

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZYXEL COMMUNICATIONS CORPORATION AND
ZYXEL NETWORKS CORPORATION,
Petitioner,

v.

ATLAS GLOBAL TECHNOLOGIES LLC,
Patent Owner

Case IPR2023-00863
Patent 9,531,520

**PATENT OWNER'S PRELIMINARY RESPONSE UNDER 37
C.F.R. § 42.107 TO PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 9,531,520**

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EXHIBIT LIST

Exhibit	Description
2001	Affidavit in Support of Motion for <i>Pro Hac Vice</i> Admission of Eric J. Enger
2002	Affidavit in Support of Motion for <i>Pro Hac Vice</i> Admission of Alden G. Harris
2003	Dr. Konstantinos Psounis Curriculum Vitae
2004	Declaration of Dr. Konstantinos Psounis in Support of Patent Owner's Preliminary Response to Petition for <i>Inter Partes</i> Review of U.S. Patent No. 9,531,520
2005	S.Azizi <i>et al.</i> , "IEEE 802.11-15/0330r1 - OFDMA Numerology and Structure", dated March 9, 2015, available at https://mentor.ieee.org/802.11/dcn/15/11-15-0330-01-00ax-ofdma-numerology-and-structure.pptx (accessed on August 9, 2023)
2006	Evgeny Khorov <i>et al.</i> , A Tutorial on IEEE 802.11ax High Efficiency WLANs, IEEE Communications Surveys & Tutorials, Vol. 21, No. 1, First Quarter 2019
2007	Proof of Service, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , Dkt. No. 19, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2008	Defendants' Preliminary Invalidity Contentions, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , October 20, 2022, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2009	Richard Lloyd, Interview with Judge Alan D. Albright, "The last thing anyone should think about WDTX is that it is patent plaintiff friendly," says Albright," IAM, https://www.iam-media.com/law-policy/albright-the-last-thing-anyone-should-think-about-venue-it-plaintiff-friendly , accessed on September 17, 2020
2010	Ryan Davis, "Albright Says He'll Very Rarely Put Cases on Hold for PTAB", Law360, https://www.law360.com/articles/1381597/print?section-ip , accessed on July 25, 2022
2011	Scheduling Order, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , Dkt. No. 27, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2012	United States District Courts-National Judicial Caseload Profile, available at https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0331.2023.pdf

Exhibit	Description
2013	Defendants' Final Invalidity Contentions, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , June 15, 2023, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2014	Defendant Opening Claim Construction Brief, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , Dkt. No. 41, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2015	Atlas Responsive Claim Construction Brief, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , Dkt. No. 42, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2016	Defendant Reply Claim Construction Brief, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , Dkt. No. 45, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2017	Joint Claim Construction Statement, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , Dkt. No. 47, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2018	Atlas Surreply Claim Construction Brief, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , Dkt. No. 48, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2019	Claim Construction Memorandum and Order, <i>Atlas Global Technologies LLC v. Zyxel Networks Corp., Zyxel Communications Corp.</i> , Dkt. No. 53, Case No. 6:22-cv-00355-ADA (W.D. Tex.)
2020	Defendants' Final Invalidity Contentions, <i>Atlas Global Techs. LLC v. Sercomm Corp.</i> , January 26, 2023, Case No. 6:21-cv-818-ADA (W.D. Tex.)
2021	Order Granting Joint Motion to Amend Scheduling Order To Extend Deadlines, <i>Atlas Global Techs. LLC v. Sercomm Corp.</i> , Dkt. No. 112, Case No. 6:21-cv-818-ADA (W.D. Tex.)
2022	IEEE Std 802.11™-2020 Excerpts

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I. Introduction

Petitioners Zyxel Communications Corporation and Zyxel Networks Corporation (collectively “Zyxel” or “Petitioner”) has challenged Claims 1-20 (the “Challenged Claims”) of U.S. Patent No. 9,531,520 (the “’520 Patent”). Patent Owner Atlas Global Technologies LLC (“Atlas” or “Patent Owner”) respectfully requests that the Board decline to institute *inter partes* review of the Challenged Claims because (1) Petitioner has not shown a reasonable likelihood of prevailing on the invalidity grounds presented for the Challenged Claims, and (2) the Petition should be discretionarily denied in light of the advanced stage of the parallel district court proceeding due to Petitioner’s lack of diligence.

First, Petitioner’s proposed grounds fail to present a reasonable likelihood of success of invalidating any of the Challenged Claims. For example, several of the Challenged Claims recite a specific unit of a wireless channel known as a “resource unit.” None of Petitioner’s references even use the term “resource unit,” much less render obvious the concept in the claimed manner. Petitioner similarly ignores the claim language and context of many other challenged limitations, repeatedly conflating single-user transmission disclosures with multi-user disclosures as well as ignoring the significant distinctions between uplink and downlink communications. This failure to map the references to the specific claim language

demonstrates the unlikelihood of Petitioner prevailing on any of its proposed grounds.

Furthermore, this Petition should be discretionarily denied under *Fintiv* in light of the advanced stage of the parallel district court proceeding and Petitioner's lack of diligence. Petitioner concedes that the parallel district court trial is scheduled to occur **5-6 months** before any potential final written decision in this proceeding, thus making it highly unlikely that institution would simplify issues for trial. That gap between the district court trial date and a final written decision is wholly attributable to Petitioner's lack of diligence—Petitioner identified and served largely the same invalidity grounds in the parallel district court litigation **six months** before it filed its Petition. Rather than promptly filing its IPR challenge, Petitioner delayed filing its Petition until April 18, 2023—almost a full year after the date the complaint was served as shown on the Proof of Service filed with the District Court.

II. Background

A. The '520 Patent Invention

The '520 Patent is titled "APPARATUS AND METHOD FOR DOWNLINK AND UPLINK MULTI-USER TRANSMISSIONS." EX1001. It was invented by Young Hoon Kwon and Ahmad Reza Hedayat while they were working on the IEEE 802.11ax standard for Wi-Fi 6 at Newracom, Inc. The patent was filed on Mar. 23, 2016, issued on Dec. 27, 2016, and claims priority to two provisional applications:

(1) provisional application no. 62/137,138, filed on Mar. 23, 2015, and (2) provisional application no. 62/140,349, filed on Mar. 30, 2015.

The '520 Patent “relates in general to wireless communication systems and methods, and more particularly to...systems and methods for multi-user transmission of response frames.” EX1001 at 1:19-23; *see* EX2004 ¶¶29-36. “These environments are generally characterized by the existence of access points and non-access point stations. In some systems, stations may utilize multi-user (“MU”) transmissions to more efficiently communicate data.” EX1001 at 1:26-31. The '520 Patent Invention proved so useful that it was adopted into the IEEE 802.11ax specification as part of the WiFi 6 standard.

Improving network performance in wireless networks with a large number of users is particularly difficult. In areas where there are multiple stations (potentially being served by multiple overlapping access points), “the primary source of performance degradation is the massive interference.” EX2006 at 198. Data must be transmitted both in the ***downlink*** (or “DL”) direction from an access point (or “AP”) to one or more stations (or “STAs”), as well as in the ***uplink*** (or “UL”) direction from one or more stations to an AP. To maximize throughput, it is necessary to coordinate which devices should be speaking or listening at a given time on a given channel, however doing so while balancing overhead and throughput is a challenge.

The '520 Patent teaches and claims methods for coordinating and/or transmitting uplink acknowledgments in a wireless network. The claim language of Claim 1 is reproduced below in order to highlight several important claim details:

pre	A method, implemented by a network device in a wireless network, for coordinating an uplink multi-user response transmission to a downlink multi-user transmission, the method comprising:
a(1)	generating, by the network device, <u>a downlink multi-user frame addressed to a plurality of stations</u> operating in the wireless network, <u>the downlink multi-user frame including a plurality of resource units (RUs)</u> , wherein generating the downlink multi-user frame comprises:
a(2)	<u>assigning each RU of the plurality of RUs to a respective station</u> in the plurality of stations, and
a(3)	including a respective set of MAC Protocol Data Units (MPDUs) in each <u>RU of the plurality of RUs</u> ,
a(4)	<u>wherein an MPDU</u> in one or more of the RUs in the plurality of RUs <u>includes acknowledgement information indicating properties of a multi-user acknowledgement transmission</u> that the station in the plurality of stations to which the RU is assigned is requested to transmit to acknowledge the downlink multi-user frame;
b	transmitting the downlink multi-user frame to the plurality of stations over a wireless channel; and
c	receiving the uplink multi-user response transmission, the uplink multi-user response transmission including multi-user acknowledgement

	transmissions respectively and simultaneously transmitted by two or more stations in the plurality of stations,
d	<u>wherein the plurality of RUs respectively correspond to a plurality of simultaneous uplink transmissions</u> , and each of the plurality of simultaneous uplink transmissions uses a sub-channel, spatial stream, or sub-channel and spatial stream combination that is not used by any other of the plurality of simultaneous uplink transmissions.

