-3	IEEE P802.11ax/D1.0	• TGax Members
RB-5	IEEE 802.11-15/0132r15	• TGax Members
RB-6	Verma 310	• Lochan Verma • Bin Tian • Sameer Vermani • Lin Yang
RB-7	Hedayat 526	• Ahmad Reza Hedayat
RB-8	Bharadwaj 718	• Arjun Bharadwaj • Bin Tian • Sameer Vermani
RB-11	IEEE P802.11ax/D0.5	• TGax Members

For example, Juhyung Son (a.k.a. John Son, Ju-Hyung Son)—an inventor of the '210 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the submissions, frameworks, and draft standards for IEEE 802.11ax being discussed, considered, and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE P802.11ax/D0.5, IEEE P802.11ax/D1.0, as well as prior drafts of it. Juhyung Son derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '210 patent.

Further, for example, Jinsam Kwak—an inventor of the ’210 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the submissions, frameworks, and draft standards for IEEE 802.11ax being discussed, considered, and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE P802.11ax/D0.5, IEEE P802.11ax/D1.0, as well as prior drafts of it. Jinsam Kwak derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’210 patent.

Further, for example, Geonjung Ko—an inventor of the ’210 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the submissions, frameworks, and draft standards for IEEE 802.11ax being discussed, considered, and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE P802.11ax/D0.5, IEEE P802.11ax/D1.0, as well as

prior drafts of it. Geonjung Ko derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’210 patent.

Further, for example, Woojin Ahn—an inventor of the ’210 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, July 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Woojin Ahn was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE P802.11ax/D0.5, IEEE P802.11ax/D1.0, as well as prior drafts of it. Woojin Ahn derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’210 patent.

Further, many of the inventors of the prior art references listed in Table 3-B above were members of Task Group AX. *See e.g.*, IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (identifying as task group members, *e.g.*, Arjun Bharadwaj, Bin Tian, Lochan Verma, Sameer Vermani, who are authors/inventors of the prior art listed above in Table 3-B). Thus, by virtue of their attendance at the Task Group AX meetings, Juhyung Son, Jinsam Kwak, Geonjung Ko, and/or Woojin Ahn, were aware of the subject matter of the prior art references listed in Table 3-B and what was discussed at those meetings, and derived this information in connection with filing a patent application that led to the ’210 patent.

Moreover, the listed inventors Juhyung Son, Jinsam Kwak, Geonjung Ko, and/or Woojin Ahn frequently collaborated with other WILUS employees and Yonsei University employees, such as Minseok Noh, Jinsoo Ahn, Ronny Yongho Kim, Hanseul Hong, Kukil Lim, Jinho Lee, Young-Chai Ko, Yongho Seok *See e.g.,* IEEE 11-16-1425, "Clarification on applying MU EDCA parameter set," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1425-02-00ax-clarification-on-applying-mu-edca-parameter-set.pptx; IEEE 11-16-1424, "Issue on the CWmax value in MU EDCA," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1424-02-00ax-issue-on-the-cwmax-value-in-mu-edca.pptx; IEEE 11-14-0838, "Discussion on dual-link STR in IEEE 802.11ax," https://mentor.ieee.org/802.11/dcn/14/11-14-0838-01-00ax-discussion-on-dual-link-str-in-ieee-802-11ax.pptx; IEEE 11-16-0352, "Consideration on MU initial link setup," https://mentor.ieee.org/802.11/dcn/16/11-16-0352-01-00ax-considerations-on-mu-initial-link-setup.pptx; IEEE 11-16-0641, "Regarding HE fragmentation," https://mentor.ieee.org/802.11/dcn/16/11-16-0641-02-00ax-regarding-he-fragmentation.pptx; IEEE 11-16-0916," TID value of ALL ACK signaling," https://mentor.ieee.org/802.11/dcn/16/11-16-0917-01-00ax-text-for-tid-value-of-all-ack-signaling.docx; IEEE 11-16-1426, "DL/UL indication in MU-RTS," https://mentor.ieee.org/802.11/dcn/16/11-16-1426-00-00ax-dl-ul-indication-in-mu-rts.pptx. By virtue of their collaborations, one or more of the listed inventors was aware of the claimed subject matter invented by these collaborators, and derived this information in connection with filing a patent application that led to the '210 patent.

To the extent that the '210 patent includes patentable subject matter with respect to any Asserted Claims, the '210 patent fails to name all inventors. As an example, the subject matter of one or more of the Asserted Claims of the '210 patent, at least as the claims are apparently being interpreted by Wilus, was disclosed in IEEE 802.11-15/0132r15 "Specification Framework for

TGax." This prior art reference relies on material authored by several of the authors of other prior art references in Table 3-B, such as Sameer Vermani and Lochan Verma. As demonstrated in the accompanying charts, IEEE 802.11-15/0132r15 discloses at least one claim element of the Asserted Claims of the '210 patent. IEEE 802.11-15/0132r15 demonstrates that other authors are inventors of the subject matter of the '210 patent, despite not being listed as a named inventor thereon. *See* Ex. B-3.

Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

3. U.S. Patent No. 10,687,281

The '281 patent, including all asserted claims therein, are invalid on the grounds that the inventors of the '281 patent derived their purported inventions from others. Table 3-C provides an identification, by the name of the person(s), from whom the purported invention was derived, and the circumstances of derivation are explained below.

Table 3-C: Prior Art under § 102 for the '281 patent

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RC-1	US 2017/0181129A1 ("Bharadwaj 129")	• Arjun Bharadwaj • Bin Tian • Lochan VERMA • Sameer Vermani
RC-2	US 2017/0094664A1 ("Lee")	• Dae Won Lee • Yujin Noh • Sungho Moon • Young Hoon Kwon
RC-3	US 2016/0353322A1 ("Li")	• Qinghua Li • Xiaogang Chen • Yuan Zhu • Huaning Niu • Hujun Yin
RC-4	US 10,219,271B1 ("Hedayat")	• Ahmad Reza HEDAYAT • Amin Jafarian

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RC-5	US 2017/0064718A1 ("Bharadwaj 718")	• Arjun Bharadwaj • Bin Tian • Sameer Vermani
RC-6	US 2016/0330058A1 ("Chen")	• Xiaogang Chen • Qinghua Li • Robert Stacey • Yuan Zhu • Chittabrata Ghosh • Po-Kai Huang • Rongzhen Yang • Huaning Niu • Jeongho Jeon
RC-7	JP 2015-165676A ("Kim")	• Youhan Kim • Zhang Ning
RC-8	US 2016/0330300A1 ("Josiam")	• Kaushik M. Josiam • Rakesh Taori
RC-9	IEEE Std 802.11ac ("802.11ac")	• Various authors
RC-10	IEEE 802.11-16/ 0045r1	• John (Ju-Hyung) Son • Geonjung Ko • Minseok Noh • Jin Sam Kwak
RC-11	IEEE 802.11-15/ 0344r2	• Young Hoon Kwon • Sungho Moon • Daewon Lee • Minho Cheong • Heejung Yu
RC-12	IEEE 802.11-14/ 1437r1	• Jinsoo Anh • Woojin Ahn • Ronny Yongho Kim
RC-13	US 2016/0174200A1 ("Seok")	• Yongho Seok

For example, Juhyung Son (a.k.a. John Son, Ju-Hyung Son)—an inventor of the '281 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016,

January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Juhyung Son derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’281 patent.

Further, for example, Jinsam Kwak—an inventor of the ’281 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Jinsam Kwak derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’281 patent.

Further, for example, Geonjung Ko—an inventor of the ’281 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015,

September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Geonjung Ko derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '281 patent.

Woojin Ahn—an inventor of the '281 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Woojin Ahn was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Woojin Ahn derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '281 patent.

Moreover, the listed inventors John (Ju-Hyung) Son, Jin Sam Kwak, Geonjung Ko, and/or Woojin Ahn frequently collaborated with other WILUS employees and Yonsei University

employees, such as Minseok Noh, Jinsoo Ahn, Ronny Yongho Kim, Hanseul Hong, Kukil Lim, Jinho Lee, Young-Chai Ko, Yongho Seok *See, e.g.*, IEEE 11-16-1425, "Clarification on applying MU EDCA parameter set," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1425-02-00ax-clarification-on-applying-mu-edca-parameter-set.pptx; IEEE 11-16-1424, "Issue on the CWmax value in MU EDCA," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1424-02-00ax-issue-on-the-cwmax-value-in-mu-edca.pptx; IEEE 11-14-0838, "Discussion on dual-link STR in IEEE 802.11ax," https://mentor.ieee.org/802.11/dcn/14/11-14-0838-01-00ax-discussion-on-dual-link-str-in-ieee-802-11ax.pptx; IEEE 11-16-0352, "Consideration on MU initial link setup," https://mentor.ieee.org/802.11/dcn/16/11-16-0352-01-00ax-considerations-on-mu-initial-link-setup.pptx; IEEE 11-16-0641, "Regarding HE fragmentation," https://mentor.ieee.org/802.11/dcn/16/11-16-0641-02-00ax-regarding-he-fragmentation.pptx; IEEE 11-16-0916," TID value of ALL ACK signaling," https://mentor.ieee.org/802.11/dcn/16/11-16-0917-01-00ax-text-for-tid-value-of-all-ack-signaling.docx; IEEE 11-16-1426, "DL/UL indication in MU-RTS," https://mentor.ieee.org/802.11/dcn/16/11-16-1426-00-00ax-dl-ul-indication-in-mu-rts.pptx. By virtue of their collaborations, one or more of the listed inventors was aware of the claimed subject matter invented by these collaborators. *See, e.g.*, US2016/0174200 ("Seok").

To the extent that the '281 patent includes patentable subject matter with respect to any Asserted Claims, the '281 patent fails to name all inventors. As an example, the subject matter of one or more of the Asserted Claims of the '281 patent, at least as the claims are apparently being interpreted by Wilus, was disclosed in IEEE 802.11-15/ 0344r2. This prior art reference was drafted by Young Hoon Kwon, Sungho Moon, Daewon Lee, Minho Cheong, and Heejung Yu, as demonstrated in the accompanying charts, IEEE 802.11-15/ 0344r2 discloses at least one claim

element of the Asserted Claims of the ’281 patent. IEEE 802.11-15/ 0344r2 demonstrates that Young Hoon Kwon, Sungho Moon, Daewon Lee, Minho Cheong, and Heejung Yu are inventors of the subject matter of the ’281 patent, despite not being listed as a named inventor thereon. *See* Ex. C11.

Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

4. U.S. Patent No. 11,470,595

The ’595 patent, including all asserted claims therein, are invalid on the grounds that the inventors of the ’595 patent derived their purported inventions from others. Table 3-D provides an identification, by the name of the person(s), from whom the purported invention was derived, and the circumstances of derivation are explained below.

Table 3-D: Prior Art under § 102 for the ’595 patent

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RD-1	US 2017/0181129A1 (“Bharadwaj 129”)	• Arjun Bharadwaj • Bin Tian • Lochan VERMA • Sameer Vermani
RD-2	US 2017/0094664A1 (“Lee”)	• Dae Won Lee • Yujin Noh • Sungho Moon • Young Hoon Kwon
RD-3	US 2016/0353322A1 (“Li”)	• Qinghua Li • Xiaogang Chen • Yuan Zhu • Huaning Niu • Hujun Yin
RD-4	US 10,219,271B1 (“Hedayat”)	• Ahmad Reza HEDAYAT • Amin Jafarian
RD-5	US 2017/0064718A1 (“Bharadwaj 718”)	• Arjun Bharadwaj • Bin Tian • Sameer Vermani
RD-6	US 2016/0330058A1 (“Chen”)	• Xiaogang Chen

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
		• Qinghua Li • Robert Stacey • Yuan Zhu • Chittabrata Ghosh • Po-Kai Huang • Rongzhen Yang • Huaning Niu • Jeongho Jeon
RD-7	JP 2015-165676A ("Kim")	• Youhan Kim • Zhang Ning
RD-8	US 2016/0330300A1 ("Josiam")	• Kaushik M. Josiam • Rakesh Taori
RD-9	US 2018/0205584A1 ("Lim")	• Dongguk Lim • Jinsoo Choi • HanGyu CHO • Jinmin Kim • Eunsung Park
RD-10	US 2017/0070998A1 ("Wu")	• Tianyu Wu • Shengquan Hu • Jianhan Liu • Thomas Edward Pare, Jr.
RD-11	IEEE Std 802.11ac ("802.11ac")	• Various authors
RD-12	IEEE 802.11-15/ 1304r1	• Sungho Moon • Daewon Lee • Yujin Noh • Munho Cheong • Heejung Yu
RD-13	IEEE 802.11-14/ 1437r1	• Jinsoo Anh • Woojin Ahn • Ronny Yongho Kim
RD-14	IEEE 802.11-16/ 0045r1	• John (Ju-Hyung) Son • Geonjung Ko • Minseok Noh • Jin Sam Kwak
RD-15	IEEE 802.11-15/ 1066r0	• Kaushik Josiam • Rakesh Taori • Sanghyum Change • Hyunjeong Kang • Mark Rison • Fei Tong • Other authors

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RD-16	US 2016/0174200A1 ("Seok")	• Yongho Seok

For example, Juhyung Son (a.k.a. John Son, Ju-Hyung Son)—an inventor of the '595 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Juhyung Son derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '595 patent.

Further, for example, Jinsam Kwak—an inventor of the '595 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the draft and final specifications for 802.11ax being

considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Jinsam Kwak derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '595 patent.

Geonjung Ko—an inventor of the '595 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Geonjung Ko derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '595 patent.

Further, for example, Woojin Ahn—an inventor of the '595 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, July 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm.

By virtue of his attendance at those meetings, Woojin Ahn was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Woojin Ahn derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '281 patent.

Moreover, the listed inventors John (Ju-Hyung) Son, Jin Sam Kwak, Geonjung Ko, and/or Woojin Ahn frequently collaborated with other WILUS employees and Yonsei University employees, such as Minseok Noh, Jinsoo Ahn, Ronny Yongho Kim, Hanseul Hong, Kukil Lim, Jinho Lee, Young-Chai Ko, Yongho Seok *See, e.g.*, IEEE 11-16-1425, "Clarification on applying MU EDCA parameter set," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1425-02-00ax-clarification-on-applying-mu-edca-parameter-set.pptx; IEEE 11-16-1424, "Issue on the CWmax value in MU EDCA," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1424-02-00ax-issue-on-the-cwmax-value-in-mu-edca.pptx; IEEE 11-14-0838, "Discussion on dual-link STR in IEEE 802.11ax," https://mentor.ieee.org/802.11/dcn/14/11-14-0838-01-00ax-discussion-on-dual-link-str-in-ieee-802-11ax.pptx; IEEE 11-16-0352, "Consideration on MU initial link setup," https://mentor.ieee.org/802.11/dcn/16/11-16-0352-01-00ax-considerations-on-mu-initial-link-setup.pptx; IEEE 11-16-0641, "Regarding HE fragmentation," https://mentor.ieee.org/802.11/dcn/16/11-16-0641-02-00ax-regarding-he-fragmentation.pptx; IEEE 11-16-0916," TID value of ALL ACK signaling," https://mentor.ieee.org/802.11/dcn/16/11-16-0917-01-00ax-text-for-tid-value-of-all-ack-signaling.docx; IEEE 11-16-1426, "DL/UL indication in MU-RTS," https://mentor.ieee.org/802.11/dcn/16/11-16-1426-00-00ax-dl-ul-indication-in-mu-rts.pptx. By virtue of their collaborations, one or more of the listed inventors

was aware of the claimed subject matter invented by these collaborators. *See, e.g.*, US2016/0174200 ("Seok").

To the extent that the '595 patent includes patentable subject matter with respect to any Asserted Claims, the '595 patent fails to name all inventors. As an example, the subject matter of one or more of the Asserted Claims of the '595 patent, at least as the claims are apparently being interpreted by Wilus, was disclosed in IEEE 802.11-15/1304r1. This prior art reference was drafted by Sungho Moon, Daewon Lee, Yujin Noh, Munho Cheong, Heejung Yu, as demonstrated in the accompanying charts, IEEE 802.11-15/1304r1 discloses at least one claim element of the Asserted Claims of the '595 patent. IEEE 802.11-15/1304r1 demonstrates that Sungho Moon, Daewon Lee, Yujin Noh, Munho Cheong, Heejung Yu are inventors of the subject matter of the '595 patent, despite not being listed as a named inventor thereon. *See* Ex. D12.

Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

5. U.S. Patent No. 11,116,035

The '035 patent, including all asserted claims therein, are invalid on the grounds that the inventors of the '035 patent derived their purported inventions from others. Table 3-E provides an identification, by the name of the person(s), from whom the purported invention was derived, and the circumstances of derivation are explained below.

Table 3-E: Prior Art under § 102 for the '035 patent

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
RE-1	IEEE 802.11-16/1180r0 and r1, "Proposed spec text for MU EDCA parameters" ("Cariou 1180")	• Individuals identified as authors in Carious 1180 at pp. 1-5
RE-2	US 9,585,166 ("Seok 166")	• Yong Ho Seok
RE-3	Hybrid adaptation of the maximum contention window (CWmax) and minimum contention	• Hassan Takabi • Ali Moghadam

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
	window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks ("Takabi")	• Ahmad Khonsari
RE-4	IEEE 802.11-15/0132r17 "Wireless LANs Specification Framework for TGax" ("Stacey 0132")	• Robert Stacey
RE-5	IEEE 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	• Individuals identified as authors in Stacey 0024 at pp. 1-5
RE-6	IEEE 802.11-16/0998r1 "2 sets of EDCA parameter," ("Cariou 0998")	• Individuals identified as authors in Cariou 0998 at pp. 1-11
RE-7	IEEE 802.11-16/0963r3 "EDCA rules – follow up 2" ("Ma 0963")	• Jing Ma • Kentaro Ishizu • Fumihide Kojima
RE-8	US 2017/0245261 ("Cariou 261")	• Laurent Cariou • Po-Kai Huang • Chittabrata Ghosh • Robert J. Stacey
RE-9	US 2016/0198500 ("Merlin 500")	• Simone Merlin • Gang Ding
RE-10	US 2018/0146476 A1 (Kim '476)	• Jeongki Kim • Kiseon Ryu • Hangyu Cho
RE-11	US 2016/0128102 A1 ("Jauh '102")	• Yuh-Ren Jaub • Ching-Hwa Yu • James June-Ming Wang • Chao-Chun Wang
RE-12	US 2018/0352572 ("Carious 572")	• Laurent Cariou • Yaron Alpert • Chittabrata Ghosh • Po-Kai Huang • Robert J. Stacey
RE-13	CN 102958185 ("Huawei 185")	• Guorui Yang, • Xuehuan Wang • Menghong Liu
RE-14	US 2011/0235596 ("Wentink 596")	• Maarten Menzo Wentink
RE-15	US 2017/0325264 ("Cherian 264")	• George Cherian • Alfred Asterjadhi • Simone Merlin

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
		• Gwendolyn Denise Barriac • Yan Zhou
RE-16	US 2017/0223730 ("Jiang 730")	• Jinjing Jiang • Liwen Chu • Lei Wang • Yakun Sun • Hongyuan Zhang • Hui-Ling Lou
RE-17	IEEE 802.11ac Specification	• Members of Task Group ac
RE-18	IEEE 802.11-2012 & 802.11-2016 Specification	• Members of Task Group ac
RE-19	US 2017/0208625 ("Choi 625")	• Hyeyoung Choi • Kiseon Ryu • Jeongki Kim • Hangyu Cho • Suhwook Kim • Kwangseok Noh
RE-20	IEEE 802.11-16/0535r0 "Comments on TGax/D0.1" ("Stacey 0535")	• Robert Stacey
RE-21	US 2017/0048048 ("Seok 048")	• Yongho Seok
RE-22	US 2017/0202023 ("Zhou 023")	• Yan Zhou • Simone Merlin • Gwendolyn Denise Barriac • Alfred Asterjadhi • George Cherian
RE-23	IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425)	• Minseok Noh
RE-24	US 2018/0034595 ("Kim 595")	• Jeongki Kim • Kiseon Ryu • Hangyu Cho
RE-25	IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")	• Individuals identified as authors in Asterjadhi 0616 at pp. 1-8
RE-26	IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")	• Minseok Noh
RE-27	IEEE P802.11ax/D1.0 ("802.11ax D1.0")	• Members of Task Group ax

For example, Woojin Ahn – an inventor of the ’035 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, July 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Woojin Ahn was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Woojin Ahn derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’035 patent.

Further, for example, Juhyung Son – an inventor of the ’035 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Juhyung Son derived

the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’035 patent.

Further, for example, Geonjung Ko – an inventor of the ’035 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015m,September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Geonjung Ko derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’035 patent.

Further, for example, Jinsam Kwak – an inventor of the ’035 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus

contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Jinsam Kwak derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '035 patent.

Further, many of the inventors of the prior art references listed in Table 3-E above were members of Task Group AX. *See e.g.*, IEEE 802.11-16/0024r1 "Proposed TGax draft specification" (identifying as task group members, *e.g.*, Laurent Cariou, Robert Stacey, Simone Merlin, Jing Ma, Jeongki Kim, Kiseon Ryu, Hangyu Cho, Maarten Menzo Wentink, George Cherian, Alfred Asterjadhi, Gwendolyn Denise Barriac, Yongho Seok, who are authors/inventors of the prior art listed above in Table 3-E). Thus, by virtue of his attendance at the Task Group AX meetings, Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak was aware of the subject matter of the prior art references listed in Table 3-E and that were discussed at those meetings, and derived this information in connection with filing a patent application that led to the '035 patent.

Moreover, the listed inventors Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak frequently collaborated with other WILUS employees and Yonsei University employees, such as Minseok Noh, Jinsoo Ahn, Ronny Yongho Kim, Hanseul Hong, Kukil Lim, Jinho Lee, Young-Chai Ko, Yongho Seok *See e.g.*, IEEE 11-16-1425, "Clarification on applying MU EDCA parameter set," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1425-02-00ax-clarification-on-applying-mu-edca-parameter-set.pptx; IEEE 11-16-1424, "Issue on the CWmax value in MU EDCA," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1424-02-00ax-issue-on-the-cwmax-value-in-mu-edca.pptx; IEEE 11-14-0838, "Discussion on dual-link STR in IEEE 802.11ax," https://mentor.ieee.org/802.11/dcn/14/11-14-0838-01-00ax-discussion-on-dual-link-str-in-ieee-802-11ax.pptx; IEEE 11-16-0352, "Consideration on MU initial link

setup," https://mentor.ieee.org/802.11/dcn/16/11-16-0352-01-00ax-considerations-on-mu-initial-link-setup.pptx; IEEE 11-16-0641, "Regarding HE fragmentation," https://mentor.ieee.org/802.11/dcn/16/11-16-0641-02-00ax-regarding-he-fragmentation.pptx; IEEE 11-16-0916," TID value of ALL ACK signaling," https://mentor.ieee.org/802.11/dcn/16/11-16-0917-01-00ax-text-for-tid-value-of-all-ack-signaling.docx; IEEE 11-16-1426, "DL/UL indication in MU-RTS," https://mentor.ieee.org/802.11/dcn/16/11-16-1426-00-00ax-dl-ul-indication-in-mu-rts.pptx. By virtue of their collaborations, one or more of the listed inventors was aware of the claimed subject matter invented by these collaborators, and derived this information in connection with filing a patent application that led to the '035 patent. *See* e.g., US 2017/0048048 ("Seok 048"); US 9,585166 ("Seok 166").

To the extent that the '035 patent includes patentable subject matter with respect to any Asserted Claims, the '035 patent fails to name all inventors. As an example, the subject matter of one or more of the Asserted Claims of the ' 035 patent, at least as the claims are apparently being interpreted by Wilus, was disclosed in IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) and IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424"). These two prior art references were drafted by Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, Minseok Noh, Jin Sam Kwak. As demonstrated in the accompanying charts, Ahn 1424 and Ahn 1425 each discloses at least one claim element of the Asserted Claims of the '035 patent. Ahn 1424 and Ahn 1425 each demonstrates that Minseok Noh is an inventor of the subject matter of the '035 patent, despite not being listed as a named inventor thereon. *See* Ex. E23 & E26.

Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

6. U.S. Patent No. 11,516,879

The ’879 patent, including all asserted claims therein, are invalid on the grounds that the inventors of the ’879 patent derived their purported inventions from others. Table 3-F provides an identification, by the name of the person(s), from whom the purported invention was derived, and the circumstances of derivation are explained below.

Table 3-F: Prior Art under § 102 for the ’879 patent

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
RF-1	IEEE 802.11-16/1180r0 and r1, “Proposed spec text for MU EDCA parameters” (“Cariou 1180”)	• Individuals identified as authors in Carious 1180 at pp. 1-5
RF-2	US 9,585,166 (“Seok 166”)	• Yong Ho Seok
RF-3	Hybrid adaptation of the maximum contention window (CWmax) and minimum contention window (CWmin) for Enhanced Service Differentiation in IEEE 802.11 Wireless Ad-hoc Networks (“Takabi”)	• Hassan Takabi • Ali Moghadam • Ahmad Khonsari
RF-4	IEEE 802.11-15/0132r17 “Wireless LANs Specification Framework for TGax” (“Stacey 0132”)	• Robert Stacey
RF-5	IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (“Stacey 0024”)	• Individuals identified as authors in Stacey 0024 at pp. 1-5
RF-6	IEEE 802.11-16/0998r1 “2 sets of EDCA parameter,” (“Cariou 0998”)	• Individuals identified as authors in Cariou 0998 at pp. 1-11
RF-7	IEEE 802.11-16/0963r3 “EDCA rules – follow up 2” (“Ma 0963”)	• Jing Ma • Kentaro Ishizu • Fumihide Kojima
RF-8	US 2017/0245261 (“Cariou 261”)	• Laurent Cariou • Po-Kai Huang • Chittabrata Ghosh • Robert J. Stacey
RF-9	US 2016/0198500 (“Merlin 500”)	• Simone Merlin • Gang Ding
RF-10	US 2018/0146476 A1 (Kim ’476)	• Jeongki Kim • Kiseon Ryu • Hangyu Cho
RF-11	US 2016/0128102 A1 (“Jauh ’102”)	• Yuh-Ren Jaub

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
		• Ching-Hwa Yu • James June-Ming Wang • Chao-Chun Wang
RF-12	US 2018/8792572 (“Carious 572”)	• Laurent Cariou • Yaron Alpert • Chittabrata Ghosh • Po-Kai Huang • Robert J. Stacey
RF-13	CN 102958185 (“Huawei 185”)	• Guorui Yang, • Xuehuan Wang • Menghong Liu
RF-14	US 2011/0235596 (“Wentink 596”)	• Maarten Menzo Wentink
RF-15	US 2017/0325264 (“Cherian 264”)	• George Cherian • Alfred Asterjadhi • Simone Merlin • Gwendolyn Denise Barriac • Yan Zhou
RF-16	US 2017/0223730 (“Jiang 730”)	• Jinjing Jiang • Liwen Chu • Lei Wang • Yakun Sun • Hongyuan Zhang • Hui-Ling Lou
RF-17	IEEE 802.11ac Specification	• Members of Task Group ac
RF-18	IEEE 802.11-2012 & 802.11-2016 Specification	• Members of Task Group ac
RF-19	US 2017/0208625 (“Choi 625”)	• Hyeyoung Choi • Kiseon Ryu • Jeongki Kim • Hangyu Cho • Suhwook Kim • Kwangseok Noh
RF-20	IEEE 802.11-16/0535r0 “Comments on TGax/D0.1” (“Stacey 0535”)	• Robert Stacey
RF-21	US 2017/0048048 (“Seok 048”)	• Yongho Seok
RF-22	US 2017/0202023 (“Zhou 023”)	• Yan Zhou • Simone Merlin • Gwendolyn Denise Barriac

No.	Patent No. or Title (Primary Inventor/Author)	Name of Person(s) from Whom Invention was Derived
		• Alfred Asterjadhi • George Cherian
RF-23	IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425)	• Minseok Noh
RF-24	US 2018/0034595 ("Kim 595")	• Jeongki Kim • Kiseon Ryu • Hangyu Cho
RF-25	IEEE 802.11-16/0616r2 "Block Ack Generation and Selection Rules" ("Asterjadhi 0616")	• Individuals identified as authors in Asterjadhi 0616 at pp. 1-8
RF-26	IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424")	• Minseok Noh
RF-27	IEEE P802.11ax/D1.0 ("802.11ax D1.0")	• Members of Task Group ax

For example, Woojin Ahn – an inventor of the '879 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, July 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Woojin Ahn was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Woojin Ahn derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '879 patent.

Further, for example, Juhyung Son – an inventor of the '879 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX"

meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Juhyung Son derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’879 patent.

Further, for example, Geonjung Ko – an inventor of the ’879 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015m,September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Geonjung Ko derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’879 patent.

Further, for example, Jinsam Kwak – an inventor of the ’879 patent – regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Jinsam Kwak derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’879 patent.

Further, many of the inventors of the prior art references listed in Table 3-E above were members of Task Group AX. *See e.g.*, IEEE 802.11-16/0024r1 “Proposed TGax draft specification” (identifying as task group members, *e.g.*, Laurent Cariou, Robert Stacey, Simone Merlin, Jing Ma, Jeongki Kim, Kiseon Ryu, Hangyu Cho, Maarten Menzo Wentink, George Cherian, Alfred Asterjadhi, Gwendolyn Denise Barriac, Yongho Seok, who are authors/inventors of the prior art listed above in Table 3-F). Thus, by virtue of his attendance at the Task Group AX meetings, Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak was aware of the subject matter of the prior art references listed in Table 3-F and that were discussed at those meetings, and derived this information in connection with filing a patent application that led to the ’879 patent.

Moreover, the listed inventors Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak frequently collaborated with other WILUS employees and Yonsei University employees, such as Minseok Noh, Jinsoo Ahn, Ronny Yongho Kim, Hanseul Hong, Kukil Lim, Jinho Lee, Young-Chai Ko, Yongho Seok *See e.g.*, IEEE 11-16-1425, "Clarification on applying MU EDCA parameter set," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1425-02-00ax-clarification-on-applying-mu-edca-parameter-set.pptx; IEEE 11-16-1424, "Issue on the CWmax value in MU EDCA," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1424-02-00ax-issue-on-the-cwmax-value-in-mu-edca.pptx; IEEE 11-14-0838, "Discussion on dual-link STR in IEEE 802.11ax," https://mentor.ieee.org/802.11/dcn/14/11-14-0838-01-00ax-discussion-on-dual-link-str-in-ieee-802-11ax.pptx; IEEE 11-16-8792, "Consideration on MU initial link setup," https://mentor.ieee.org/802.11/dcn/16/11-16-8792-01-00ax-considerations-on-mu-initial-link-setup.pptx; IEEE 11-16-0641, "Regarding HE fragmentation," https://mentor.ieee.org/802.11/dcn/16/11-16-0641-02-00ax-regarding-he-fragmentation.pptx; IEEE 11-16-0916," TID value of ALL ACK signaling," https://mentor.ieee.org/802.11/dcn/16/11-16-0917-01-00ax-text-for-tid-value-of-all-ack-signaling.docx; IEEE 11-16-1426, "DL/UL indication in MU-RTS," https://mentor.ieee.org/802.11/dcn/16/11-16-1426-00-00ax-dl-ul-indication-in-mu-rts.pptx. By virtue of their collaborations, one or more of the listed inventors was aware of the claimed subject matter invented by these collaborators, and derived this information in connection with filing a patent application that led to the '879 patent. *See* e.g., US 2017/0048048 ("Seok 048"); US 9,585166 ("Seok 166").