'520 Patent Claim 1 at 30:46-31:13.

Some relevant technical background to aid in understanding the claimed invention is provided in the following sections.

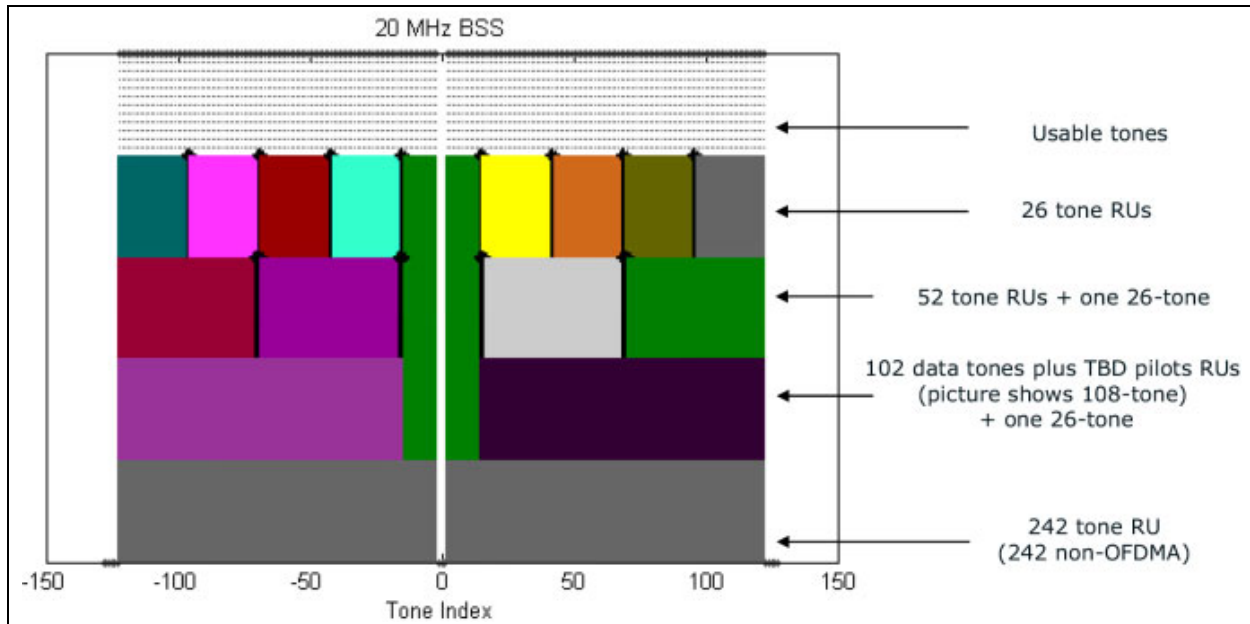
1. Resource Units

The first point to note is that Claim 1 recites “resource units (RUs).” *See* limitations a(1-4), d. A resource unit is a specific unit of wireless channel resources. The '520 Patent explains that “[t]he resource units may be **particular** spatial streams or sub-channels of a wireless channel upon which the DL MU frame will be transmitted.” '520 Patent at 14:12-14 (emphasis added). Importantly, “resource units” do not refer to any arbitrary allocation of resources—in the context of the '520 Patent, they are particular, predefined units of channel resources. *See* EX2004 ¶¶42-44.

This understanding is further reinforced by the fact that the '520 Patent inventions were incorporated into the 802.11ax specification, along with the '520 Patent's repeated references to the 802.11 specification (particularly the 802.11ax

draft specification). *See, e.g.*, EX1001 at 25:3-25 (“For example, a first set of STAs may transmit a set of acknowledgements while a second set of STAs may transmit data (e.g., video, voice, etc.) in **designated resource units** of the same UL MU transmission...Therefore, in some embodiments, multiplexed acknowledgement frames shall use the HE frame format **as defined in 802.11ax** and shown in FIG. 4C.” (emphasis added)), 4:65-5:3 (“During the standardization activities of the Institute of Electrical and Electronics Engineers (IEEE) 802.11, multiuser (MU) simultaneous transmission techniques such as Orthogonal Frequency Division Multiple Access (OFDMA) and Multi-User Multiple Input Multiple Output (MUMIMO) are considered to improve network efficiency.”). Thus, a POSITA would have used the 802.11 specification to further inform the definition of resource units. In the context of 802.11ax and the specification of the ’520 Patent, a “resource unit” has a specific, defined set of properties and only resource units with those properties can be allocated by the system. *See* EX2004 ¶¶45-50.

For example, Dr. Psounis analyzed a submission to the IEEE P802.11 - Task Group developing the 802.11ax standard (“TGax”) that addresses resource units. He notes that the submission “discusses subdividing the 242 tones of the 20 MHz channel into defined ‘resource units’ as small as 26 tones each, i.e., the 20MHz channel would be subdivided into up to nine resource units. *See, e.g.*, EX2005 at 13. This is illustrated graphically in the document:”



EX2004 ¶¶45-47. As Dr. Psounis explains, “[t]his document illustrates that a POSITA at the time of the ’520 Patent would have understood ‘resource units’ to connote particular, predefined units of resources, not merely any allocation of resources.” EX2004 ¶47. For example, Dr. Psounis notes that “in the context of 802.11ax as it existed at the time of the ’520 Patent, a group of 26 subcarriers could be a resource unit, but a group of, *e.g.*, 20 subcarriers could not be a resource unit.” EX2004 ¶56. In other words, a POSITA at the time of the ’520 Patent understood that an arbitrary or ad hoc assignment of resources (*e.g.* 20 tones) is not a resource unit. In the context of the ’520 Patent, a POSITA would understand that only particular, predefined units of resources (*e.g.* the 26 tone RU illustrated above) are “resource units.” Thus, consistent with the ’520 Patent’s disclosure, a POSITA would have understood an RU to be much narrower than an arbitrary channel or sub-channels as relied on in Petitioner’s references.

2. Downlink Frame

Next, the claimed RUs are (a) included in a *downlink* frame, and (b) each downlink RU is assigned to a specific receiving station, and (c) at least one RU carries uplink acknowledgement information for its assigned receiving station. This can be seen in limitations a(1-2) and a(4) of Claim 1:

a(1)	generating, by the network device, <u>a downlink multi-user frame addressed to a plurality of stations</u> operating in the wireless network, <u>the downlink multi-user frame including a plurality of resource units (RUs)</u> , wherein generating the downlink multi-user frame comprises:
a(2)	<u>assigning each RU of the plurality of RUs to a respective station</u> in the plurality of stations, and
	...
a(4)	<u>wherein an MPDU</u> in one or more of the RUs in the plurality of RUs <u>includes acknowledgement information indicating properties of a multi-user acknowledgement transmission that the station in the plurality of stations to which the RU is assigned is requested to transmit to acknowledge the downlink multi-user frame;</u>

As shown, the downlink multi-user frame includes a plurality of RUs [a(1)], each RU is assigned to a respective station [a(2)], and at least one RU contains acknowledgement information for its assigned station [a(4)]. Thus, the claim requires that the RUs in the *downlink* frame must be assigned to respective receiving stations.

Notably, limitation d also refers to the plurality of RUs, and it explains that these downlink RUs correspond to a plurality of simultaneous uplink transmissions from the stations to which the downlink RUs were assigned. Because each downlink RU instigates its assigned station to send an uplink transmission (*e.g.* via the claimed “acknowledgement information”), limitation d indicates that the stations that send an uplink transmission correspond to the ones that were assigned an RU in the downlink frame:

d	<u>wherein the plurality of RUs respectively correspond to a plurality of simultaneous uplink transmissions</u> , and each of the plurality of simultaneous uplink transmissions uses a sub-channel, spatial stream, or sub-channel and spatial stream combination that is not used by any other of the plurality of simultaneous uplink transmissions.
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B. Level of Ordinary Skill in the Art

Petitioner asserts that a POSITA “would have: (1) a bachelor’s degree in electrical engineering or a closely related field, and (2) a minimum of 2-3 years of industry or academic experience with wireless communication physical layer protocols. However, an individual with an advanced degree in a relevant field, such as electrical engineering, would require less industry or academic experience (*e.g.*, 1-2 years).” Pet. at 14-15. Patent Owner does not offer a different definition at this

stage, because even under Petitioner’s proposed definition the Petition fails to present a reasonable likelihood of success.¹

C. Petitioner’s references

Petitioner’s invalidity grounds are based on U.S. Patent No. 10,257,806 (“Chu806”), U.S. Patent No. 10,230,497 (“Merlin”), and U.S. Patent Pub. No. 2017/0367077 (“Shu”):

Ground	Claims	References	Statutory Basis
1	1-20	Chu806	§103
2	1-20	Merlin	§103
3	1-20	Shu	§103

Pet. at 3.