To the extent that the '879 patent includes patentable subject matter with respect to any Asserted Claims, the '879 patent fails to name all inventors. As an example, the subject matter of one or more of the Asserted Claims of the '879 patent, at least as the claims are apparently being

interpreted by Wilus, was disclosed in IEEE 802.11-16/1425r2 "Clarification on applying MU EDCA parameter set" ("Ahn 1425) and IEEE 802.11-16/1424r1 "Issue on the CWmax value in MU EDCA" ("Ahn 1424"). These two prior art references were drafted by Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, Minseok Noh, Jin Sam Kwak. As demonstrated in the accompanying charts, Ahn 1424 and Ahn 1425 each discloses at least one claim element of the Asserted Claims of the '879 patent. Ahn 1424 and Ahn 1425 each demonstrates that Minseok Noh is an inventor of the subject matter of the '879 patent, despite not being listed as a named inventor thereon. *See* Ex. F23 & F26.

Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

7. U.S. Patent No. 11,129,163

The '163 patent, including all asserted claims therein, are invalid on the grounds that the inventors of the '163 patent derived their purported inventions from others. Table 3-G provides an identification, by the name of the person(s), from whom the purported invention was derived, and the circumstances of derivation are explained below.

Table 3-G: Prior Art under § 102 for the '163 patent

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RG-1	US 2017/0223731 ("Lee 731")	• Wookbong Lee • Kiseon Ryu • Jeongki Kim • Jinsoo Choi • HanGyu Cho
RG-2	WO 2016/021858 ("Lee 858")	• Wookbong Lee • Kiseon Ryu • Jeongki Kim • Jinsoo Choi • HanGyu Cho

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RG-3	IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	• Individuals identified as authors in Stacey 0024 at pp. 1-5
RG-4	IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042")	• Geonjung Ko • Ju-Hyung Son • Minseok Noh • Jin Sam Kwak
RG-5	Evgeny Khorov et al., *IEEE 802.11ax: How to Build High Efficiency WLANs*, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov")	• Engeny Khorov • Anton Kiryanov • Andrey Lyakhov
RG-6	US 2016/0249397 ("Seok 397")	• Yongho Seok
RG-7	US 10,666,368 ("Barriac 368")	• Gwendolyn Barriac • George Cherian • Simone Merlin • Alfred Asterjadhi • Yan Zhou • Gang Ding • Qungjian Tian
RG-8	US 10,321,485 ("Noh 485")	• Yujin Noh • Young Hoon Kwon • Dae Won Lee • Sungho Moon
RG-9	US 2016/0345258 ("Zhou 258")	• Yan Zhou • Gwendolyn Barriac • Simone Merlin • George Cherian
RG-10	US 2021/0243787 ("Oteri 787")	• Oghenekome Oteri • Hanqing Lou • Frank La Sita • Fengjun Xi
RG-11	US 2017/0127352 ("Park '352")	• Giwon Park • Kiseon Ryu • Jeongki Kim • HanGyu Cho • Suhwook Kim
RG-12	US 2017/0188306 ("Park 306")	• Giwon Park • Kiseon Ryu • Jeongki Kim • HanGyu Cho • Suhwook Kim
RG-13	US 2015/0124744 ("Zhu 744")	• Hao Zhu

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
		• Simone Merlin • Chao Zou • Srinivas Katar • Hemanth Sampath • Gwendolyn Barriac
RG-14	WO 2017/031640 (“Du 640”)	• Zhenguo Du Zhengu
RG-15	US 2017/0078887 (“Barriac 887”)	• Gwendolyn Barriac • George Cherian • Simone Merlin • Alfred Asterjadhi • Yan Zhou • Gang Ding • Qungjian Tian
RG-16	IEEE 802.11-16/0396r0 “Issues on BSS Color Collision” (“Ko 0396”)	• Geonjung Ko • Ju-Hyung Son • Minseok Noh • Jin Sam Kwak
RG-17	US 2016/0330663 (“Zhou 663”)	• Yan Zhou • Gwendolyn Barriac • Simone Merlin • George Cherian • Alfred Asterjadhi • Qingjian Tian • Gang Ding
RG-18	EP 2986066A (“Nelson 066”)	• George Nelson • James Proctor • John Hoffmann • Antoine Rouphael
RG-19	US 2019/082387 (“Kim 387”)	• Jeongki Kim • Kiseon Ryu • HanGyu Cho
RG-20	US 2016/330685 (“Asterjadhi 685”)	• Alfred Asterjadhi • Simone Merlin • George Cherian • Gwendolyn Barriac • Gang Ding • Yan Zhou
RG-21	US 2017/257817 (“Itagaki 817”)	• Takeshi Itagaki • Yuichi Morioka • Tomoya Yamaura
RG-22	IEEE Std 802.11ac (“802.11ac”)	• Various authors

Woojin Ahn—an inventor of the ’163 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, July 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Woojin Ahn was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Woojin Ahn derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’163 patent.

Juhyung Son—an inventor of the ’163 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Juhyung

Son derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’163 patent.

Geonjung Ko—an inventor of the ’163 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Geonjung Ko derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the ’163 patent.

Jinsam Kwak—an inventor of the ’163 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or “Task Group AX” meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus

contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Jinsam Kwak derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '163 patent.

Further, many of the inventors of the prior art references listed in Table 3-G above were members of Task Group AX. *See e.g.*, IEEE 802.11-16/0024r1 "Proposed TGax draft specification" (identifying as task group members, *e.g.*, Kiseon Ryu, Jeongki Kim, Jinsoo Choi, HanGyu Cho, Yongbo Seok, Gwendolyn Barriac, George Cherian, Simone Merlin, Alfred Asterjadhi, Yujin Noh, Young Hon Kwon, Dae Won Lee, Suhwook Kim, and Hemanth Sampath, who are authors/inventors of the prior art listed above in Table 3-G). Thus, by virtue of his attendance at the Task Group AX meetings, Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak was aware of the subject matter of the prior art references listed in Table 3-G and that were discussed at those meetings, and derived this information in connection with filing a patent application that led to the '163 patent.

Moreover, the listed inventors Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak frequently collaborated with other WILUS employees and Yonsei University employees, such as Minseok Noh, Jiho Lee, and Young-Chai Ko. *See, e.g.*, IEEE 802.11-16/0042r2, "BSS Color Settings for a Multiple BSSID Set," available at https://mentor.ieee.org/802.11/dcn/16/11-16-0042-02-00ax-bss-color-settings-for-a-multiple-bssid-set.pptx; IEEE 802.11-16/0396r0, "Issues on BSS Color Bits Collision," available at https://mentor.ieee.org/802.11/dcn/16/11-16-0396-00-00ax-issues-on-bss-color-bits-collision.pptx; IEEE 802.11-16/0640r3, "BSS Color Collision," available at https://mentor.ieee.org/802.11/dcn/16/11-16-0640-03-00ax-bss-color-collision.pptx; IEEE 802.11-16/-918r0 "Discussions on Partial BSS Color," available at

https://mentor.ieee.org/802.11/dcn/16/11-16-0918-00-00ax-discussions-on-partial-bss-color.pptx; IEEE 802.11-16/1236r0, "Text for Partial BSS Color and AID Assignment Rule," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1236-00-00ax-text-for-partial-bss-color-and-aid-assignment-rule.docx. By virtue of their collaborations, one or more of the listed inventors was aware of the claimed subject matter invented by these collaborators.

To the extent that the '163 patent includes patentable subject matter, the '163 patent names an alleged inventor who did not invent the subject matter of the Asserted Claims. As an example, the subject matter of one or more of the Asserted Claims of the '163 patent, at least as the claims are apparently being interpreted by Wilus, was disclosed in IEEE 802.11-16/0396r0 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") and IEEE 802.11-16/396r0 "Issues on BSS Color Collision" ("Ko 0396"). Ko 0042 and Ko 0396 were drafted by Geonjung Ko, Ju-Hyung Son, Minseok Noh, and Jin Sam Kwak. As demonstrated in the accompanying charts, Ko 0042 and Ko 0396 each disclose at least one claim element of the Asserted Claims of the '163 patent. Ko 0042 and Ko 0396 each demonstrate that Minseok Noh is an inventor of the subject matter of the '163 patent, despite not being listed as a named inventor. *See* RG4, RG16.

Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

8. U.S. Patent No. 11,700,597

The '597 patent, including all asserted claims therein, are invalid on the grounds that the inventors of the '597 patent derived their purported inventions from others. Table 3-H provides an identification, by the name of the person(s), from whom the purported invention was derived, and the circumstances of derivation are explained below.

Table 3-H: Prior Art under § 102 for the '597 patent

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RH-1	US 2017/0223731 ("Lee 731")	• Wookbong Lee • Kiseon Ryu • Jeongki Kim • Jinsoo Choi • HanGyu Cho
RH-2	WO 2016/021858 ("Lee 858")	• Wookbong Lee • Kiseon Ryu • Jeongki Kim • Jinsoo Choi • HanGyu Cho
RH-3	IEEE P802.11 802.11-16/0024r1 "Proposed TGax draft specification" ("Stacey 0024")	• Individuals identified as authors in Stacey 0024 at pp. 1-5
RH-4	IEEE 802.11-16/0042r2 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042")	• Geonjung Ko • Ju-Hyung Son • Minseok Noh • Jin Sam Kwak
RH-5	Evgeny Khorov et al., *IEEE 802.11ax: How to Build High Efficiency WLANs*, 2015 Int'l Conf. on Eng'g & Telecomm. 14-19 (2015) ("Khorov")	• Engeny Khorov • Anton Kiryanov • Andrey Lyakhov
RH-6	US 2016/0249397 ("Seok 397")	• Yongho Seok
RH-7	US 10,666,368 ("Barriac 368")	• Gwendolyn Barriac • George Cherian • Simone Merlin • Alfred Asterjadhi • Yan Zhou • Gang Ding • Qungjian Tian
RH-8	US 10,321,485 ("Noh 485")	• Yujin Noh • Young Hoon Kwon • Dae Won Lee • Sungho Moon
RH-9	US 2016/0345258 ("Zhou 258")	• Yan Zhou • Gwendolyn Barriac • Simone Merlin • George Cherian
RH-10	US 2021/0243787 ("Oteri 787")	• Oghenekome Oteri • Hanqing Lou • Frank La Sita • Fengjun Xi
RH-11	US 2017/0127352 ("Park '352")	• Giwon Park

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
		• Kiseon Ryu • Jeongki Kim • HanGyu Cho • Suhwook Kim
RH-12	US 2017/0188306 ("Park 306")	• Giwon Park • Kiseon Ryu • Jeongki Kim • HanGyu Cho • Suhwook Kim
RH-13	US 2015/0124744 ("Zhu 744")	• Hao Zhu • Simone Merlin • Chao Zou • Srinivas Katar • Hemanth Sampath • Gwendolyn Barriac
RH-14	WO 2017/031640 ("Du 640")	• Zhenguo Du
RH-15	US 2017/0078887 ("Barriac 887")	• Gwendolyn Barriac • George Cherian • Simone Merlin • Alfred Asterjadhi • Yan Zhou • Gang Ding • Qungjian Tian
RH-16	IEEE 802.11-16/0396r0 "Issues on BSS Color Collision" ("Ko 0396")	• Geonjung Ko • Ju-Hyung Son • Minseok Noh • Jin Sam Kwak
RH-17	US 2016/0330663 ("Zhou 663")	• Yan Zhou • Gwendolyn Barriac • Simone Merlin • George Cherian • Alfred Asterjadhi • Qingjian Tian • Gang Ding
RH-18	EP 2986066A ("Nelson 066")	• George Nelson • James Proctor • John Hoffmann • Antoine Rouphael
RH-19	US 2019/082387 ("Kim 387")	• Jeongki Kim • Kiseon Ryu • HanGyu Cho

Ex.	Prior Art Disclosing Technical Features	Name of Person(s) from Whom Invention was Derived
RH-20	US 2016/330685 ("Asterjadhi 685")	• Alfred Asterjadhi • Simone Merlin • George Cherian • Gwendolyn Barriac • Gang Ding • Yan Zhou
RH-21	US 2017/257817 ("Itagaki 817")	• Takeshi Itagaki • Yuichi Morioka • Tomoya Yamaura
RH-22	IEEE 802.11ac ("802.11ac")	• Various authors

For example, Woojin Ahn—an inventor of the '597 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, July 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Woojin Ahn was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Woojin Ahn derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '597 patent.

Further, for example, Juhyung Son—an inventor of the '597 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May 2015, March 2015, May 2015, July 2015 September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May

2017, July 2017, and September 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Juhyung Son was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Juhyung Son derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '597 patent.

Further, for example, Geonjung Ko—an inventor of the '597 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, January 2015, May 2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Geonjung Ko was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Geonjung Ko derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '597 patent.

Further, for example, Jinsam Kwak—an inventor of the '597 patent—regularly attended IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group and/or "Task Group AX" meetings, including at least the meeting in September 2014, November 2014, January 2015, May

2015, March 2015, September 2015, November 2015, January 2016, March 2016, May 2016, July 2016, September 2016, November 2016, January 2017, March 2017, May 2017, July 2017. *See* IEEE Status of Project IEEE 802.11ax High Efficiency (HE) Wireless LAN Task Group, available at https://www.ieee802.org/11/Reports/tgax_update.htm. By virtue of his attendance at those meetings, Jinsam Kwak was aware of the draft and final specifications for 802.11ax being considered and voted upon at those meetings, including technical submissions by non-Wilus contributors, IEEE 802.11 vD0.1, D1.0, and D2.0 as well as prior drafts of it. Jinsam Kwak derived the information learned at those meetings and from the related documents in connection with filing a patent application that led to the '597 patent.

Further, many of the inventors of the prior art references listed in Table 3-H above were members of Task Group AX. *See e.g.*, IEEE 802.11-16/0024r1 "Proposed TGax draft specification" (identifying as task group members, *e.g.*, Kiseon Ryu, Jeongki Kim, Jinsoo Choi, HanGyu Cho, Yongbo Seok, Gwendolyn Barriac, George Cherian, Simone Merlin, Alfred Asterjadhi, Yujin Noh, Young Hon Kwon, Dae Won Lee, Suhwook Kim, and Hemanth Sampath, who are authors/inventors of the prior art listed above in Table 3-H). Thus, by virtue of his attendance at the Task Group AX meetings, Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak was aware of the subject matter of the prior art references listed in Table 3-H and that were discussed at those meetings, and derived this information in connection with filing a patent application that led to the '597 patent.

Moreover, the listed inventors Woojin Ahn, John (Ju-Hyung) Son, Geonjung Ko, and/or Jin Sam Kwak frequently collaborated with other WILUS employees and Yonsei University employees, such as Minseok Noh, Jiho Lee, and Young-Chai Ko. *See, e.g.*, IEEE 802.11-16/0042r2, "BSS Color Settings for a Multiple BSSID Set," available at

https://mentor.ieee.org/802.11/dcn/16/11-16-0042-02-00ax-bss-color-settings-for-a-multiple-bssid-set.pptx; IEEE 802.11-16/0396r0, "Issues on BSS Color Bits Collision," available at https://mentor.ieee.org/802.11/dcn/16/11-16-0396-00-00ax-issues-on-bss-color-bits-collision.pptx; IEEE 802.11-16/0640r3, "BSS Color Collision," available at https://mentor.ieee.org/802.11/dcn/16/11-16-0640-03-00ax-bss-color-collision.pptx; IEEE 802.11-16/-918r0 "Discussions on Partial BSS Color," available at https://mentor.ieee.org/802.11/dcn/16/11-16-0918-00-00ax-discussions-on-partial-bss-color.pptx; IEEE 802.11-16/1236r0, "Text for Partial BSS Color and AID Assignment Rule," available at https://mentor.ieee.org/802.11/dcn/16/11-16-1236-00-00ax-text-for-partial-bss-color-and-aid-assignment-rule.docx. By virtue of their collaborations, one or more of the listed inventors was aware of the claimed subject matter invented by these collaborators.

To the extent that the '597 patent includes patentable subject matter, the '597 patent names an alleged inventor who did not invent the subject matter of the Asserted Claims. As an example, the subject matter of one or more of the Asserted Claims of the '597 patent, at least as the claims are apparently being interpreted by Wilus, was disclosed in IEEE 802.11-16/0396r0 "BSS Color Settings for a Multiple BSSID Set" ("Ko 0042") and IEEE 802.11-16/396r0 "Issues on BSS Color Collision" ("Ko 0396"). Ko 0042 and Ko 0396 were drafted by Geonjung Ko, Ju-Hyung Son, Minseok Noh, and Jin Sam Kwak. As demonstrated in the accompanying charts, Ko 0042 and Ko 0396 each disclose at least one claim element of the Asserted Claims of the '597 patent. Ko 0042 and Ko 0396 each demonstrate that Minseok Noh is an inventor of the subject matter of the '597 patent, despite not being listed as a named inventor. *See* RH4, RH16.

Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

V. P.R. 3-3(c) – Claim Charts

Pursuant to Rule 3-3(d), Defendants identify invalidity claim charts identifying disclosures in the references identified in Section III supra as to the Asserted Claims of the Asserted Patents are provided in attached Exhibits A-01-A-08 & Appendix A (’077 patent), Exhibits B-01-B-08 & Appendix B (’210 patent), Exhibits C-01-13 &Appendix C (’281 patent), Exhibits D-01-16 & Appendix D (’595 patent), Exhibits E-01-E-27 & Appendix E (’035 patent), Exhibits F-01-F-27 & Appendix F (’879 patent), Exhibits G-01-G-24 & Appendix G (’163 patent), and Exhibits H-01-H-24 & Appendix H (’597 patent). Furthermore, Defendants identify obviousness combinations on a claim-by-claim basis for each of the Asserted Patents in Attachment A.

Defendants have identified relevant portions and/or features of the prior art. However, the identified prior art may contain additional descriptions of or alternative support for the claim limitations. Defendants may rely on uncited portions or features of the identified prior art, other documents, and expert testimony, to provide context or to aid in understanding the identified prior art and the state of the art. Citations to a particular figure in a reference include the caption and description of the figure and any text relating to the figure. Similarly, citations to particular text referring to a figure include the figure and caption as well. Portions relevant to dependent claims incorporate by reference the citations to the chain of claims from which that dependent claim derives. Likewise, portions related to subsequent limitations that refer to claim elements identified, described, and/or cited to in earlier limitations may rely on the citations related to those portions of the claim chart that identify and/or describe these elements.

Throughout the invalidity claim charts in Exhibits & Appendices A-H, Defendants provide examples of where references disclose subject matter recited in preambles of the Asserted Claims, regardless whether the preambles limit the claims. Defendants reserve the right to argue that the preambles are or are not limitations. Further, where an entry in a claim chart corresponding to a

given limitation refers back to the discussion of another claim, the entry incorporates all evidence cited for the other claim.

VI. P.R. 3-3(d) – Other Grounds For Invalidity

A. U.S. Patent No. 10,313,077

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the ’077 patent based on lack of written description under 35 U.S.C. § 112 (a); lack of enablement under 35 U.S.C. § 112 (a); indefiniteness under 35 U.S.C. § 112 (b); and indefiniteness under 35 U.S.C. § 112 (f). These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff’s purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants’ invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court’s claim construction, as well as Plaintiff’s alleged scope of the ’077 patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112 (a)

The ’077 patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the ’077 patent Asserted Claims at the time the ’077 patent was filed. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that “reasonably conveys to those skilled in the art that the inventor had possession of the

claimed subject matter as of the filing date." *Id*. One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

The specification of the '077 patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '077 patent Asserted Claims without undue experimentation. To the extent the following limitations are definite (under 35 U.S.C. § 112 (b)), the application that became the '077 patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112 (a):[35]

Term	Relevant Claim(s)
"obtain length information indicating information on a duration of the non-legacy physical layer frame, from the legacy signaling field" / "obtaining length information indicating information on a duration of the non-legacy physical layer frame after a legacy signaling field, from the legacy signaling field"	1, 8
"obtain[\ing] information other than [the] information on the duration of the non-legacy physical layer frame through a remaining value obtained by dividing the length information by a data size transmittable by a symbol of a legacy physical layer frame, wherein the data size transmittable by a symbol of the legacy physical layer frame is 3 octets when a data rate of the legacy physical layer frame is 6 Mbps"	1, 8
"determine the number of symbols of data of the non-legacy physical layer frame according to a following equation, $N_{SYM} = \left\lfloor \left(\frac{\text{L\_LENGTH} + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) \Big/ T_{SYM} \right\rfloor - b_{PE\_Disambiguity}$ where $\lfloor x \rfloor$ denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes a value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $b_{PE\_Disambiguity}$ denotes a value of PE Disambiguity field, $T_{HE\_PREAMBLE}$ denotes a duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes a duration of a symbol of the data of the non-legacy physical layer frame"	1

[35] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
"determining the number of symbols of the data of the non-legacy physical layer frame according to a following equation, $N_{SYM} = \left\lfloor \left(\frac{\text{L\_LENGTH} + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) / T_{SYM} \right\rfloor - b_{PE\_Disambiguity}$ where [x] denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes a value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $b_{PE\_Disambiguity}$ denotes a value of PE Disambiguity field, $T_{HE\_PREAMBLE}$ denotes a duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes a duration of a symbol of the data of the non-legacy physical layer frame,"	8
"m denotes a value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame"	1, 2, 8, 9
"wherein the PE Disambiguity field is set based on the duration of a symbol of the data of the non-legacy physical layer frame and an increment of duration to set a value of the length information based on a duration of a symbol of [the] legacy physical layer frame"	1, 8
"The wireless communication terminal of claim 1, wherein the processor is configured to obtain a duration of a packet extension which is a padding of the non-legacy physical layer frame, according to a following equation, $T_{PE} = \left\lfloor \frac{\left(\frac{\text{L\_LENGTH} + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) - N_{SYM} \times T_{SYM}}{4} \right\rfloor \times 4$ where $\lfloor x \rfloor$ denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes the value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $T_{HE\_PREAMBLE}$ denotes the duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes the duration of a symbol of the data of the non-legacy physical layer frame."	2
"obtaining a duration of a packet extension which is a padding of the non-legacy physical layer frame, according to a following equation, $T_{PE} = \left\lfloor \frac{\left(\frac{\text{L\_LENGTH} + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) - N_{SYM} \times T_{SYM}}{4} \right\rfloor \times 4$	9

Term	Relevant Claim(s)
where [x] denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes the value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $T_{HE\_PREAMBLE}$ denotes the duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes the duration of a symbol of the data of the non-legacy physical layer frame."	
"wherein the increment of duration is a value obtained by multiplying a difference between a value obtained by performing a ceiling operation on a value obtained by dividing the duration of the non-legacy physical layer frame after the legacy signaling field by the duration of a symbol of the legacy physical layer frame and the value obtained by dividing the duration of the non-legacy physical layer frame after the legacy signaling field by the duration of a symbol of the legacy physical layer frame by the duration of a symbol of the legacy physical layer frame."	3, 10
"determin[e\ing] whether the non-legacy physical layer frame comprises a predetermined signaling field based on the length information"	5, 12
"obtain[\ing] the information other than the information on the duration of the non-legacy physical layer frame based on the remaining value and a modulation method of a third symbol after the legacy signaling field"	6, 13

2. Indefiniteness Under 35 U.S.C. § 112 (b)

Under § 112 (b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." *Id.* A patent is indefinite under § 112 (b) "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '077 patent Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite under § 112 (a), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention.

The following limitations recited in the '077 patent Asserted Claims are indefinite in whole, in part or in combination:[36]

Term	Relevant Claim(s)
"obtain[\ing] information other than [the] information on the duration of the non-legacy physical layer frame through a remaining value obtained by dividing the length information by a data size transmittable by a symbol of a legacy physical layer frame"	1, 8
"wherein the data size transmittable by a symbol of the legacy physical layer frame is 3 octets when a data rate of the legacy physical layer frame is 6 Mbps"	1, 8
"bPE_Disambiguity denotes a value of PE Disambiguity field" / "wherein the PE Disambiguity field is set based on the duration of a symbol of the data of the non-legacy physical layer frame and an increment of duration to set a value of the length information based on a duration of a symbol of [the] legacy physical layer frame."	1, 8
"a symbol of the legacy physical layer frame"	1-3, 8-10
"determin[e\ing] whether the non-legacy physical layer frame comprises a predetermined signaling field based on the length information"	5, 12
"obtain[\ing] the information other than the information on the duration of the non-legacy physical layer frame based on the remaining value and a modulation method of a third symbol after the legacy signaling field"	6, 13

Furthermore, Section 112 (f) allows a patentee to express a claim element "as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112, ¶ 6. For such claims, the written description of the patent must disclose with sufficient particularity the corresponding structure for performing the claimed function, and it must clearly link that structure to the claimed function. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1379 (Fed. Cir. 2013). Several of the '077 patent Asserted Claims are invalid as indefinite because they contain means-plus-function terms subject to Section 112 (f),

[36] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

and the ’077 patent fails to disclose with sufficient particularity the corresponding structure for performing the claimed function.

The following limitations recited in the ’077 patent Asserted Claims are governed by Section 112 (f) and are indefinite in whole, in part or in combination:[37]

Term	Relevant Claim(s)
“wherein the processor is configured to receive a non-legacy physical layer frame by using the transceiver, obtain a legacy signaling field including information decodable by a legacy wireless communication terminal from the non-legacy physical layer frame, obtain length information indicating information on a duration of the non-legacy physical layer frame, from the legacy signaling field, obtain information other than information on the duration of the non-legacy physical layer frame through a remaining value obtained by dividing the length information by a data size transmittable by a symbol of a legacy physical layer frame, wherein the data size transmittable by a symbol of the legacy physical layer frame is 3 octets when a data rate of the legacy physical layer frame is 6 Mbps, and determine the number of symbols of data of the non-legacy physical layer frame according to a following equation, $N_{SYM} = \left\lfloor \left(\frac{\text{L\_LENGTH} + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) \Big/ T_{SYM} \right\rfloor - b_{PE\_Disambiguity}$ where $\lfloor x \rfloor$ denotes a largest integer less than or equal to x, L_LENGTH denotes the length information, m denotes a value obtained by subtracting the remaining value from the data size transmittable by a symbol of the legacy physical layer frame, $b_{PE\_Disambiguity}$ denotes a value of PE Disambiguity field, $T_{HE\_PREAMBLE}$ denotes a duration of non-legacy preamble of the non-legacy physical layer frame, T_{SYM} denotes a duration of a symbol of the data of the non-legacy physical layer frame, wherein the PE Disambiguity field is set based on the duration of a symbol of the data of the non-legacy physical layer frame and an increment of duration to set a value of the length information based on a duration of a symbol of the legacy physical layer frame.	1-7

[37] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

3. Invalidity Under 35 U.S.C. § 101

Pursuant to the Court's Standing Order, Defendants contend that the '077 patent's Asserted Claims are invalid under 35 U.S.C. § 101 because the claims are not directed to patent-eligible subject matter. Defendants' contentions that the Asserted Claims are invalid under 35 U.S.C. § 101 do not constitute, and should not be interpreted as, admissions regarding the construction or scope of the claims of the Asserted Claims, or that any of the claims of the '077 patent are not anticipated or rendered obvious by prior art.

35 U.S.C. § 101 provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor[.]" Because abstract ideas form the "basic tools of scientific and technological work," they are unpatentable subject matter under 35 U.S.C. § 101. *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014). "The Supreme Court provided a two-part test for assessing patent eligibility under Section 101." *Certain Elec. Devices, Including Streaming Players, Televisions, Set Top Boxes, Remote Controllers, & Components Thereof,* Inv. No. 337-TA-1200, Order No. 21, 2020 WL 6441422 at *4 (Sept. 14, 2020).

Under the first step of *Alice* ("Step One"), a court must decide whether the claims are directed to ineligible subject matter, such as an abstract idea. *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1326 (Fed. Cir. 2017); *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015). To do so, a court examines the claims to determine whether their "character as a whole," or their "focus," is an abstract idea. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016). This examination entails "identify[ing] and defin[ing] whatever fundamental concept appears wrapped up" in the claims. *Accenture Glob. Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1341 (Fed. Cir. 2013) (internal quotation marks and citations omitted). Once ascertained, the court then determines whether that character is "directed

to excluded subject matter," such as an abstract idea. *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016) (internal citation omitted). This inquiry often asks whether the claims' character is directed to "a specific means or method" for improving technology or whether it is simply directed to an abstract end-result. *RecogniCorp*, 855 F.3d at 1326. If the claims are not directed to an abstract idea, the inquiry ends. *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1349 (Fed. Cir. 2017). To resolve this question, "it is often helpful to ask whether the claims are directed to 'an improvement in the functioning of a computer,' or merely 'adding conventional computer components to well-known business practices.'" *Affinity Labs. of Texas, LLC v. Amazon.com Inc.*, 838 F.3d 1266, 1270 (Fed. Cir. 2016) (quoting *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1338 (Fed. Cir. 2016)). "Generalized steps to be performed on a computer using conventional computer activity are abstract[.]" *RecogniCorp*, 855 F.3d at 1326 (internal quotation marks omitted). And "[c]laims directed to generalized steps to be performed on a computer using conventional computer activity are not patent eligible." *Affinity Labs.*, 838 F.3d at 1270 (citing *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1348-49 (Fed. Cir. 2015)).