1. Chu806 [EX1004]

Chu806 is titled “Medium Access Control for Multi-Channel OFDM in a Wireless Local Area Network.” EX1004. Chu806 was filed Nov. 11, 2014, issued Apr. 9, 2019, and claims priority to two U.S. Provisional Applications dated Nov. 11, 2013 and Mar. 4, 2014. Chu806 identifies the disclosure as being related to “wireless local area networks that utilize orthogonal frequency division multiplexing

¹ Patent Owner reserves the right to propose a different definition if the Petition is instituted.

(OFDM).” EX1006 at 1:16-19. The Chu806 disclosure provides general descriptions of OFDM communication between communication devices, but lacks any disclosure of specific elements of the ’520 Patent invention such as, for example, the claimed resource units and acknowledgement information. *See* EX2004 ¶38.

2. Merlin [EX1005]

Merlin is a U.S. Patent titled “Protocols For Multiple User Frame Exchanges.” EX1004. It was filed Oct. 30, 2014, issued Mar. 12, 2019, and claims priority to a provisional application filed Nov. 1, 2013. Merlin “relate[s] to wireless communications and, more particularly, to frame structures and protocols for uplink multiple user (MU) frame exchanges.” EX1004 at 1:14-17. Merlin provides general disclosures related to a station acknowledging a downlink frame from an access point, but fails to provide specific implementation details needed to actually achieve the specific multi-user communications taught and claimed by the ’520 Patent, such as, for example, the claimed resource units and acknowledgement information. *See* EX2004 ¶39.

3. Shu [EX1006]

Shu is U.S. Patent Application Publication titled “Data Transmission Method And Apparatus Used In Wireless Local Area Network.” It is based on a PCT filed Mar. 18, 2015, published Dec. 21, 2017, and claims priority to a foreign application dated Aug. 25, 2014. Shu “relate[s] to the field of communications technologies, and

in particular, to a data transmission method and apparatus used in a wireless local area network.” Shu ¶2. Shu purports to teach “a method and an apparatus for acknowledging transmission of downlink data frames by multiple stations in a wireless local area network , which can reduce time required by the multiple stations to feed back acknowledgment messages.” Shu ¶5. However, Shu fails to address several aspects of the ’520 Patent invention, such as the use of resource units or the specific claimed MPDUs. *See* EX2004 ¶40.

III. Legal Standards

An IPR should not be instituted unless Petitioner has shown a likelihood of success on the invalidity grounds presented *in the petition*. *See In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (“[T]he Board must base its decision on arguments that were advanced by a party, and to which the opposing party was given a chance to respond.”). “In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

“To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific

reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int’l*, 829 F.3d at 1380.

IV. Claim Construction

Claims are construed according to *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). “Any prior claim construction determination concerning a term of the claim in a civil action...will be considered.” *Id.*

Petitioner’s only claim construction argument is that the preambles of ’520 Patent Claims 1, 8, and 18 should be treated as limiting. Pet. at 15-16. For the purposes of this Preliminary Response and evaluating whether the Petition should be instituted, Patent Owner agrees, except that as indicated above, the plain meaning of “resource unit” is a particular, predefined unit of channel resources. At this stage, no further claim construction is needed beyond the plain and ordinary meaning of the relevant claim terms in order to evaluate the Parties’ arguments as discussed further below.² Patent Owner has included the parties’ claim construction briefing and the District Court’s Markman Order from the parallel proceeding as Exhibits 2014 to 2019.

² Patent Owner reserves the right to propose additional claim constructions in its Response.

V. Argument

As detailed below, the Board should decline to institute review because (A) the proposed grounds fail to present a reasonable likelihood of success on the merits,³ and (B) the Petition should be discretionarily denied under *Fintiv* because of the advanced stage of the parallel proceeding and Petitioner's lack of diligence.

A. All Grounds Fail to Present a Reasonable Likelihood of Success on the Merits

1. Ground 1: Chu806

For Ground 1, Petitioner asserts that "Chu806 renders Claims 1-20 obvious." Pet. at 19. However, Chu806 fails to render obvious the Challenged Claims, at least because it fails to render obvious (i) the claimed resource units [Claim 1], (ii/iv/v) the claimed acknowledgement information [Claims 1, 8, 18], (iii) the claimed plurality of uplink transmissions [Claim 1].

³ While Patent Owner disagrees with many of the arguments in the Petition, for the purposes of this Preliminary Response Patent Owner has addressed only the independent claim arguments and has not challenged Petitioner's priority date assertions. Patent Owner reserves the right to assert additional arguments regarding all claims and grounds if the Petition is instituted.

i. [Claim 1] Chu806 fails to render obvious the claimed resource units

Ground 1 fails to render obvious Claim 1 because it cannot render obvious the claimed “plurality of resource units (RUs)” included in a “downlink multi-user frame.” Claim 1 recites:

generating, by the network device, a downlink multi-user frame addressed to a plurality of stations operating in the wireless network, **the downlink multi-user frame including a plurality of resource units (RUs)**, wherein generating the downlink multi-user frame comprises: **assigning each RU of the plurality of RUs** to a respective station in the plurality of stations, and **including a respective set of MAC Protocol Data Units (MPDUs) in each RU of the plurality of RUs**,

wherein an MPDU in **one or more of the RUs in the plurality of RUs** includes acknowledgement information indicating properties of a multi-user acknowledgement transmission that the station in the **plurality of stations to which the RU is assigned** is requested to transmit to acknowledge the downlink multi-user frame;

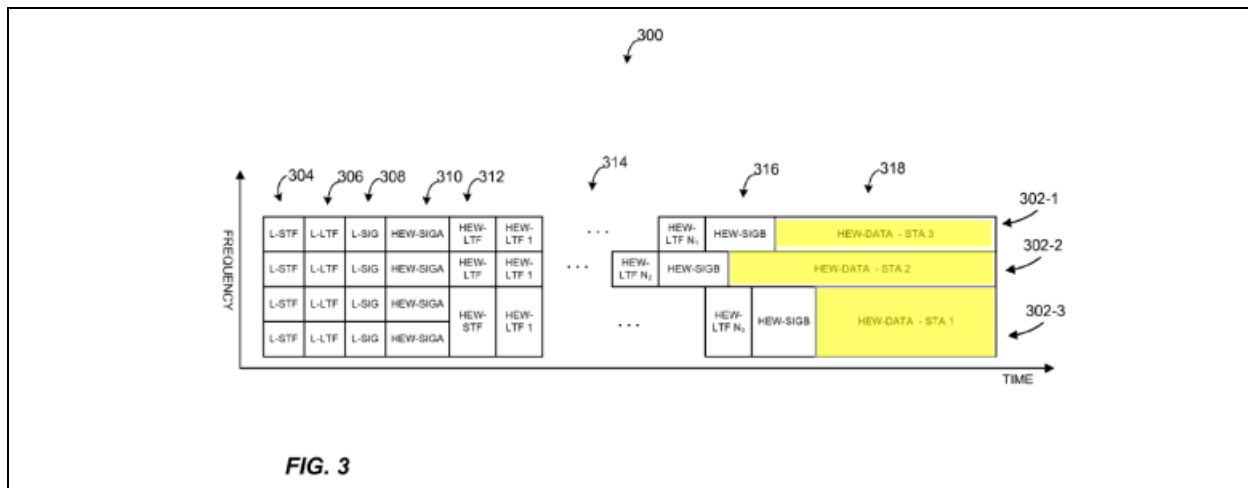
EX1001 at Claim 1 at 30:50-65.

As discussed in Section II.A.1 (and incorporated by reference here), RUs are not an arbitrary allocation of resources, but instead, according to the plain and ordinary meaning, they are particular, predefined units of channel resources. Chu806 fails to teach or render obvious the claimed resource units. *See* EX2004 ¶¶41-64.

As an initial matter, Liwen Chu, Hongyuan Zhang, and Yakun Sun—three inventors shown on the face of the Chu806 Patent—were involved in the development of 802.11ax and are authors of an 802.11ax task group submission specifically related to resource units. *See* EX2005 at 2; EX2004 ¶¶48-49. As discussed above, this proposal demonstrates that in the context of 802.11ax, resource units are particular defined units of channel resources rather than an arbitrary or ad hoc resource assignment. For example, this task group submission teaches that the minimum resource unit size is 26 tones. Other arbitrary resource allocations (*e.g.* 20 tones or 30 tones) are not allowed because resources must be allocated as predefined “units” of 26 tones.

Therefore, the inventors of Chu806 would have been aware of the concept of resource units, and could have used that language in Chu806 if they had intended to refer to the concept. Yet the term “resource unit” appears nowhere in Chu806, nor does Chu include any discussion of the concept of parceling out channel resources into particular, predefined units. Instead, Chu assigns resources on an arbitrary or ad hoc basis, without the concept of resource “units” being taught or disclosed.

Petitioner first asserts that Chu806 Fig. 3 and 7:58-8:13 render this obvious. Specifically, Petitioner highlights the “OFDM data unit” of Figure 3:



Pet. at 21.

However, an OFDM data unit is not a unit of channel resources. *See* EX2004 ¶¶51-53. Instead, as the name suggests it is a unit of data. Chu806 notes that two OFDM data units can be transmitted within the same sub-channel (confirming that the OFDM data unit is the data being transmitted, not the channel resources allocated for use in transmission). EX1004 at 29:59-67; *see also id.* at 29:12-14 (discussing “transmission of multiple OFDM data units in a single channel”). Chu806 also notes that OFDM data units are MPDUs. EX1004 at 13:22-24. An MPDU is a well-known acronym for “MAC Protocol Data Unit,” which a POSITA would again understand to be a unit of data carried on a channel resource, not the channel resource itself. *See* EX1001 at 1:60-62. This distinction is important in the Claims of the ’520 Patent, which recite a set of MPDUs carried “in each of the plurality of RUs.” EX1001 Claim 1 at 30:57-58.

Petitioner then posits an alternate theory, pointing to several places where Chu806 mentions allocation of “sub-channels” and asserting that discussion renders obvious the claimed RUs. *See* Pet. at 21-22 (citing, *e.g.*, Chu806 at Abstract, 7:11-12). Based on this, Petitioner concludes “[f]rom at least Chu806’s disclosures of the allocations of different sub-channel blocks to STAs, a POSITA would readily understand that Chu806’s AP allocates and assigns each of the resources to each of the multiple STAs, and that Chu806 renders obvious the [1a] limitation...” Pet. at 21-22.

However, the sub-channels Chu806 refers to are arbitrary channel resource allocations without any concept of particular or predefined “units” of resources. Merely referring to a sub-channel (which can be of any arbitrary size or consist of any arbitrary number of tones) would not have been understood by a POSITA to render obvious a resource unit (RU), which must be a particular, predefined unit of channel resources. Chu806 repeatedly explains the nature of its channel/subchannel discussion, noting that any arbitrary level of granularity may be used. *See, e.g.*, EX1004 at 10:58-67 (discussing “sub-channel allocating” with granularities of 20MHz, 10MHz, 5 MHz, 1MHz, “or other suitable bandwidth sub-channels”). These are not “particular” resource units as a POSITA would have understood them, but rather arbitrary allocations incompatible with the claimed 802.11ax RU approach.

Furthermore, Petitioner relies on disclosures from Chu806 which allocate sub-channels for use in an *uplink* transmission. As discussed above in Section II.A.2 (incorporated here by reference), the claimed RUs are in the *downlink* frame. Petitioner relies on Chu806's abstract, but it states "[a] first communication device allocates respective sub-channels of [OFDM] channel to two or more second communication devices for uplink [OFDMA] transmission from the two or more second communication devices." Pet. at 21 (quoting Chu806 Abstract) (emphasis modified). Thus, even if the sub-channels could be considered RUs, they still could not be the claimed RUs in a downlink frame.

Petitioner also cites to Chu806's Fig. 20A embodiment for support, suggesting it would render obvious "assigning each RU of the plurality of RUs to a respective station in the plurality of stations." Pet. at 21-22. However, nothing Petitioner cites supports the conclusion that this information is located in an MPDU or RU addressed "to a respective station." In fact, Chu806 at 37:8-16 states this information is included in a separate "scheduling frame" and not in an MPDU of the downlink multi-user frame. Thus, a POSITA would not have understood the cited Chu806 disclosure to render obvious Claim 1.

ii. [Claim 1] Chu806 fails to render obvious the claimed acknowledgement information

Ground 1 fails to render obvious Claim 1 because it cannot render obvious the claimed “acknowledgement information indicating properties of a multi-user acknowledgement transmission”. Claim 1 recites:

generating, by the network device, **a downlink multi-user frame** addressed to a plurality of stations operating in the wireless network, the downlink multi-user frame including a plurality of resource units (RUs), wherein generating the downlink multi-user frame comprises: assigning each RU of the plurality of RUs to a respective station in the plurality of stations, and **including a respective set of MAC Protocol Data Units (MPDUs)** in each RU of the plurality of RUs, wherein **an MPDU** in one or more of the RUs in the plurality of RUs **includes acknowledgement information indicating properties of a multi-user acknowledgement transmission** that the station in the plurality of stations to which the RU is assigned is requested to transmit to acknowledge the downlink multi-user frame;

EX1001 Claim 1 at 30:57-65 (emphasis added).

The only thing that Petitioner expressly maps to this limitation is Chu806’s disclosure of an embodiment with MAC header including an ACK policy field. *See* Pet. at 25-26 (citing Chu806 at 29:37-43). However, Petitioner ignores Chu806’s explanation that the point of that embodiment is “to prevent an acknowledgement

frame from the first client station to interfere with transmission of the OFDM data unit.” EX1004 at 29:31-33. Instead of “indicating properties of a multi-user acknowledgement transmission,” the ACK policy field being relied on in Chu instructs a station not to send an acknowledgement transmission at all. Thus, there is no acknowledgement transmission to even indicate the properties of the cited embodiment. *See* EX2004 ¶63.

Even if the ACK policy field Petitioner relies on could be said to indicate properties of an acknowledgment transmission, it still fails because it is not properties of a “multi-user” transmission. A multi-user transmission refers to a transmission to or from multiple different stations occurring substantially simultaneously. *See, e.g.,* EX1001 at 4:65-5:3 (referring to “multi-user (MU) simultaneous transmission techniques”), 15:43-54 (describing the sequential acknowledgment frame transmission of Figs. 1A and 1B as the “single user transmission manner”). In the cited Chu embodiment, the first client station is indicated not to respond, and the second client station is indicated to send an “immediate acknowledgment.” EX1004 at 29:31-46. This sequential, one-at-a-time transmission style reflects single user transmissions, not a multi-user transmission. Thus, it still could not render obvious “indicating properties of a **multi-user** acknowledgement transmission.”

Furthermore, nothing else Petitioner cites in Chu806 could render obvious the claimed “acknowledgement information indicating properties of a multi-user acknowledgement transmission.” For example, Petitioner refers to a “channel allocation field” of Chu806. Pet. at 22-23 (citing Chu806 at 12:28-34). However, a channel allocation field allocates channels in a downlink frame to stations so that a station can determine whether it is one of the intended recipients of the downlink frame. *See, e.g.*, EX1004 at 11:11:9-13 (“A non-legacy client station 25 is configured to determine, based on the group ID subfield 552 of the **channel allocation field** 550 whether the client station 25 is a member of the OFDMA group to which the OFDMA data unit is directed...” (emphasis added)). The channel allocation field does not indicate any of the “properties of a multi-user acknowledgement transmission.” *See* EX2004 ¶¶55, 60.

The cited portions do not even support the conclusion that the “channel allocation field” is located in an MPDU in one or more RU’s as claimed. In fact, Chu806 teaches that the “channel allocation field” is located in the “primary channel,” rather than in a RU assigned to a station. EX1004 at 12:62-63. The “primary channel” is “[t]he common channel of operation for all stations (STAs) that are members of the basic service set (BSS). For example, in a 20 MHz, 40 MHz, 80 MHz, 160 MHz or 80+80 MHz BSS the primary channel is a primary 20 MHz

channel.” EX2022 at 168. Thus, it is a channel shared by all stations, and not an RU assigned to a specific station as claimed. *See* EX2004 ¶¶61-62.