If the claims, as here, are directed to one or more abstract ideas, then the court advances to the second step of *Alice* ("Step Two"), where the claim elements must be scrutinized "both individually and 'as an ordered combination' to determine whether the additional elements 'transform the nature of the claim' into a patent-eligible application." *Enfish*, 822 F.3d at 1354 (quoting *Alice*, 573 U.S. at 217). At Step Two, the court searches for an "'inventive concept' sufficient to 'transform the nature of the claim into a patent-eligible application.'" *RecogniCorp*, 855 F.3d at 1327 (quoting Alice, 573 U.S. at 217). To save a patent at Step Two, an inventive concept must be evident in the claims. *See Alice*, 573 U.S. at 221; *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1149 (Fed. Cir. 2016). The "inventive concept" must also "involve

more than performance of well-understood, routine, and conventional activities previously known to the industry." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1367 (Fed. Cir. 2018); *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 73 (2012); *Certain Elec. Devices*, 2020 WL 6441422 at *4. The Federal Circuit's "precedent is clear that merely adding computer functionality to increase the speed or efficiency of the process does not confer patent eligibility on an otherwise abstract idea." *Ericsson Inc. v. TCL Commc'n Tech. Holdings Ltd.*, 955 F.3d 1317, 1330 (Fed. Cir. 2020) (citing *Intellectual Ventures I LLC v. Capital One Bank (USA)*, 792 F.3d 1363, 1370 (Fed. Cir. 2015)). In addition, limitations that simply restrict the invention to a single field of use or merely add "token post-solution" requirements also fail to impart patentability. *Bilski v. Kappos*, 561 U.S. 593, 612 (2010).

All Asserted Claims of the '077 patent are invalid under 35 U.S.C. § 101 because they fail to claim patent-eligible subject matter. The Asserted Claims are directed to the abstract idea of determining an amount of received data.. The Asserted Claims, however, fail to describe anything beyond the abstract idea of determining an amount of received data.. None of the remaining claim elements, considered individually or as an ordered combination, transform the nature of the claims into patent-eligible subject matter. To the extent structure is claimed in any of the claims, that structure is nothing more than general purpose computer components performing general purpose computer functions. Such general purpose structure is insufficient to transform the nature of the claims into patent-eligible subject matter.

Further detail regarding Samsung's contentions that the Asserted Claims of the '077 patent do not qualify as patent-eligible subject matter are contained in Exhibit A101. Specifically, pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit A101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual

and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit A101, each Challenged Claim of the '077 patent is directed to an abstract idea and therefore is not directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit A101, which references and incorporates information from Exhibits A-01-A-08, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Samsung provides the following description of the relevant industry at the relevant time. As of the alleged priority date for the '077 patent (June 29, 2015), the relevant industry was well-developed. Wireless telecommunications had been around for decades. Further, all individual elements disclosed and recited in the '077 patent were conventional, routine, and well-known in the industry. *See generally* Exhibits A-01-A-08, Appendix A. By way of example, the need for coexistence among legacy and non-legacy wireless communication terminals was known. *See, e.g.*, Exhibits A-01-A-08, A101 at [1pre], Appendix A. Conventional components such as transceivers and processers were known, as were non-legacy physical layer frames. *See, e.g.*, Exhibits A-01-A-08, A101 at [1a]-[1c]. It was also known that a non-legacy physical layer frame could include a legacy signaling field, and that the number of symbols of data of the non-legacy physical layer frame could be determined. *See, e.g.*, Exhibits A-01-A-08, A101 at [1d]–[1f], Appendix A. Indeed, none of these concepts was new or merely on the verge of development as of the alleged priority date of the '077 patent. Instead, these concepts had been known for years and were the subject of many

published articles and/or patents from around the world. The '077 patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

B. U.S. Patent No. 11,159,210

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '210 patent based on lack of written description under 35 U.S.C. § 112 (a); lack of enablement under 35 U.S.C. § 112 (a); and indefiniteness under 35 U.S.C. § 112 (b). These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '210 patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112 (a)

The '210 patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '210 patent Asserted Claims at the time the '210 patent was filed. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id*. One of ordinary skill in the art would not have

understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

The specification of the ’210 patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the ’210 patent Asserted Claims without undue experimentation. To the extent the following limitations are definite (under 35 U.S.C. § 112 (b)), the application that became the ’210 patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112 (a):[38]

Term	Relevant Claim(s)
“wherein when a SIG-B compression field of the HE-SIG-A indicates full bandwidth multi User-Multiple Input Multiple Output (MU-MIMO) transmission, a format of user field(s) included in a user specific field of the HE-SIG-B is identified based on a number of MU-MIMO users indicated by a subfield of the HE-SIG-A”	1, 6
“wherein when the number of MU-MIMO users indicates two or more users, the user specific field of the HE-SIG-B includes user fields for MU-MIMO allocation, and wherein when the number of MU-MIMO users indicates a single user, the user specific field of the HE-SIG-B includes one user field for non-MU-MIMO allocation”	1, 6
“wherein when the number of MU-MIMO users indicates a single user”	1, 6
“the number of MU-MIMO users is indicated by a number of HE-SIG-B symbols field in the HE-SIG-A”	4, 9
“specific subfield”	5
“the SIG-B compression field indicates whether full bandwidth MU-MIMO transmission is used”	5
“when the SIG-B compression field indicates full bandwidth MU-MIMO transmission, the specific subfield indicates the number of MU-MIMO users”	5

[38] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

2. Indefiniteness Under 35 U.S.C. § 112 (b)

Under § 112 (b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." *Id.* A patent is indefinite under § 112 (b) "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Several of the '210 patent Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite under § 112 (a), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention.

The following limitations recited in the '210 patent Asserted Claims are indefinite in whole, in part or in combination:[39]

Term	Relevant Claim(s)
"wherein when a SIG-B compression field of the HE-SIG-A indicates full bandwidth multi User-Multiple Input Multiple Output (MU-MIMO) transmission, a format of user field(s) included in a user specific field of the HE-SIG-B is identified based on a number of MU-MIMO users indicated by a subfield of the HE-SIG-A"	1, 6
"wherein when the number of MU-MIMO users indicates two or more users, the user specific field of the HE-SIG-B includes user fields for MU-MIMO allocation, and wherein when the number of MU-MIMO users indicates a single user, the user specific field of the HE-SIG-B includes one user field for non-MU-MIMO allocation"	1, 6
"wherein when the number of MU-MIMO users indicates a single user"	1, 6
"the number of MU-MIMO users is indicated by a number of HE-SIG-B symbols field in the HE-SIG-A"	4, 9
"the SIG-B compression field indicates whether full bandwidth MU-MIMO transmission is used"	5

[39] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
"when the SIG-B compression field indicates full bandwidth MU-MIMO transmission, the specific subfield indicates the number of MU-MIMO users"	5

Furthermore, Section 112 (f) allows a patentee to express a claim element "as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112, ¶ 6. For such claims, the written description of the patent must disclose with sufficient particularity the corresponding structure for performing the claimed function, and it must clearly link that structure to the claimed function. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1379 (Fed. Cir. 2013). Several of the '210 patent Asserted Claims are invalid as indefinite because they contain means-plus-function terms subject to Section 112 (f), and the '210 patent fails to disclose with sufficient particularity the corresponding structure for performing the claimed function.

The following limitations recited in the '210 patent Asserted Claims are governed by Section 112 (f) and are indefinite in whole, in part or in combination:[40]

Term	Relevant Claim(s)
"a communication unit"	1-5
"a processor configured to process signals transmitted and received through the communication unit, …"	1-5

3. Invalidity Under 35 U.S.C. § 101

Pursuant to the Court's Standing Order, Defendants contend that the '210 patent's Asserted Claims are invalid under 35 U.S.C. § 101 because the claims are not directed to patent-eligible subject matter. Defendants' contentions that the Asserted Claims are invalid under 35 U.S.C. §

[40] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

101 do not constitute, and should not be interpreted as, admissions regarding the construction or scope of the claims of the Asserted Claims, or that any of the claims of the ’210 patent are not anticipated or rendered obvious by prior art.

All Asserted Claims of the ’210 patent are invalid under 35 U.S.C. § 101 because they fail to claim patent-eligible subject matter. The Asserted Claims are directed to the abstract idea of extracting data. The Asserted Claims, however, fail to describe anything beyond the abstract idea of extracting data. None of the remaining claim elements, considered individually or as an ordered combination, transform the nature of the claims into patent-eligible subject matter. To the extent structure is claimed in any of the claims, that structure is nothing more than general purpose computer components performing general purpose computer functions. Such general purpose structure is insufficient to transform the nature of the claims into patent-eligible subject matter.

Further detail regarding Samsung’s contentions that the Asserted Claims of the ’210 patent do not qualify as patent-eligible subject matter are contained in Exhibit B101. Specifically, pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit B101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit B101, each Challenged Claim of the ’210 patent is directed to an abstract idea and therefore is not directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit B101, which references and incorporates information from Exhibits B01-B08, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the

relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Samsung provides the following description of the relevant industry at the relevant time. As of the alleged priority date for the '210 patent (January 9, 2017), the relevant industry was well-developed. Wireless telecommunications had been around for decades. Further, all individual elements disclosed and recited in the '210 patent were conventional, routine, and well-known in the industry. *See generally* Exhibits B01-B08, Appendix B. By way of example, the need for signaling for MU-MIMO transmissions was known. *See, e.g.*, Exhibits B01-B08, B101 at [1pre], Appendix B. Communication units and processors configured to process signals transmitted and received through the communication unit were also known. *See, e.g.*, Exhibits B01-B08, B101 at [1a]–[1c], Appendix B. It was also known to use the preamble of a data unit, which contains certain fields, in order to signal various things—including a multi-user packet. *See, e.g.*, Exhibits B01-B08, B101 at [1d]–[1h], Appendix B. Indeed, none of these concepts was new or merely on the verge of development as of the alleged priority date of the '210 patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The '210 patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

C. U.S. Patent No. 10,687,281

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '281 patent based on lack of written description under 35 U.S.C. § 112 (a); lack of enablement under 35 U.S.C. § 112 (a); indefiniteness under 35 U.S.C. § 112 (b); and indefiniteness under 35 U.S.C. § 112 (f). These contentions shall not be construed as an admission that any claim construction

advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '281 patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112 (a)

The '281 patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '281 patent Asserted Claims at the time the '281 patent was filed. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a "manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

The specification of the '281 patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '281 patent Asserted Claims without undue experimentation. To the extent the following limitations are definite (under 35 U.S.C. § 112 (b)),

the application that became the ’281 patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112 (a):[41]

Term	Relevant Claim(s)
a communication unit / receive a wireless packet through the communication unit	1-6
[obtain/obtaining] bandwidth information indicated via a bandwidth field of HE-SIG-A of the received packet,	1-6, 8-13
[obtain/obtaining] information of an unassigned resource unit via at least one of the bandwidth field of the HE-SIG-A and a subfield of HE-SIG-B of the received packet, and	1-6, 8-13
[decode/decoding] the received packet based on the bandwidth information and the information of the unassigned resource unit,	1-6, 8-13
wherein the information of the unassigned resource unit is indicated via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B, and	1-6, 8-13
wherein the bandwidth field of the HE-SIG-A indicates channel information to be punctured within the bandwidth, and the resource unit allocation field indicates additional puncturing information for the unassigned resource unit within the bandwidth	1-6, 8-13
wherein the resource unit allocation field indicates a specific resource unit not assigned to a user through a predetermined index	2, 9
wherein the specific resource unit not assigned to a user is at least one of a 242-tone resource unit, a 484-tone resource unit, and a 996-tone resource unit	3, 10
wherein the information of the unassigned resource unit is obtained through resource unit arrangement information indicated by the resource unit allocation field of the HE-SIG-B and a Null STA ID contained in a user field corresponding to a specific resource unit in the resource unit arrangement	4, 11
wherein the specific resource unit is at least one of a 26-tone resource unit, a 52-tone resource unit, and a 106-tone resource unit	5, 12
wherein when the bandwidth field indicates puncturing of one of two 20 MHz channels in a secondary 40 MHz channel within a bandwidth of 80 MHz or puncturing of at least one of two 20 MHz channels in a secondary 40 MHz channel within a bandwidth of 160 MHz or 80+80 MHz, the resource unit allocation field indicates which 20 MHz channel in the secondary 40 MHz channel is punctured	6, 13

[41] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

2. Indefiniteness Under 35 U.S.C. § 112 (b)

Under § 112 (b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." *Id.* A patent is indefinite under § 112 (b) "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '281 patent Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite under § 112 (a), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention.

The following limitations recited in the '281 patent Asserted Claims are indefinite in whole, in part or in combination:[42]

Term	Relevant Claim(s)
a communication unit / receive a wireless packet through the communication unit	1-6
[obtain/obtaining] bandwidth information indicated via a bandwidth field of HE-SIG-A of the received packet,	1-6, 8-13
[obtain/obtaining] information of an unassigned resource unit via at least one of the bandwidth field of the HE-SIG-A and a subfield of HE-SIG-B of the received packet, and	1-6, 8-13
[decode/decoding] the received packet based on the bandwidth information and the information of the unassigned resource unit,	1-6, 8-13
wherein the information of the unassigned resource unit is indicated via a combination of the bandwidth field of the HE-SIG-A and a resource unit allocation field of the HE-SIG-B, and	1-6, 8-13
wherein the bandwidth field of the HE-SIG-A indicates channel information to be punctured within the bandwidth, and the resource unit allocation field indicates additional puncturing information for the unassigned resource unit within the bandwidth	1-6, 8-13

[42] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
wherein the resource unit allocation field indicates a specific resource unit not assigned to a user through a predetermined index	2, 9
wherein the specific resource unit not assigned to a user is at least one of a 242-tone resource unit, a 484-tone resource unit, and a 996-tone resource unit	3, 10
wherein the information of the unassigned resource unit is obtained through resource unit arrangement information indicated by the resource unit allocation field of the HE-SIG-B and a Null STA ID contained in a user field corresponding to a specific resource unit in the resource unit arrangement	4, 11
wherein the specific resource unit is at least one of a 26-tone resource unit, a 52-tone resource unit, and a 106-tone resource unit	5, 12
wherein when the bandwidth field indicates puncturing of one of two 20 MHz channels in a secondary 40 MHz channel within a bandwidth of 80 MHz or puncturing of at least one of two 20 MHz channels in a secondary 40 MHz channel within a bandwidth of 160 MHz or 80+80 MHz, the resource unit allocation field indicates which 20 MHz channel in the secondary 40 MHz channel is punctured	6, 13

Furthermore, Section 112 (f) allows a patentee to express a claim element "as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112, ¶ 6. For such claims, the written description of the patent must disclose with sufficient particularity the corresponding structure for performing the claimed function, and it must clearly link that structure to the claimed function. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1379 (Fed. Cir. 2013). Several of the '281 patent Asserted Claims are invalid as indefinite because they contain means-plus-function terms subject to Section 112 (f), and the '281 patent fails to disclose with sufficient particularity the corresponding structure for performing the claimed function.

The following limitations recited in the '281 patent Asserted Claims are governed by Section 112 (f) and are indefinite in whole, in part or in combination:[43]

[43] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
a processor … configured to	1-6
a communication unit	1-6

3. Invalidity Under 35 U.S.C. § 101

Pursuant to the Court's Standing Order, Defendants contend that the '281 patent's Asserted Claims are invalid under 35 U.S.C. § 101 because the claims are not directed to patent-eligible subject matter. Defendants' contentions that the Asserted Claims are invalid under 35 U.S.C. § 101 do not constitute, and should not be interpreted as, admissions regarding the construction or scope of the claims of the Asserted Claims, or that any of the claims of the '281 patent are not anticipated or rendered obvious by prior art.

All Asserted Claims of the '281 patent are invalid under 35 U.S.C. § 101 because they fail to claim patent-eligible subject matter. The Asserted Claims are directed to the abstract idea of identifying unused resources. The claims recite a related abstract concept of identifying unassigned resource unit(s). The Asserted Claims, however, fail to describe anything beyond the abstract idea of identifying unused resources. None of the remaining claim elements, considered individually or as an ordered combination, transform the nature of the claims into patent-eligible subject matter. To the extent structure is claimed in any of the claims, that structure is nothing more than general purpose computer components performing general purpose computer functions. Such general purpose structure is insufficient to transform the nature of the claims into patent-eligible subject matter.