Petitioner’s citation to Chu at 14:7-12 regarding “uplink channel allocation information included in the control frame” also fails to teach the limitation. Chu states that “the AP 14 transmits a control frame, such as a scheduling frame, to the client stations 25 ***prior to transmission of an OFDMA data unit*** to the client stations 25.” EX1004 at 13:50-53. Thus, the uplink channel allocation of Chu806 is not included in the “OFDMA data units” of the of the downlink multiuser frame, but rather is included in an entirely separate control frame sent prior to the downlink multiuser frame. Thus, the cited “channel allocation field” cannot be the claimed “acknowledgement information” because it is not included in “an MPDU in one or more of the RUs” in the downlink multiuser frame (in fact it is not included in the downlink multi-user frame at all, but in a separate preceding control frame).

iii. [Claim 1] Chu806 fails to render obvious the claimed plurality of uplink transmissions

Ground 1 fails to render obvious Claim 1 because it cannot render obvious the claimed “each of the plurality of simultaneous uplink transmissions uses a sub-stream combination that is not used by any other of the plurality of simultaneous uplink transmissions.” Claim 1 recites:

A method, implemented by a network device in a wireless network, for coordinating an uplink multi-user response transmission to a downlink multi-user transmission, the method comprising:
generating, by the network device, a downlink multi-user frame addressed to a plurality of stations operating in the wireless network, **the downlink multi-user frame including a plurality of resource units (RUs)**, wherein generating the downlink multi-user frame comprises:
...

wherein the plurality of RUs respectively correspond to a plurality of simultaneous uplink transmissions, and each of the plurality of simultaneous uplink transmissions uses a sub-channel, spatial stream, or sub-channel and spatial stream combination that is not used by any other of the plurality of simultaneous uplink transmissions.

EX1001 Claim 1 at 30:47-31:13 (emphasis added). Chu806 fails to teach the claimed plurality of uplink transmissions. *See* EX2004 ¶¶65-70.

This limitation contains two distinct relevant components: (1) there must be a plurality of simultaneous *uplink* transmissions, and (2) each transmission must use a sub-channel, spatial stream, or sub-channel and spatial stream combination that is *not used by any other transmission*. Nothing Petitioner cites in Chu806 meets these two requirements.

Petitioner cites to Chu806 at 7:11-15 in support, relying heavily on language from Chu806 that states “the AP 14 allocates different sub-channels to different

client stations.” Pet. at 28. However, those statements relate specifically to *downlink* transmissions, not the simultaneous *uplink* transmissions claimed by the ’520 Patent. See EX2004 ¶69.

Petitioner also cites Chu806 at 8:15-18 which states that the AP may receive uplink data on respective sub-channels. However this passage does not say that the uplink transmissions are simultaneous, and Figure 3 (to which this passage refers) shows that the uplink transmissions are staggered along the horizontal time axis, indicating that the stations send their uplink transmissions non-simultaneously. Furthermore, Chu806 at 8:15-18 does not teach that the uplink transmissions must each use different sub-channels and/or spatial streams from one another. Chu states that the uplink transmissions are received “via respective sub-channels of the WLAN 10 allocated for uplink transmission of the OFDM data units” but does not say that these allocated sub-channels must be different from one another.

In fact, Chu806 teaches the opposite—that the same sub-channel should be assigned to multiple stations for an uplink transmission. See, e.g., Chu806 at 7:22-25 (“the AP assigns the primary and the non-primary communication channels **in any suitable manner** to the one or more client stations” (emphasis added)); *id.* at 29:47-57 (“the AP **allocates a particular sub-channel for uplink transmission by multiple client stations** as part of an OFDMA transmission from a plurality of client stations to the AP...**transmission of the multiple OFDM uplink data units in a**

single channel is multiplexed in time among the multiple client stations” (emphasis added)); *See* EX2004 ¶68.

Thus, the cited portions of Chu806 would have failed to render obvious the claimed “each of the plurality of simultaneous uplink transmissions uses a sub-stream combination that is not used by any other of the plurality of simultaneous uplink transmissions.”

iv. [Claim 8] Chu806 fails to render obvious the claimed acknowledgement information

Ground 1 fails to render obvious Claim 8 because it cannot render obvious the claimed “acknowledgement information indicating properties of a multi-user acknowledgement transmission.” Claim 8 recites:

A method, implemented by a first station in a wireless network, for transmitting an uplink acknowledgment, the method comprising:
receiving a downlink multi-user frame addressed to a plurality of stations, including the first station, and received from an access point in the wireless network;

processing a first MAC Protocol Data Units (MPDU) in the downlink multi-user frame to determine acknowledgement information indicating properties of a first multi-user acknowledgement frame;

EX1001 Claim 8 at 31:52-58 (emphasis added).

Petitioner asserts this limitation is rendered obvious by Chu806’s disclosure of a MAC header including an ACK policy field, similar to its argument for Claim

1. For the same reasons discussed in Section V.A.1.ii for Claim 1 (incorporated here by reference), that argument fails. *See* EX2004 ¶¶71-76.

Petitioner also cites Chu806’s disclosure of “channel allocation information” and “uplink channel allocation information” similar to its argument for Claim 1. For the same reasons discussed in Section V.A.1.ii for Claim 1 (incorporated here by reference), that argument fails.

v. [Claim 18] Chu806 fails to render obvious the claimed acknowledgement information

Ground 1 fails to render obvious Claim 18 because it cannot render obvious the claimed “acknowledgement information indicating properties of a first multi-user acknowledgement frame.” Claim 18 recites:

18. A method, implemented by a first station in a wireless network, for transmitting an uplink acknowledgment, the method comprising:
receiving a downlink multi-user frame addressed to a plurality of stations, including the first station, wherein the downlink multi-user frame is received from an access point in the wireless network;
receiving a multi-user block acknowledgement request frame that solicits acknowledgements from the first station and a second station, **wherein the multi-user block acknowledgement request frame includes acknowledgement information indicating properties of a first multi-user acknowledgement frame;**

EX1001 Claim 18 at 32:53-65 (emphasis added).

As discussed above for Claims 1 and 8 (and incorporated here by reference), Chu806 fails to disclose the claimed “acknowledgement information indicating properties of a first multi-user acknowledgement frame.” *See* Sections V.A.1.ii, V.A.1.iv; *see also* EX2004 ¶¶77-79.

Petitioner cites Chu806 at 24:27-30 disclosure that “uplink scheduling information is provided to the client [STAs] 25 by respective separate scheduling frames 1152 transmitted as control frames separate from the OFDM data units 1104.” Pet. at 45. However, Chu806 does not teach that the “respective separate scheduling frames” indicate properties of a multi-user acknowledgement frame as claimed. Petitioner concedes that Chu806 actually teaches that “the scheduling frame 1202 indicates to the [STA] 25 that the [STAs] 25 should provide indications of the amount of buffered data at the [STAs] 25 and/or indications of requested medium time for an uplink transmission by the [STAs] 25.” Pet. at 46 (quoting EX1004 at 25:34-38). Petitioner suggests this meets the limitation because “Chu806 describes additional control for a subsequent UL ACK frame.” However, as Dr. Psounis explains, the cited portion actually means that that “the ‘respective separate scheduling frames’ request specific information from individual stations, and do not indicate ‘properties of a first multi-user acknowledgement frame.’” EX2004 ¶79.

Petitioner also cites to its Claim 16 analysis in support. Pet. at 46-47. However, its Claim 16 analysis merely repeats the same analysis of Chu806 at 24:27-

30, and cites nothing else that a POSITA would indicate properties of a multi-user acknowledgement frame. Petitioner's vague assertions of "additional control" do not meet the requirements of a specific block acknowledgement request frame including acknowledgement information of a specific type of acknowledgement frame. Thus, Ground 1 fails to render obvious Claim 18.

2. Ground 2: Merlin

For Ground 2, Petitioner asserts that "Merlin renders Claims 1-20 obvious." Pet. at 49. However, Merlin fails to render obvious the Challenged Claims, at least because it fails to render obvious the claimed (i) resource units [Claim 1], (ii) MPDU in one or more of the RUs including acknowledgement information [Claim 1], (iii/v/vi) downlink multi-user frame addressed to a plurality of stations [Claims 1, 8, 18], and (iv) acknowledgement information [Claim 8].

i. [Claim 1] Merlin fails to render obvious the claimed resource units

Ground 2 fails to render obvious Claim 1 because it cannot render obvious the claimed "plurality of resource units (RUs)". Claim 1 recites:

generating, by the network device, a downlink multi-user frame addressed to a plurality of stations operating in the wireless network, **the downlink multi-user frame including a plurality of resource units (RUs), wherein generating the downlink multi-user frame comprises: assigning each RU of the plurality of RUs to a respective station in the plurality of stations, and**

**including a respective set of MAC Protocol Data Units (MPDUs) in
each RU of the plurality of RUs,**

wherein an MPDU in **one or more of the RUs in the plurality of RUs**
includes acknowledgement information indicating properties of a
multi-user acknowledgement transmission that the station in the
plurality of stations to which the RU is assigned is requested to
transmit to acknowledge the downlink multi-user frame;

EX1001 Claim 1 at 30:50-65 (emphasis added).

As discussed in Section II.A.1 (and incorporated by reference here), an arbitrary allocation of resources is not a resource unit, but instead RUs are particular predefined units of resources. Furthermore, the claimed “plurality of resource units (RUs)” are in the “*downlink* multi-user frame.” Merlin fails to render obvious these claimed resource units. *See* EX2004 ¶¶81-93.

As an initial matter, Simone Merlin, Gwendolyn Barriac, and Hemanth Sampath, the three inventors shown on the face of the Merlin Patent, were involved in the standardization of 802.11ax and were co-authors of the submission IEEE 802.11-15/0330r1, alongside the inventors of Chu. EX2005 at 4. As discussed above in the context of Chu, this submission demonstrates that the inventors of Merlin would have understood “resource units” in the context of 802.11ax as being a distinct concept from an arbitrary allocation of channel resources. Based on this, they would have used the term “resource units” in Merlin or would have described the concept of resource units in Merlin if they had intended to refer to resource units. Yet the

term “resource units” appears nowhere in Merlin, nor does any discussion of the concept of particular units of resources. Instead, the authors of Merlin deliberately described a system that allocates resources arbitrarily, without using predefined channel resource units. *See* EX2004 ¶84.

Petitioner relies on “Merlin’s disclosures of the AP’s allocations of spatial streams/channels to STAs and the indication of resource allocations in a DL MU A-MPDU that solicits UP MU responses” to teach this limitation. *See* Pet. at 51-52. However, the cited portions of Merlin refer only generically to spatial streams/channels, and a POSITA would not understand them to render obvious the claimed specific resource units. Merlin does not teach or suggest parceling out the spatial streams or channels into particular “units” of resources.

Additionally, Petitioner relies on discussions of “resource allocation” in Merlin, but those resource allocations are for an *uplink* response, rather than a *downlink* frame as claimed. As discussed above in Section II.A.2 (incorporated here by reference), the claimed resource units are assigned to stations so that they can process the *downlink* frame. For example, Petitioner relies on Merlin’s disclosure at 18:24-28 for support. Pet. at 51. But that section of Merlin explains that “some of the 8 reserved bits in the BAR control field 910 may be used for the variable length BAR information field 912 to indicate the *resource allocation for the [uplink] responses*...the parameters to be used (e.g. duration of the response PPDU, spatial

stream/channel allocation, and power allocation) may also be indicated by bits in the BAR frame.” *Id.* at 18:16-28 (emphasis added); *see also id.* at 12:30-35 (explaining the block acknowledgements are transmitted in the uplink direction). The “BAR” frame is a block acknowledgement request in the downlink direction, and it solicits block acknowledgements in the uplink direction from the STAs. *See, e.g., id.* at 4:13-15, 17:52-55. The resource allocations Petitioner relies are the resources intended for the STA’s to use in the uplink response, not for interpreting the downlink BAR. Thus, even if they were specific “resource units” rather than generic resource allocations, they would still fail to meet the claim language. *See* EX2004 ¶¶85-93.

Petitioner cites language suggesting that “STAs may send the response frame using the same spatial streams of the soliciting frame.” Pet. at 52 (quoting EX1005 at 15:65-67) (emphasis omitted). However, even if the spatial streams referred to were the “resource units,” the cited portion of Merlin says nothing about the assignment of the spatial streams to particular stations for purposes of processing the information in the downlink frame. *See* EX2004 ¶87. Thus, the cited disclosure could not render obvious the claimed “resource units” included in a downlink frame (1) each of which are assigned to a station, and (2) which “include[] acknowledgement information indicating properties of a multi-user acknowledgement transmission that the station in the plurality of stations to which the RU is assigned.”

ii. [Claim 1] Merlin fails to render obvious the MPDU in one or more of the RUs including acknowledgement information

Ground 2 fails to render obvious Claim 1 because it cannot render obvious the claimed “acknowledgement information indicating properties of a multi-user acknowledgement transmission.” Claim 1 recites:

generating, by the network device, a downlink multi-user frame addressed to a plurality of stations operating in the wireless network, the downlink multi-user frame including a plurality of resource units (RUs), wherein generating the downlink multi-user frame comprises: assigning each RU of the plurality of RUs to a respective station in the plurality of stations, and

including a respective set of MAC Protocol Data Units (MPDUs) in each RU of the plurality of RUs,

wherein **an MPDU in one or more of the RUs in the plurality of RUs includes acknowledgement information indicating properties of a multi-user acknowledgement transmission** that the station in the plurality of stations to which the RU is assigned is requested to transmit to acknowledge the downlink multi-user frame;

EX1001 Claim 1 at 30:57-65 (emphasis added). Merlin would not have rendered this obvious. Petitioner relies on citations to Merlin’s A-MPDU’s, but nothing cited indicates that those MPDUs include “acknowledgement information indicating properties of a multi-user acknowledgement transmission.” *See* Pet. at 51-53; *see also* EX2004 ¶¶92-93. Nor does Petitioner even attempt to expressly map any portion of Merlin to the claimed acknowledgement information. Instead,

Petitioner provides analysis of three different limitations (1[a-c]) in a single section with no attempt to provide a direct mapping to Merlin.

Petitioner cites to Merlin 12:6-9, which discloses “a FDMA transmission may consist of... MU PPDU s on each channel (e.g. 20 MHz). Each MU PPDU may be... a MU-MIMO....” Pet. at 69-70. However, as both the reference itself and Dr. Psounis explain, this passage does not refer to MPDU s, but rather PPDU s. EX2004 ¶93. An MPDU is “[t]he unit of data exchanged between two [] MAC entities...” EX2022 at 164. A PPDU is “[t]he unit of data exchanged between two [] PHY entities...” EX2022 at 167. The MAC (“Medium Access Control”) and PHY (“Physical Layer”) are separate layers of the IEEE 802 architecture—Petitioner cannot treat them as interchangeable and ignore the actual claim language which recites an MPDU. Thus, Petitioner’s Ground 2 fails to render obvious Claim 1.

iii. [Claim 1] Merlin fails to render obvious the claimed downlink multi-user frame addressed to a plurality of stations

Ground 2 fails to render obvious Claim 1 because it cannot render obvious the claimed “downlink multi-user frame addressed to a plurality of stations.” Claim 1 recites:

generating, by the network device, a downlink multi-user frame addressed to a plurality of stations operating in the wireless network, the downlink multi-user frame including a plurality of resource units (RUs), wherein generating the downlink multi-user

frame comprises: assigning each RU of the plurality of RUs to a respective station in the plurality of stations, and
EX1001 at Claim 1 at 30:50-56.

As discussed above, Merlin does not disclose “assigning” any downlink resources, let alone assigning them to “each” station. Merlin also does not render obvious “a downlink multi-user frame addressed to a plurality of stations.” Just as the cited passages of Merlin fail to disclose “assigning” any downlink resources, they similarly fail to disclose a mechanism by which the downlink multi-user frame is “addressed” to multiple stations. For example, the cited passages of Merlin do not disclose any field or information in the downlink frame that indicates which stations the frame is addressed to. Nor does Petitioner even attempt to expressly map anything to the “addressed to a plurality of stations” language.

iv. [Claim 8] Merlin fails to render obvious the claimed acknowledgement information

Ground 1 fails to render obvious Claim 8 because it cannot render obvious the claimed “acknowledgement information indicating properties of a multi-user acknowledgement transmission.” Claim 8 recites:

A method, implemented by a first station in a wireless network, for transmitting an uplink acknowledgment, the method comprising:
receiving a downlink multi-user frame addressed to a plurality of stations, including the first station, and received from an access point in the wireless network;

**processing a first MAC Protocol Data Units (MPDU) in the
downlink multi-user frame to determine acknowledgement
information indicating properties of a first multi-user
acknowledgement frame;**

EX1001 Claim 8 at 31:52-58 (emphasis added).

As discussed above for Claim 1 in Section V.A.2.ii (and incorporated here by reference), Merlin fails to render obvious the claimed acknowledgement information. *See* EX2004 ¶¶94-97.

Petitioner refers to Merlin’s discussion of “response parameters” in support, citing Merlin at 15:26-33. Pet. at 59-60. However, the cited portion of Merlin do not teach that the “response parameters” are included in any MPDU, nor do they assert that the response parameters correspond to a “first multi-user acknowledgment frame.” *See* EX2004 ¶96.