Further detail regarding Samsung's contentions that the Asserted Claims of the '281 patent do not qualify as patent-eligible subject matter are contained in Exhibit C101. Specifically, pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit C101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual

and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit C101, each Challenged Claim of the ’281 patent is directed to an abstract idea and therefore is not directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit C101, which references and incorporates information from Exhibits C1-C13, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Samsung provides the following description of the relevant industry at the relevant time. As of the alleged priority date for the ’281 patent (December 24, 2015), the relevant industry was well-developed. Wireless telecommunications, including cellular telecommunications had been around for decades. Further, all individual elements disclosed and recited in the ’281 patent were conventional, routine, and well-known in the industry. *See generally* Exhibits C1-C13. By way of example, using HE-SIG-A to provide bandwidth information was known. *See, e.g.*, Exhibits C1-C13, C101 at [1e]. Also, using HE-SIG-B to provide which resource units are assigned or unassigned was known. *See, e.g.*, Exhibits C1-C13, C101 at [1f]. Further, channel puncturing was known. *See, e.g. See, e.g.*, Exhibits C1-C13, C101 at [1i]. Indeed, none of these concepts was new or merely on the verge of development as of the alleged priority date of the ’281 Patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The ’281 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

D. U.S. Patent No. 11,470,595

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '595 patent based on lack of written description under 35 U.S.C. § 112 (a); lack of enablement under 35 U.S.C. § 112 (a); and indefiniteness under 35 U.S.C. § 112 (b). These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '595 patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112 (a)

The '595 patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '595 patent Asserted Claims at the time the '595 patent was filed. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

The specification of the ’595 patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the ’595 patent Asserted Claims without undue experimentation. To the extent the following limitations are definite (under 35 U.S.C. § 112 (b)), the application that became the ’595 patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112 (a):[44]

Term	Relevant Claim(s)
[receive/receiving] a wireless packet including an High Efficiency Signal A (HE-SIG-A) field and an High Efficiency Signal B (HE-SIG-B) field	1-6, 7-12
[obtain/obtaining] bandwidth information indicated via a bandwidth field included in the HE-SIG-A field	1-6, 7-12
[obtain/obtaining] information of an unassigned resource unit via at least one subfield included in the HE-SIG-B field	1-6, 7-12
wherein the bandwidth field is related to bandwidth over which the received wireless packet is transmitted, and is used to obtain the information of the unassigned resource unit wherein the bandwidth field is related to bandwidth over which the received wireless packet is transmitted, and wherein the bandwidth field of HE-SIG-A is used to obtain the information of the unassigned resource unit	1-6, 7-12
[decode/decoding] a data of the received wireless packet based on the bandwidth information and the information of the unassigned resource unit	1-6, 7-12
wherein the unassigned resource unit is explicitly indicated with the information of the unassigned resource unit based on the bandwidth field and the at least one subfield	1-6, 7-12
wherein the information of the unassigned resource unit includes information of a C26 field indicating whether a user is allocated to a center 26-tone resource unit of 80 MHz upon the bandwidth related to a transmission of the received wireless packet indicated by the bandwidth field being 80 MH or more, not 20 MHz or 40 MHz	1-6, 7-12
wherein the HE-SIG-B field consists of HE-SIG-B content channel 1 and HE-SIG-B content channel 2 in units of 20 MHz respectively, and wherein the C26 field is carried in both the HE-SIG-B content channel 1 and the HE-SIG-B content channel 2	2, 8

[44] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
wherein when the received wireless packet is transmitted in a total bandwidth of 80 MHz, both of a C26 field carried in the HE-SIG-B content channel 1 and a C26 field carried in the HE-SIG-B content channel 2 indicate whether a user is allocated to a center 26-tone resource unit in the total bandwidth of 80 MHz	3, 9
wherein when the C26 field indicates that a user is allocated to the center 26-tone resource unit, a user field corresponding to the center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 1	4, 10
wherein when the received wireless packet is transmitted in a total bandwidth of 160 MHz or 80+80 MHz, the total bandwidth includes a first 80 MHz bandwidth and a second 80 MHz bandwidth, a first C26 field carried in the HE-SIG-B content channel 1 indicates whether a user is allocated to a first center 26-tone resource unit in the first 80 MHz bandwidth, and a second C26 field carried in the HE-SIG-B content channel 2 indicates whether a user is allocated to a second center 26-tone resource unit in the second 80 MHz bandwidth	5, 11
wherein when the first C26 field indicates that a user is allocated to the first center 26-tone resource unit, a user field corresponding to the first center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 1, and wherein when the second C26 field indicates that a user is allocated to the second center 26-tone resource unit, a user field corresponding to the second center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 2	6, 12

2. Indefiniteness Under 35 U.S.C. § 112 (b)

Under § 112 (b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." *Id.* A patent is indefinite under § 112 (b) "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Several of the '595 patent Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable

certainty and are indefinite under § 112 (a), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention.

The following limitations recited in the '595 patent Asserted Claims are indefinite in whole, in part or in combination:[45]

Term	Relevant Claim(s)
[receive/receiving] a wireless packet including an High Efficiency Signal A (HE-SIG-A) field and an High Efficiency Signal B (HE-SIG-B) field	1-6, 7-12
[obtain/obtaining] bandwidth information indicated via a bandwidth field included in the HE-SIG-A field	1-6, 7-12
[obtain/obtaining] information of an unassigned resource unit via at least one subfield included in the HE-SIG-B field	1-6, 7-12
wherein the bandwidth field is related to bandwidth over which the received wireless packet is transmitted, and is used to obtain the information of the unassigned resource unit wherein the bandwidth field is related to bandwidth over which the received wireless packet is transmitted, and wherein the bandwidth field of HE-SIG-A is used to obtain the information of the unassigned resource unit	1-6, 7-12
[decode/decoding] a data of the received wireless packet based on the bandwidth information and the information of the unassigned resource unit	1-6, 7-12
wherein the unassigned resource unit is explicitly indicated with the information of the unassigned resource unit based on the bandwidth field and the at least one subfield	1-6, 7-12
wherein the information of the unassigned resource unit includes information of a C26 field indicating whether a user is allocated to a center 26-tone resource unit of 80 MHz upon the bandwidth related to a transmission of the received wireless packet indicated by the bandwidth field being 80 MH or more, not 20 MHz or 40 MHz	1-6, 7-12
wherein the HE-SIG-B field consists of HE-SIG-B content channel 1 and HE-SIG-B content channel 2 in units of 20 MHz respectively, and wherein the C26 field is carried in both the HE-SIG-B content channel 1 and the HE-SIG-B content channel 2	2, 8
wherein when the received wireless packet is transmitted in a total bandwidth of 80 MHz, both of a C26 field carried in the HE-SIG-B	3, 9

[45] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
content channel 1 and a C26 field carried in the HE-SIG-B content channel 2 indicate whether a user is allocated to a center 26-tone resource unit in the total bandwidth of 80 MHz	
wherein when the C26 field indicates that a user is allocated to the center 26-tone resource unit, a user field corresponding to the center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 1	4, 10
wherein when the received wireless packet is transmitted in a total bandwidth of 160 MHz or 80+80 MHz, the total bandwidth includes a first 80 MHz bandwidth and a second 80 MHz bandwidth, a first C26 field carried in the HE-SIG-B content channel 1 indicates whether a user is allocated to a first center 26-tone resource unit in the first 80 MHz bandwidth, and a second C26 field carried in the HE-SIG-B content channel 2 indicates whether a user is allocated to a second center 26-tone resource unit in the second 80 MHz bandwidth	5, 11
wherein when the first C26 field indicates that a user is allocated to the first center 26-tone resource unit, a user field corresponding to the first center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 1, and wherein when the second C26 field indicates that a user is allocated to the second center 26-tone resource unit, a user field corresponding to the second center 26-tone resource unit is carried in a user specific field of the HE-SIG-B content channel 2	6, 12

Furthermore, Section 112 (f) allows a patentee to express a claim element "as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112, ¶ 6. For such claims, the written description of the patent must disclose with sufficient particularity the corresponding structure for performing the claimed function, and it must clearly link that structure to the claimed function. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1379 (Fed. Cir. 2013). Several of the '595 patent Asserted Claims are invalid as indefinite because they contain means-plus-function terms subject to Section 112 (f), and the '595 patent fails to disclose with sufficient particularity the corresponding structure for performing the claimed function.

The following limitations recited in the '595 patent Asserted Claims are governed by Section 112 (f) and are indefinite in whole, in part or in combination:[46]

Term	Relevant Claim(s)
a processor … configured to	1-6

3. Invalidity Under 35 U.S.C. § 101

Pursuant to the Court's Standing Order, Defendants contend that the '595 patent's Asserted Claims are invalid under 35 U.S.C. § 101 because the claims are not directed to patent-eligible subject matter. Defendants' contentions that the Asserted Claims are invalid under 35 U.S.C. § 101 do not constitute, and should not be interpreted as, admissions regarding the construction or scope of the claims of the Asserted Claims, or that any of the claims of the '595 patent are not anticipated or rendered obvious by prior art.

All Asserted Claims of the '595 patent are invalid under 35 U.S.C. § 101 because they fail to claim patent-eligible subject matter. The Asserted Claims are directed to the abstract idea of identifying unused resources. The claims recite a related abstract concept of identifying unassigned resource unit(s). The Asserted Claims, however, fail to describe anything beyond the abstract idea of identifying unused resources. None of the remaining claim elements, considered individually or as an ordered combination, transform the nature of the claims into patent-eligible subject matter. To the extent structure is claimed in any of the claims, that structure is nothing more than general purpose computer components performing general purpose computer functions. Such general purpose structure is insufficient to transform the nature of the claims into patent-eligible subject matter.

[46] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Further detail regarding Samsung's contentions that the Asserted Claims of the '595 patent do not qualify as patent-eligible subject matter are contained in Exhibit D101. Specifically, pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit D101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit D101, each Challenged Claim of the '595 patent is directed to an abstract idea and therefore is not directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit D101, which references and incorporates information from Exhibits D1-D16, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Samsung provides the following description of the relevant industry at the relevant time. As of the alleged priority date for the '595 Patent (December 24, 2015), the relevant industry was well-developed. Wireless telecommunications, including cellular telecommunications had been around for decades. Further, all individual elements disclosed and recited in the '595 patent were conventional, routine, and well-known in the industry. *See generally* Exhibits D1-D16. By way of example, using HE-SIG-A to provide bandwidth information was known. *See, e.g.*, Exhibits, D101 at [1c]. Also, using HE-SIG-B to provide which resource units are assigned or unassigned was known. *See, e.g.*, Exhibits D1-D16, D101 at [1d]. Further, providing information as to whether a user allocated to a center 26-tone resource unit was known. *See, e.g. See, e.g.*, Exhibits D1-D16, D101 at [1h].

Indeed, none of these concepts was new or merely on the verge of development as of the alleged priority date of the ’281 Patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The ’281 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

E. U.S. Patent No. 11,116,035

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the ’035 patent based on lack of written description under 35 U.S.C. § 112 (a); lack of enablement under 35 U.S.C. § 112 (a); indefiniteness under 35 U.S.C. § 112 (b); and indefiniteness under 35 U.S.C. § 112 (f). These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff’s purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants’ invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court’s claim construction, as well as Plaintiff’s alleged scope of the ’035 patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112 (a)

The ’035 patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the ’035 patent Asserted Claims at the time the ’035 patent was filed. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351

(Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id*. One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

The specification of the '035 patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '035 patent Asserted Claims without undue experimentation. To the extent the following limitations are definite (under 35 U.S.C. § 112 (b)), the application that became the '035 patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112 (a):[47]

Term	Relevant Claim(s)
transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) using the transceiver,	1, 8
switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal,	1, 8
when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends,	1, 8
when the MPDU included in the trigger-based PPDU requests the immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received,	1, 8
when the second parameter set timer expires, terminate an application of the second parameter set, and	1, 8
access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set.	1, 8

[47] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
wherein the MPDU included in the trigger-based PPDU is a QoS data frame.	2, 9
wherein the processor is configured to receive a beacon frame from the base wireless communication terminal and obtain information indicating a period of the second parameter set timer from the beacon frame.	3, 10
wherein the processor is configured to calculate a random integer value within a contention window (CW), set a backoff timer based on the random integer value, and access the channel based on the back off timer and a predetermined slot time,	4, 5
wherein the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW.	4
wherein the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW.	5

2. Indefiniteness Under 35 U.S.C. § 112 (b)

Under § 112 (b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." *Id.* A patent is indefinite under § 112 (b) "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '035 patent Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite under § 112 (a), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention.

The following limitations recited in the '035 patent Asserted Claims are indefinite in whole, in part or in combination:[48]

[48] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
set	1, 3, 4, 5, 8, 10
parameter set	1, 8
immediate response	1, 8
first parameter set	1, 8
second parameter set	1, 3, 8
set of parameters used for the channel access	1, 8
period of the parameter set timer	3, 10
second parameter set timer	1, 3, 8, 10
priority of data	1, 8
predetermined slot time	4, 5
beacon frame	3, 10
QoS Data Frame	2, 9
a trigger-based physical layer protocol data unit (PPDU)	1, 2, 8, 9
a MAC protocol data unit (MPDU)	1, 8
when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response,	1, 8
when the MPDU included in the trigger-based PPDU requests the immediate response,	1, 8
setting a second parameter set timer	1, 8
set a back off timer	4, 5
channel	1, 8
channel access	1, 8
access category	1, 8
a multi-user uplink transmission participation of the wireless communication terminal	1, 8
access a channel according to a priority of data to be transmitted	1, 8
terminate an application of the second parameter set	1, 8
switch a parameter set	1, 8
when the transmission of the trigger-based PPDU ends	1, 8
for the access category of the MPDU for which immediate response is received,	1, 8
when the second parameter set timer expires	1, 8
transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) using the transceiver,	1, 8
switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal,	1, 8
when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends,	1, 8

Term	Relevant Claim(s)
when the MPDU included in the trigger-based PPDU requests the immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received,	1, 8
when the second parameter set timer expires, terminate an application of the second parameter set, and	1, 8
access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set.	1, 8
wherein the MPDU included in the trigger-based PPDU is a QoS data frame.	2, 9
receive a beacon frame from the base wireless communication terminal	3, 10
obtain information indicating a period of the second parameter set timer from the beacon frame.	3, 10
calculate a random integer value within a contention window (CW),	4, 5
set a backoff timer based on the random integer value, and	4, 5
access the channel based on the back off timer and a predetermined slot time,	4, 5
wherein the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW.	4
if a value of the CW is greater than the maximum value (CWmax) of the CW according to a priority of the data to be transmitted, sets the value of the CW to the CWmax.	5

Furthermore, Section 112 (f) allows a patentee to express a claim element "as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112 (f). For such claims, the written description of the patent must disclose with sufficient particularity the corresponding structure for performing the claimed function, and it must clearly link that structure to the claimed function. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1379 (Fed. Cir. 2013). Several of the '035 patent Asserted Claims are invalid as indefinite because they contain means-plus-function terms subject to Section 112 (f), and the '035 patent fails to disclose with sufficient particularity the corresponding structure for performing the claimed function.