Petitioner further cites Merlin at 14:26-35 based on discussion of a “response type indication.” Pet. at 59-60. However, the “response type indication” does not “indicat[e] properties of a first multi-user acknowledgment frame.” Instead, the response type indication indicates whether or not the result is multi-user or single-user. *See, e.g.*, EX1005 at 14:28-30 (explaining response types are, “e.g., UL SU-MIMO, UL MU-MIMO, or UL FDMA”). Nor are a “response parameter” and “response type indication” the same thing as used by Merlin. Thus, Petitioner’s

mixed reliance on different fields (and absence of explanation) is improper and cannot present a reasonable likelihood of success. *See* EX2004 ¶97.

v. [Claim 8] Merlin fails to render obvious the claimed downlink multi-user frame addressed to a plurality of stations

Ground 2 fails to render obvious Claim 8 because it cannot render obvious the claimed “downlink multi-user frame addressed to a plurality of stations.” Claim 8 recites:

receiving a **downlink multi-user frame addressed to a plurality of stations**, including the first station, and received from an access point in the wireless network;
EX1001 at Claim 8 at 31:52-54.

As discussed above for Claim 1 (and incorporated here by reference), Merlin fails to render obvious this limitation. *See* Section V.A.2.iii.

vi. [Claim 18] Merlin fails to render obvious the claimed downlink multi-user frame addressed to a plurality of stations

Ground 2 fails to render obvious Claim 18 because it cannot render obvious the claimed “downlink multi-user frame addressed to a plurality of stations.” Claim 18 recites:

receiving a **downlink multi-user frame addressed to a plurality of stations**, including the first station, wherein the downlink multi-user frame is received from an access point in the wireless network;
EX1001 at Claim 18 at 32:56-59.

As discussed above for Claim 1 (and incorporated here by reference), Merlin fails to render obvious this limitation. *See* Section V.A.2.iii.

3. Ground 3: Shu

For Ground 3, Petitioner asserts that “Shu renders Claims 1-20 obvious.” Pet. at 65. However, Shu fails to render obvious the Challenged Claims, at least because it fails to render obvious the claimed (i) resource units [Claim 1], (ii/iv) MPDUs [Claims 1, 8], (iii/v/vi) downlink multi-user frame addressed to a plurality of stations [Claims 1, 8, 18].

i. [Claim 1] Shu fails to render obvious the claimed resource units

Ground 3 fails to render obvious Claim 1 because it cannot render obvious the claimed “plurality of resource units (RUs)”. Claim 1 recites:

generating, by the network device, a downlink multi-user frame addressed to a plurality of stations operating in the wireless network, **the downlink multi-user frame including a plurality of resource units (RUs), wherein generating the downlink multi-user frame comprises: assigning each RU of the plurality of RUs to a respective station in the plurality of stations, and including a respective set of MAC Protocol Data Units (MPDUs) in each RU of the plurality of RUs,** wherein an MPDU in **one or more of the RUs in the plurality of RUs** includes acknowledgement information indicating properties of a multi-user acknowledgement transmission that the station in the

plurality of stations to which the RU is assigned is requested to transmit to acknowledge the downlink multi-user frame;
EX1001 Claim 1 at 30:50-65 (emphasis added).

As discussed in Section II.A.1 (and incorporated by reference here), an arbitrary allocation of resources is not a resource unit, but instead RUs are particular predefined units of channel resources. Petitioner relies on generic disclosures of “resource information,” which lack the predefined “unit” structure of the claimed “resource units.” *See* Pet. at 65-69; EX2004 ¶¶98-108.

Furthermore, the claimed “plurality of resource units (RUs)” are assigned for use in the “*downlink* multi-user frame.” Petitioner relies on disclosures relating to *uplink* frames instead, and as a result Petitioner’s Ground 3 fails. *See* EX2004 ¶101.

For example, Petitioner cites to Shu’s discussion of “channel resources.” Specifically, “the channel resource allocated by the [AP] to each [STA] of the multiple [STAs]..., [and] where the channel resource information is used to indicate a channel resource allocated by the access point to a station receiving the corresponding downlink data frame.” Pet. at 66 (quoting EX1006 ¶54); *see also* Pet. at 66-69 (citing Shu ¶¶11-12, 51, 53-54, 62). However, each of these refer to resources allocated for the stations to respond in the uplink direction—none of them refer to resource units assigned to the stations for processing of the downlink frame (and the respective acknowledgement information). *See* EX2004 ¶102.

Petitioner also cites to Shu ¶69 to teach the claim limitations. Pet. at 67. However, yet again “that information [is] used to identify a channel resource that is used to send an *acknowledgment message*” in the uplink direction in response to a “downlink data frame.” Shu ¶69 (emphasis added); *see* EX2004 ¶103.

Petitioner also cites Shu’s discussion of the “sub-channel index field [] located in the PLCP Header field.” Pet. at 68 (citing Shu ¶67). Yet again, the channel resources identified in the “sub-channel index” are allocated to send uplink “acknowledgement messages to the access point by using the channel resources allocated by the access point to the multiple stations.” *See* Shu ¶66. Ultimately, Ground 3 fails to render obvious Claim 1, both because Shu fails to render obvious the claimed “resource units,” and because the channel resources Petitioner relies on in lieu of resource units are allocated for uplink transmissions, not for processing the downlink frame.

Petitioner’s grounds also fail to render obvious “assigning each RU of the plurality of RUs to a respective station in the plurality of stations.” Shu does not teach “assigning” any of the downlink channel resources (the purported RUs) to “each station.” The cited portions of Shu only allocate uplink channel resources (rather than downlink), and none state that “each” resource must be assigned. *See* EX2004 ¶107.

ii. [Claim 1] Shu fails to render obvious the claimed MPDUs

Ground 3 fails to render obvious Claim 1 because it cannot render obvious the claimed “MPDUs”. Claim 1 recites:

generating, by the network device, a downlink multi-user frame
addressed to a plurality of stations operating in the wireless network,
the downlink multi-user frame including a plurality of resource units
(RUs), wherein generating the downlink multi-user frame
comprises: assigning each RU of the plurality of RUs to a respective
station in the plurality of stations, and
including a respective set of **MAC Protocol Data Units (MPDUs)** in
each RU of the plurality of RUs,
wherein an **MPDU** in one or more of the RUs in the plurality of RUs
includes acknowledgement information indicating properties of a
multi-user acknowledgement transmission that the station in the
plurality of stations to which the RU is assigned is requested to
transmit to acknowledge the downlink multi-user frame;

EX1001 Claim 1 at 30:50-65 (emphasis added).

Shu never addresses MPDUs. Nor does Petitioner attempt to expressly map anything in Shu to the claimed MPDUs. *See* Pet. at 65-69. Petitioner relies on a single conclusory statement:

In view of Shu’s disclosure of a channel resource information in a MAC header and corresponding to a DL frame, a POSITA would readily understand that the frames generated by the AP disclosed in Shu renders obvious the [1a] limitation [sic] “generating the downlink multi-user frame comprises: assigning each RU of the plurality of RUs to a

respective station in the plurality of stations, and including a respective set of MAC Protocol Data Units (MPDUs) in each RU of the plurality of RUs.”

Pet. at 67 (discussing Shu ¶69). But again, the cited portion of Shu does not address MPDUs, and even if it did, it still could not establish that there was a “respective set of MAC Protocol Data Units (MPDUs) in each RU” in a downlink frame as claimed. *See* EX2004 ¶108.

iii. [Claim 1] Shu fails to render obvious the claimed downlink multi-user frame addressed to a plurality of stations

Ground 3 fails to render obvious Claim 1 because it cannot render obvious the claimed “downlink multi-user frame addressed to a plurality of stations.” Claim 1 recites:

A method, implemented by a network device in a wireless network, for coordinating an uplink multi-user response transmission to a downlink multi-user transmission, the method comprising:

generating, by the network device, **a downlink multi-user frame addressed to a plurality of stations operating in the wireless network**, the downlink multi-user frame including a plurality of resource units (RUs);

EX1001 at Claim 1 at 30:46-53.

Shu does not disclose or render obvious “a downlink multi-user frame ***addressed*** to a plurality of stations.” Just as the cited passages of Shu fail to disclose “assigning” any downlink resources, they similarly fail to disclose a mechanism by

which the downlink multi-user frame is “addressed” to multiple stations. For example, the cited passages of Shu do not disclose any field or information in the downlink frame that indicates which stations the frame is addressed to.

iv. [Claim 8] Shu fails to render obvious the claimed MPDUs

Ground 3 fails to render obvious Claim 8 because it cannot render obvious the claimed “MPDUs”. Claim 8 recites:

processing a first **MAC Protocol Data Units (MPDU)** in the downlink multi-user frame to determine acknowledgement information indicating properties of a first multi-user acknowledgement frame;
EX1001 Claim 8 at 31:55-58 (emphasis added).