The following limitations recited in the '035 patent Asserted Claims are governed by Section 112 (f) and are indefinite in whole, in part or in combination:[49]

Term	Relevant Claim(s)
"a processor, wherein the processor is configured to: transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) using the transceiver, switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal, when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends, when the MPDU included in the trigger-based PPDU requests the immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received, when the second parameter set timer expires, terminate an application of the second parameter set, and access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set."	1-5

3. Invalidity Under 35 U.S.C. § 101

Pursuant to the Court's Standing Order, Defendants contend that the '035 patent's Asserted Claims are invalid under 35 U.S.C. § 101 because the claims are not directed to patent-eligible subject matter. Defendants' contentions that the Asserted Claims are invalid under 35 U.S.C. § 101 do not constitute, and should not be interpreted as, admissions regarding the construction or scope of the claims of the Asserted Claims, or that any of the claims of the '035 patent are not anticipated or rendered obvious by prior art.

[49] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

All Asserted Claims of the ’035 patent are invalid under 35 U.S.C. § 101 because they fail to claim patent-eligible subject matter. The Asserted Claims are directed to the abstract idea of analyzing data and using the data to select parameters. The Asserted Claims, however, fail to describe anything beyond the abstract idea of analyzing data and using the data to select parameters. None of the remaining claim elements, considered individually or as an ordered combination, transform the nature of the claims into patent-eligible subject matter. To the extent structure is claimed in any of the claims, that structure is nothing more than general purpose computer components performing general purpose computer functions. Such general purpose structure is insufficient to transform the nature of the claims into patent-eligible subject matter.

Further detail regarding Samsung’s contentions that the Asserted Claims of the ’035 patent do not qualify as patent-eligible subject matter are contained in Exhibit E101. Specifically, pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit E101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit E101, each Challenged Claim of the ’035 patent is directed to an abstract idea and therefore is not directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit E101, which references and incorporates information from Exhibits E1-E27, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Samsung provides the following description of the relevant industry at the relevant time. As of the alleged priority date for the '035 patent (September 7, 2016), the relevant industry was well-developed. Wireless telecommunications, including cellular telecommunications had been around for decades. Further, all individual elements disclosed and recited in the '035 patent were conventional, routine, and well-known in the industry. *See generally* Exhibits E1-E27. By way of example, processors and transceivers were known. *See, e.g.*, Exhibits E1-E27, E101 at [1a]–[1b]. The need for enhanced distributed channel access was known. *See, e.g.*, Exhibits E1-E27, E101 at 1[pre]. It was also well known to transmit a trigger-based physical layer protocol data unit using a transceiver. *See, e.g.*, Exhibits E1-E27, E101 at [1c]. It was also well known that parameters used for channel access could be switched from a first set to a second set based on the content of a frame. E1-E27, E101 at [1d]. Further, setting a timer for an access category based on whether an immediate response was requested was also well known, as was terminating an application and accessing a channel according to data priority. *See, e.g.* Exhibits E1-E27, E101 at [1e]–[1h]. Indeed, none of these concepts was new or merely on the verge of development as of the alleged priority date of the '035 patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The '035 patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

F. U.S. Patent No. 11,516,879

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '879 patent based on lack of written description under 35 U.S.C. § 112 (a); lack of enablement under 35 U.S.C. § 112 (a); indefiniteness under 35 U.S.C. § 112 (b); and indefiniteness under 35 U.S.C. § 112 (f). These contentions shall not be construed as an admission that any claim construction

advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '879 patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112 (a)

The '879 patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '879 patent Asserted Claims at the time the '879 patent was filed. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

The specification of the '879 patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '879 patent Asserted Claims without undue experimentation. To the extent the following limitations are definite (under 35 U.S.C. § 112 (b)),

the application that became the '879 patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112 (a):[50]

Term	Relevant Claim(s)
receive, from the base wireless communication terminal, a trigger frame using the transceiver, wherein the trigger frame triggers a orthogonal frequency division multiple access (OFDMA) uplink transmission of the wireless communication terminal,	1, 8
transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) in response to the trigger frame using the transceiver,	1, 8
switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal,	1, 8
when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends,	1, 8
when the MPDU included in the trigger-based PPDU requests an immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received,	1, 8
when the second parameter set timer expires, terminate an application of the second parameter set, and	1, 8
access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set.	1, 8
wherein the MPDU included in the trigger-based PPDU is a QoS data frame.	2, 9
wherein the processor is configured to receive a beacon frame from the base wireless communication terminal and obtain information indicating a period of the second parameter set timer from the beacon frame.	3, 10
wherein the processor is configured to calculate a random integer value within a contention window (CW), set a backoff timer based on the random integer value, and access the channel based on the back off timer and a predetermined slot time,	4, 5
wherein the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW.	4

[50] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
if a value of the CW is greater than the maximum value (CWmax) of the CW according to a priority of the data to be transmitted, sets the value of the CW to the CWmax.	5
transmitting the data through the channel.	8

2. Indefiniteness Under 35 U.S.C. § 112 (b)

Under § 112 (b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." *Id.* A patent is indefinite under § 112 (b) "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '879 patent Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite under § 112 (a), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention.

The following limitations recited in the '879 patent Asserted Claims are indefinite in whole, in part or in combination:[51]

Term	Relevant Claim(s)
triggers a orthogonal frequency division multiple access (OFDMA) uplink transmission of the wireless communication terminal	1, 8
set	1, 3, 4, 5, 8, 10
parameter set	1, 8
immediate response	1, 8
first parameter set	1, 8
second parameter set	1, 3, 8
set of parameters used for the channel access	1, 8
period of the parameter set timer	3, 10
second parameter set timer	1, 3, 8, 10
priority of data	1, 8

[51] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
predetermined slot time	4, 5
beacon frame	3, 10
QoS Data Frame	2, 9
a trigger-based physical layer protocol data unit (PPDU)	1, 2, 8, 9
a MAC protocol data unit (MPDU)	1, 8
when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response,	1, 8
when the MPDU included in the trigger-based PPDU requests the immediate response,	1, 8
setting a second parameter set timer	1, 8
set a back off timer	4, 5
channel	1, 8
channel access	1, 8
access category	1, 8
a multi-user uplink transmission participation of the wireless communication terminal	1, 8
access a channel according to a priority of data to be transmitted	1, 8
terminate an application of the second parameter set	1, 8
switch a parameter set	1, 8
when the transmission of the trigger-based PPDU ends	1, 8
for the access category of the MPDU for which immediate response is received,	1, 8
when the second parameter set timer expires	1, 8
receive, from the base wireless communication terminal, a trigger frame using the transceiver, wherein the trigger frame triggers a orthogonal frequency division multiple access (OFDMA) uplink transmission of the wireless communication terminal,	1, 8
transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) in response to the trigger frame using the transceiver,	1, 8
switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal,	1, 8
when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends,	1, 8
when the MPDU included in the trigger-based PPDU requests an immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received,	1, 8

Term	Relevant Claim(s)
when the second parameter set timer expires, terminate an application of the second parameter set, and	1, 8
access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set.	1, 8
wherein the MPDU included in the trigger-based PPDU is a QoS data frame.	2, 9
wherein the processor is configured to receive a beacon frame from the base wireless communication terminal	3, 10
obtain information indicating a period of the second parameter set timer from the beacon frame.	3, 10
wherein the processor is configured to calculate a random integer value within a contention window (CW),	4, 5
set a backoff timer based on the random integer value, and	4, 5
access the channel based on the back off timer and a predetermined slot time,	4, 5
wherein the parameter set comprises a minimum value (CWmin) of the CW and a maximum value (CWmax) of the CW.	4
if a value of the CW is greater than the maximum value (CWmax) of the CW according to a priority of the data to be transmitted, sets the value of the CW to the CWmax.	5
transmitting the data through the channel.	8

Furthermore, Section 112 (f) allows a patentee to express a claim element "as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112 (f). For such claims, the written description of the patent must disclose with sufficient particularity the corresponding structure for performing the claimed function, and it must clearly link that structure to the claimed function. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1379 (Fed. Cir. 2013). Several of the '879 patent Asserted Claims are invalid as indefinite because they contain means-plus-function terms subject to Section 112 (f), and the '879 patent fails to disclose with sufficient particularity the corresponding structure for performing the claimed function.

The following limitations recited in the '879 patent Asserted Claims are governed by Section 112 (f) and are indefinite in whole, in part or in combination:[52]

Term	Relevant Claim(s)
"a processor, wherein the processor is configured to: receive, from the base wireless communication terminal, a trigger frame using the transceiver, wherein the trigger frame triggers a orthogonal frequency division multiple access (OFDMA) uplink transmission of the wireless communication terminal, transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) in response to the trigger frame using the transceiver, switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal, when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends, when the MPDU included in the trigger-based PPDU requests an immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received, when the second parameter set timer expires, terminate an application of the second parameter set, and access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set.	1-5

3. Invalidity Under 35 U.S.C. § 101

Pursuant to the Court's Standing Order, Defendants contend that the '879 patent's Asserted Claims are invalid under 35 U.S.C. § 101 because the claims are not directed to patent-eligible subject matter. Defendants' contentions that the Asserted Claims are invalid under 35 U.S.C. § 101 do not constitute, and should not be interpreted as, admissions regarding the construction or

[52] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

scope of the claims of the Asserted Claims, or that any of the claims of the '879 patent are not anticipated or rendered obvious by prior art.

All Asserted Claims of the '879 patent are invalid under 35 U.S.C. § 101 because they fail to claim patent-eligible subject matter. The Asserted Claims are directed to the abstract idea of analyzing data and using the data to select parameters. The Asserted Claims, however, fail to describe anything beyond the abstract idea of analyzing data and using the data to select parameters. None of the remaining claim elements, considered individually or as an ordered combination, transform the nature of the claims into patent-eligible subject matter. To the extent structure is claimed in any of the claims, that structure is nothing more than general purpose computer components performing general purpose computer functions. Such general purpose structure is insufficient to transform the nature of the claims into patent-eligible subject matter.

Further detail regarding Samsung's contentions that the Asserted Claims of the '879 patent do not qualify as patent-eligible subject matter are contained in Exhibit F101. Specifically, pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit F101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit F101, each Challenged Claim of the '879 patent is directed to an abstract idea and therefore is not directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit F101, which references and incorporates information from Exhibits F1-F27, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the

relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Samsung provides the following description of the relevant industry at the relevant time. As of the alleged priority date for the '879 patent (September 7, 2016), the relevant industry was well-developed. Wireless telecommunications, including cellular telecommunications had been around for decades. Further, all individual elements disclosed and recited in the '879 patent were conventional, routine, and well-known in the industry. *See generally* Exhibits F1-F27. By way of example, the need for enhanced distributed channel access was known. *See, e.g.*, Exhibits F1-F27, F101 at 1[pre]. Processors and transceivers were known. *See, e.g.*, Exhibits F1-F27, F101 at [1a]–[1b]. Trigger frames which trigger an OFDMA uplink transmission were known. *See, e.g.*, Exhibits F1-F27, F101 at [1c]. It was also well known to transmit a trigger-based physical layer protocol data unit using a transceiver. See, e.g., Exhibits F1-F27, F101 at [1d]. It was also well known that parameters used for channel access could be switched from a first set to a second set based on the content of a frame. F1-F27, F101 at [1e]. Further, setting a timer for an access category based on whether an immediate response was requested was also well known, as was terminating an application and accessing a channel according to data priority. *See, e.g.* Exhibits F1-F27, F101 at [1f]–[1i]. Indeed, none of these concepts was new or merely on the verge of development as of the alleged priority date of the '879 patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The '879 patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

G. U.S. Patent No. 11,129,163

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '163 patent based on lack of written description under 35 U.S.C. § 112 (a); lack of enablement under 35 U.S.C. § 112 (a); indefiniteness under 35 U.S.C. § 112 (b); and indefiniteness under 35 U.S.C. § 112 (f). These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '163 patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112 (a)

The '163 patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '163 patent Asserted Claims at the time the '163 patent was filed. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

The specification of the ’163 patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the ’163 patent Asserted Claims without undue experimentation. To the extent the following limitations are definite (under 35 U.S.C. § 112 (b)), the application that became the ’163 patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112 (a):[53]

Term	Relevant Claim(s)
“wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU) by using the transceiver,”	1-8
“wherein the processor is configured . . . not to use a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed,”	1-8
“wherein the BSS color is an identifier of a BSS,”	1-16
“wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated.”	1-16
“wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,”	2, 3
“wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,”	2, 3, 10, 11
“wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU.”	2, 3, 10, 11
“wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,”	3, 11
“wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,”	3, 11
“wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,”	3, 11
“wherein the processor is configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame.”	3

[53] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
"wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	4, 5
"wherein the BSS color collision represents that different BSSs correspond to one BSS color."	4, 5, 12, 13
"wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	5
"wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU,"	6, 14
"wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU."	6, 14
"wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value."	7, 8
"wherein the predetermined value is 0."	8, 16
"receiving a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU)"	9-16
"not using a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed,"	9-16
"wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	10, 11
"wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame."	11
"wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	12, 13
"wherein the signaling that a BSS color collision has occurred comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	13
"wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value."	15, 16

2. Indefiniteness Under 35 U.S.C. § 112 (b)

Under § 112 (b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." *Id.* A patent is indefinite under § 112 (b) "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '163 patent Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite under § 112 (a), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention.

The following limitations recited in the '163 patent Asserted Claims are indefinite in whole, in part or in combination:[54]

Term	Relevant Claim(s)
"wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU) by using the transceiver,"	1-8
"wherein the processor is configured . . . not to use a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed,"	1-8
"wherein the BSS color is an identifier of a BSS,"	1-16
"wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated."	1-16
"wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	2, 3
"wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,"	2, 3, 10, 11

[54] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
"wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU."	2, 3, 10, 11
"wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,"	3, 11
"wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,"	3, 11
"wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,"	3, 11
"wherein the processor is configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame."	3
"wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	4, 5
"wherein the BSS color collision represents that different BSSs correspond to one BSS color."	4, 5, 12, 13
"wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	5
"wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU,"	6, 14
"wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU."	6, 14
"wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value."	7, 8
"wherein the predetermined value is 0."	8, 16
"receiving a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU)"	9-16
"not using a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed,"	9-16
"wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	10, 11
"wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV	11

Term	Relevant Claim(s)
when the wireless communication terminal gets a valid signaling field of the MAC frame."	
"wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	12, 13
"wherein the signaling that a BSS color collision has occurred comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	13
"wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by the signaling field of the PPDU is a predetermined value."	15, 16

Furthermore, Section 112 (f) allows a patentee to express a claim element "as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112, ¶ 6. For such claims, the written description of the patent must disclose with sufficient particularity the corresponding structure for performing the claimed function, and it must clearly link that structure to the claimed function. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1379 (Fed. Cir. 2013). Several of the '163 patent Asserted Claims are invalid as indefinite because they contain means-plus-function terms subject to Section 112 (f), and the '163 patent fails to disclose with sufficient particularity the corresponding structure for performing the claimed function.

The following limitations recited in the '163 patent Asserted Claims are governed by Section 112 (f) and are indefinite in whole, in part or in combination:[55]

Term	Relevant Claim(s)
"wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Processing Data Unit (PPDU) by using the transceiver, and not to use a Basic Service Set (BSS) color when signaling information indicates that an operation based on the BSS color is not allowed,"	1-8

[55] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

3. Invalidity Under 35 U.S.C. § 101

Pursuant to the Court's Standing Order, Defendants contend that the '163 patent's Asserted Claims are invalid under 35 U.S.C. § 101 because the claims are not directed to patent-eligible subject matter. Defendants' contentions that the Asserted Claims are invalid under 35 U.S.C. § 101 do not constitute, and should not be interpreted as, admissions regarding the construction or scope of the claims of the Asserted Claims, or that any of the claims of the '163 patent are not anticipated or rendered obvious by prior art.

All Asserted Claims of the '163 patent are invalid under 35 U.S.C. § 101 because they fail to claim patent-eligible subject matter. The Asserted Claims are directed to the abstract idea of disallowing operation on the basis of a group identifier. The claims recite a related abstract concept of recognizing an identifier collision/contention. The Asserted Claims, however, fail to describe anything beyond the abstract idea of disallowing operation on the basis of a group identifier. None of the remaining claim elements, considered individually or as an ordered combination, transform the nature of the claims into patent-eligible subject matter. To the extent structure is claimed in any of the claims, that structure is nothing more than general purpose computer components performing general purpose computer functions. Such general-purpose structure is insufficient to transform the nature of the claims into patent-eligible subject matter.

Further detail regarding Samsung's contentions that the Asserted Claims of the '163 patent do not qualify as patent-eligible subject matter are contained in Exhibit G101. Specifically, pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit G101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit G101, each Challenged Claim of the '163 patent is directed to an abstract idea and therefore is not directed to

patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit G101, which references and incorporates information from Exhibits G1-G24, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Samsung provides the following description of the relevant industry at the relevant time. As of the alleged priority date for the '163 patent (March 4, 2016), the relevant industry was well-developed. Wireless telecommunications—including Wi-Fi—had been around for decades. Further, all individual elements disclosed and recited in the '163 patent were conventional, routine, and well-known in the industry. *See generally* Exhibits G1-G24. By way of example, wireless communication terminals (*e.g.*, stations, wireless devices, etc.) were well-known. *See, e.g.*, Exhibits G1-G24, G101 at 1[pre]. Both transceivers and processors were also well-known. *See, e.g.*, G1-G24, G101 at 1[a], 1[b]. Further, receiving a physical layer protocol data unit ("PPDU") and not performing a BSS color-based operation when received signaling information indicates the operation is not allowed was well-known. *See, e.g.* Exhibits G1-G24, G101 at 1[c], 1[d]. Additionally, it was well-known to receive signaling information from a base wireless communication terminal. *See, e.g.*, Exhibits G1-G24, G101 at 1[e]. Indeed, none of these concepts was new or merely on the verge of development as of the alleged priority date of the '163 patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from

around the world. The ’163 patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

H. U.S. Patent No. 11,700,597

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the ’597 patent based on lack of written description under 35 U.S.C. § 112 (a); lack of enablement under 35 U.S.C. § 112 (a); indefiniteness under 35 U.S.C. § 112 (b); and indefiniteness under 35 U.S.C. § 112 (f). These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff’s purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants’ invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court’s claim construction, as well as Plaintiff’s alleged scope of the ’597 patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112 (a)

The ’597 patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the ’597 patent Asserted Claims at the time the ’597 patent was filed. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id*. One of ordinary skill in the art would not have

understood that the inventors were in possession of the full scope of the claimed apparatus and methods.

The specification of the '597 patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '597 patent Asserted Claims without undue experimentation. To the extent the following limitations are definite (under 35 U.S.C. § 112 (b)), the application that became the '597 patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112 (a):[56]

Term	Relevant Claim(s)
"wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Protocol Data Unit (PPDU) by using the transceiver,"	1-8
"wherein the processor is configured . . . not to use a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,"	1-8
"wherein the BSS color is an identifier of a BSS,"	1-16
"wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated."	1-16
"wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	2, 3
"wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,"	2, 3, 10, 11
"wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU."	2, 3, 10, 11
"wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,"	3, 11
"wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,"	3, 11
"wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,"	3, 11

[56] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
"wherein the processor is configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame."	3
"wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	4, 5
"wherein the BSS color collision represents that different BSSs correspond to one BSS color."	4, 5, 12, 13
"wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	5
"wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU,"	6, 14
"wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU."	6, 14
"wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by a signaling field of the PPDU is a predetermined value."	7, 8
"wherein the predetermined value is 0."	8, 16
"receiving a physical layer convergence procedure (PLCP) Protocol Data Unit (PPDU);"	9-16
"not using a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,"	9-16
"wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	10, 11
"wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame."	11
"wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	12, 13
"wherein the signaling that a BSS color collision has occurred comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	13

Term	Relevant Claim(s)
"wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by a signaling field of the PPDU is a predetermined value."	15, 16

2. Indefiniteness Under 35 U.S.C. § 112 (b)

Under § 112 (b), "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." *Id.* A patent is indefinite under § 112 (b) "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '597 patent Asserted Claims are invalid because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite under § 112 (a), for failing to particularly point out and distinctly claim the subject matter the applicants regard as their invention.

The following limitations recited in the '597 patent Asserted Claims are indefinite in whole, in part or in combination:[57]

Term	Relevant Claim(s)
"wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Protocol Data Unit (PPDU) by using the transceiver,"	1-8
"wherein the processor is configured . . . not to use a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,"	1-8
"wherein the BSS color is an identifier of a BSS,"	1-16
"wherein the signaling information is transmitted from a base wireless communication terminal to which the wireless communication terminal is associated."	1-16
"wherein the processor is configured not to set an Intra-BSS Network Allocation Vector (NAV) by using the BSS color	2, 3

[57] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	
"wherein the Intra-BSS NAV is different from a Basic NAV and is a NAV which is set based on an Intra-BSS PPDU,"	2, 3, 10, 11
"wherein the Basic NAV is set based on an Inter-BSS PPDU or a PPDU which is not able to be identified as the Inter-BSS PPDU or the Intra-BSS PPDU."	2, 3, 10, 11
"wherein the PPDU includes a TXOP Duration field in the signaling field of the PPDU and a medium access control (MAC) frame which includes a duration field,"	3, 11
"wherein the TXOP Duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,"	3, 11
"wherein the duration field indicates information used for setting the Intra-BSS NAV and the Basic NAV,"	3, 11
"wherein the processor is configured not to use the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame."	3
"wherein the processor is configured to signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	4, 5
"wherein the BSS color collision represents that different BSSs correspond to one BSS color."	4, 5, 12, 13
"wherein the processor is configured to determine that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	5
"wherein the operation based on the BSS color includes entering a doze state of a power save operation based on a BSS color indicated by a signaling field of the PPDU,"	6, 14
"wherein the power save operation is an operation for the wireless communication terminal to enter the doze state until an end of a received PPDU which is an Intra-BSS PPDU."	6, 14
"wherein the processor is configured not to perform a spatial reuse operation when the BSS color indicated by a signaling field of the PPDU is a predetermined value."	7, 8
"wherein the predetermined value is 0."	8, 16
"receiving a physical layer convergence procedure (PLCP) Protocol Data Unit (PPDU);"	9-16
"not using a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,"	9-16
"wherein the method further comprises not setting an Intra-BSS Network Allocation Vector (NAV) by using the BSS color	10, 11

Term	Relevant Claim(s)
indicated by a signaling field of the PPDU when the signaling information indicates that the operation based on the BSS color is not allowed,"	
"wherein the method further comprises not using the TXOP Duration field for setting the Intra-BSS NAV or the Basic NAV when the wireless communication terminal gets a valid signaling field of the MAC frame."	11
"wherein the method further comprises signal that the operation based on the BSS color is not allowed when the wireless communication terminal recognizes that a BSS color collision has occurred,"	12, 13
"wherein the signaling that a BSS color collision has occurred comprises determining that BSS color collision has occurred based on address fields of a medium access control (MAC) frame."	13
"wherein the method further comprises not performing a spatial reuse operation when the BSS color indicated by a signaling field of the PPDU is a predetermined value."	15, 16

Furthermore, Section 112 (f) allows a patentee to express a claim element "as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112, ¶ 6. For such claims, the written description of the patent must disclose with sufficient particularity the corresponding structure for performing the claimed function, and it must clearly link that structure to the claimed function. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1379 (Fed. Cir. 2013). Several of the '597 patent Asserted Claims are invalid as indefinite because they contain means-plus-function terms subject to Section 112 (f), and the '597 patent fails to disclose with sufficient particularity the corresponding structure for performing the claimed function.

The following limitations recited in the '597 patent Asserted Claims are governed by Section 112 (f) and are indefinite in whole, in part or in combination:[58]

[58] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
"wherein the processor is configured to receive a physical layer convergence procedure (PLCP) Protocol Data Unit (PPDU) by using the transceiver, and not to use a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed,"	1-8

3. Invalidity Under 35 U.S.C. § 101

Pursuant to the Court's Standing Order, Defendants contend that the '597 patent's Asserted Claims are invalid under 35 U.S.C. § 101 because the claims are not directed to patent-eligible subject matter. Defendants' contentions that the Asserted Claims are invalid under 35 U.S.C. § 101 do not constitute, and should not be interpreted as, admissions regarding the construction or scope of the claims of the Asserted Claims, or that any of the claims of the '597 patent are not anticipated or rendered obvious by prior art.

All Asserted Claims of the '597 patent are invalid under 35 U.S.C. § 101 because they fail to claim patent-eligible subject matter. The Asserted Claims are directed to the abstract idea of disallowing operation on the basis of a group identifier. The claims recite a related abstract concept of recognizing an identifier collision/contention. The Asserted Claims, however, fail to describe anything beyond the abstract idea of disallowing operation on the basis of a group identifier. None of the remaining claim elements, considered individually or as an ordered combination, transform the nature of the claims into patent-eligible subject matter. To the extent structure is claimed in any of the claims, that structure is nothing more than general purpose computer components performing general purpose computer functions. Such general-purpose structure is insufficient to transform the nature of the claims into patent-eligible subject matter.

Further detail regarding Samsung's contentions that the Asserted Claims of the '597 patent do not qualify as patent-eligible subject matter are contained in Exhibit H101. Specifically,

pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit H101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit H101, each Challenged Claim of the '597 patent is directed to an abstract idea and therefore is not directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit H101, which references and incorporates information from Exhibits H1-H24, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Samsung provides the following description of the relevant industry at the relevant time. As of the alleged priority date for the '597 patent (March 4, 2016), the relevant industry was well-developed. Wireless telecommunications—including Wi-Fi—had been around for decades. Further, all individual elements disclosed and recited in the '597 patent were conventional, routine, and well-known in the industry. *See generally* Exhibits H1-H24. By way of example, wireless communication terminals (*e.g.*, stations, wireless devices, etc.) were well-known. *See, e.g.*, Exhibits H1-H24, H101 at 1[pre]. Both transceivers and processors were also well-known. *See, e.g.*, H1-H24, H101 at 1[a], 1[b]. Further, receiving a physical layer protocol data unit ("PPDU") and not performing a BSS color-based operation when received signaling information indicates the operation is not allowed was well-known. *See, e.g.* Exhibits H1-H24, H101 at 1[c], 1[d]. Additionally, it was well-known to receive signaling information from a base wireless communication terminal. *See,*

e.g., Exhibits H1-H24, H101 at 1[e]. Indeed, none of these concepts was new or merely on the verge of development as of the alleged priority date of the '597 patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The '597 patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

VII. P.R. 3-4 Production

In connection with these Invalidity Contentions, Defendants also hereby provide the documents required by P.R. 3-4. *See* PRIOR_ART_00000001-PRIOR_ART_00020788. Pursuant to P.R. 3-4(a), Defendants produce and/or make available for inspection documents, source code, and other materials sufficient to show the operation of any aspects or elements of the Accused Products identified by Plaintiff in its P.R. 3-1(c) charts. Defendants also identify third party supplier documents, source code, and other materials not in their possession as responsive to Plaintiff's allegations in its P.R. 3-1(c) charts. In addition, Samsung will make available source code for inspection pursuant to Paragraphs 8 and 10 of the Protective Order, with proper notice of Plaintiff's intent to inspect.

Pursuant to P.R. 3-4(b), Defendants also produce a copy of each item of prior art identified herein. These prior art references and corroborating evidence are cited in attached invalidity claim charts in Appendices A-H. Defendants will also make available for inspection any prior art systems or devices upon request to the extent Defendants acquire such systems or devices. References that were cited during prosecution of the Asserted Patents may not be contained in Defendants' production as they are not required to be under the local patent rules. Defendants' search for prior art references, additional documentation, and/or corroborating evidence concerning prior art systems and devices is ongoing. Accordingly, Defendants reserve the right to

supplement their production as Defendants obtain additional prior art references, documentation, and/or corroborating evidence concerning invalidity during the course of discovery.

Date: February 13, 2025

Respectfully submitted,

/s/ Ralph A. Phillips

Michael J. McKeon
DC Bar No. 459780
mckeon@fr.com
Ruffin B. Cordell
TX Bar No. 04820550
cordell@fr.com
Ralph A. Phillips
DC Bar No. 475571
rphillips@fr.com
Bryan J. Cannon
DC Bar No. 1723657
cannon@fr.com
Payal Patel
DC Bar No. 90019320
ppatel@fr.com
FISH & RICHARDSON, P.C.
1000 Maine Ave., S.W., Ste. 1000
Washington, DC 20024
Telephone: 202-783-5070
Facsimile: 202-783-2331

Thomas H. Reger II
Texas Bar No. 24032992
reger@fr.com
Rodeen Talebi
TX Bar No. 24103958
talebi@fr.com
FISH & RICHARDSON P.C.
1717 Main Street, Suite 5000
Dallas, TX 78766
Telephone: 214-747-5070
Facsimile: 214-747-2091

Aleksandr Gelberg
CA Bar No. 279989
gelberg@fr.com
John-Paul Fryckman
CA Bar No. 317591
fryckman@fr.com
FISH & RICHARDSON, P.C.
12860 El Camino Real, Ste. 400
San Diego, CA 92130

Telephone: 858-678-5070
Facsimile: 858-678-5099

Bailey K. Benedict
TX Bar No. 24083139
benedict@fr.com
FISH & RICHARDSON, P.C.
909 Fannin Street, Ste. 2100
Houston, TX 77010
Telephone: 713-654-5300
Facsimile: 713-652-0109

Melissa R. Smith
Texas Bar No. 24001351
GILLAM & SMITH, LLP
303 South Washington Avenue
Marshall, Texas 75670
Telephone: 903-934-8450
Facsimile: 903-934-9257
Email: melissa@gillamsmithlaw.com

Attorneys for Defendants
Samsung Electronics Co., Ltd., and
Samsung Electronics America, Inc.

/s/ Lawrence R. Jarvis

Benjamin C. Elacqua (Lead Counsel)
Texas Bar Number 24055443
elacqua@fr.com
FISH & RICHARDSON, P.C.
909 Fannin Street, Suite 2100
Houston, TX 77010
Telephone: (713) 654-5300
Facsimile: (713-652-0109

Lawrence R. Jarvis
GA Bar No. 102116
jarvis@fr.com
FISH & RICHARDSON, P.C.
1180 Peachtree St. NE, Fl. 21
Atlanta, GA 30309
Telephone: (404) 892-5005
Facsimile: (404) 892-5002

Melissa R. Smith
Texas Bar No. 24001351
GILLAM & SMITH, LLP
303 South Washington Avenue Marshall,
Texas 75670
Telephone: (903) 934-8450
Facsimile: (903) 934-9257
Email: melissa@gillamsmithlaw.com

Attorneys for Defendant HP Inc.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of the foregoing document has been served on February 13, 2025, to all counsel of record via e-mail.

/s/ Ralph A. Phillips