As discussed above for Claim 1 (incorporated here by reference), Shu fails to teach or render obvious the claimed MPDU. *See* Section V.A.3.ii; EX2004 ¶¶109-110. As a result, Petitioner’s Ground 3 fails to render obvious Claim 8.

v. [Claim 8] Shu fails to render obvious the claimed downlink multi-user frame addressed to a plurality of stations

Ground 3 fails to render obvious Claim 8 because it cannot render obvious the claimed “downlink multi-user frame addressed to a plurality of stations.” Claim 8 recites:

receiving a **downlink multi-user frame addressed to a plurality of stations,** including the first station, and received from an access point in the wireless network;
EX1001 Claim 8 at 31:52-54 (emphasis added).

As discussed above for Claim 1 (and incorporated here by reference), Shu fails to render obvious this limitation. *See* Section V.A.3.iii.

vi. [Claim 18] Merlin fails to render obvious the claimed downlink multi-user frame addressed to a plurality of stations

Ground 2 fails to render obvious Claim 18 because it cannot render obvious the claimed “downlink multi-user frame addressed to a plurality of stations.” Claim 18 recites:

receiving a **downlink multi-user frame addressed to a plurality of stations**, including the first station, wherein the downlink multi-user frame is received from an access point in the wireless network;
EX1001 at Claim 18 at 32:56-59 (emphasis added).

As discussed above for Claim 1 (and incorporated here by reference), Shu fails to render obvious this limitation. *See* Section V.A.3.iii.

B. The Board should exercise its discretion to deny the Petition under *Fintiv*

The Board should exercise its discretion to deny the Petition under *Fintiv*. Petitioner delayed filing its IPR challenge for almost a full year after service of the district court complaint,⁴ despite having prepared and served largely the same

⁴ Patent Owner contends Zyxel Networks Corporation was served with the district court complaint at least as of April 21, 2022 (as shown on the Proof of Service filed

invalidity theories in its invalidity contentions as part of the parallel district court litigation six months earlier.⁵ Petitioner concedes that the district court trial is scheduled to occur five to six months prior to any potential final written decision in this proceeding—a gap wholly attributable to Petitioner’s delay in filing its challenge. Pet. at 7. In light of the advanced stage of the district court litigation, Petitioner’s lack of diligence in filing its Petition demonstrates that its actions are purely meant to “increase, rather than limit, litigation costs,” and thus the Petition should be denied under *Fintiv*. See Director’ *Fintiv* Guidance at 1 (June 21, 2022), available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

The Director has discretion to deny institution under 35 U.S.C. § 314(a). *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016). The Board should exercise such discretion here and deny the Petition because the same invalidity

with the district court), yet did not file its Petition until April 18, 2023. See EX2007 at 4; Pet. at 78; *see also* 35 U.S.C. § 315(b).

⁵ Compare Exhibit 2008 at 17-18 (Petitioner’s invalidity contentions based on Chu806, Merlin, and Shu, served October 20, 2022) with Pet. at 78 (filed April 18, 2023).

arguments will be addressed, and resolved, in the co-pending district court proceedings before the Board would issue a final written decision.

Patent Owner has asserted the '520 Patent against Petitioner Zyxel in the Western District of Texas in *Atlas Global Technologies LLC v. Zyxel Networks Corporation and Zyxel Communications Corporation*, Case No. 6:22-cv-00355, filed April 4, 2022 (W.D. Tex.) (“District Court Proceeding”). The Board considers the presence and status of parallel district court litigation in determining whether to deny institution. *See NHK Spring Co. Ltd. v. Intri-Plex Techs. Inc.*, IPR2018-00752, Paper 8, at 20 (P.T.A.B. Sept. 12, 2018) (precedential); *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15, at 17 (P.T.A.B. May 13, 2020) (informative) [hereinafter “*Fintiv*”]; *see also Gen. Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19, at 16-17 (P.T.A.B. Sept. 6, 2017) (“[W]e recognize that an objective of the AIA is to provide an effective and efficient alternative to district court litigation”). *Fintiv* “sets forth factors that balance considerations of system efficiency, fairness, and patent quality when a patent owner raises an argument for discretionary denial due to the advanced state of a parallel proceeding.” *Fintiv*, Paper 15, at 7-8 (citing *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, at 5-6 (P.T.A.B. Mar. 20, 2020) (precedential)).

The factors are:

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

Id. “[T]he Board examines these factors, which relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution. In evaluating the factors, the Board takes a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.* (internal citations omitted). Additionally, on June 21, 2022, USPTO Director Vidal issued interim guidance for discretionary denial analysis (hereinafter the “Director’s Guidance”).⁶ As detailed below, these factors favor discretionary denial under §314(a).

⁶ Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

Factor 1: The District Court Proceeding is ongoing in front of Judge Albright in the Western District of Texas. Zyxel has not moved to stay the District Court Proceeding pending the resolution of this IPR, nor is there evidence that such a stay would be granted. In fact, Judge Albright has been outspoken on his preference not to stay cases pending PTAB decision. *See, e.g.,* EX2009 (IAM Article) at 1 (“[Question to Judge Albright]: You’re one of the judges who hears a lot of patent cases who has tended not to stay cases pending a PTAB decision – why is that? [Answer from Judge Albright]: You know, I have done that because I think that people have a constitutional right to assert their patent. I mean, patents are in the Constitution, the right to a jury trial is in the Constitution. I am not taking away anyone’s right to go to the PTAB, but I think people ought to have a jury trial.”); EX2010 (Law360 Article) (“Albright Says He’ll Very Rarely Put Cases On Hold For PTAB”). Thus, this factor favors denial of institution because evidence exists that the Judge in the District Court Proceeding would not grant a stay even if institution were to occur. *See Fintiv*, Paper 11 at 6 (noting the analysis is based on whether “evidence exists that [a stay] may be granted if a proceeding is instituted”).

Factor 2: Trial in the District Court Proceeding is scheduled for May 16, 2024. EX2011 at (Scheduling Order) at 4. In addition to the district court’s schedule, the Director’s Guidance has suggested that parties refer to the median time to trial for a district as well as judge specific disposition data when evaluating the *Fintiv*

factors. Director's Guidance at 8-9. The District Court Proceeding was filed April 4, 2022. EX1008 (Complaint) at 60. The most recent statistics for WDTX show a median time to trial of 28.2 months, which would suggest a trial around the beginning of August 2024. EX2012 (March 2023 WDTX Judicial Caseload Profile) at 37.

If the Board reaches its institution decision within three months of receiving the preliminary response, 35 U.S.C. §314(b), and issues a final written decision within 1 year of institution, 35 U.S.C. §316(a)(11), a final written decision would likely not issue until around November 2024. Thus, both the scheduled trial date (May 16, 2024) as well as the projected trial date (August 2024) fall several months before any final written decision would be likely to issue. Further, as noted above, the fact that the trial will occur so many months before any final written decision in this proceeding is wholly attributable to Petitioner's lack of diligence in filing its Petition. Thus, this factor weighs in favor of denial.

Factor 3: The investment in the parallel proceeding is significant. In the District Court Proceeding, the parties conducted a *Markman* hearing and received a Claim Construction Order. EX2019 (Claim Construction Order). Both preliminary and final invalidity contentions have already been served. EX2008; EX2013. Furthermore, opening expert reports are due November 2, 2023, which means that Petitioner will likely have already served (or will be about to serve) its expert report

on validity before an institution decision issues in this proceeding. EX2011 at 3. Given the completion of the *Markman* process and the advanced stage of the discovery in the District Court Proceeding, this factor favors denial.

Petitioner suggests this factor is “firmly neutral given Petitioner’s [] diligence.” Pet. at 8-9. However, as discussed above nothing could be further from the truth— Petitioner did not file its Petition until six months after first identifying its invalidity theories, and almost a full year after the service date shown in the Proof of Service filed with the District Court. EX2007 at 4. Had Petitioner been diligent, it would have filed its Petition six months earlier, shortly after it first identified its invalidity theories (as shown in its invalidity contentions, EX2008). As it stands, Petitioner delayed so long that the parties will likely be in the middle of serving expert and rebuttal validity reports before an institution decision is likely to issue, and a final written decision in this proceeding has very little chance of simplifying any issues prior to trial in the District Court.

Factor 4: Petitioner’s asserted grounds in this proceeding are also part of its invalidity contentions in the District Court Proceeding. *See, e.g.,* EX2008 (Preliminary Invalidity Contentions) at 17-18 (identifying Chu806, Merlin, and Shu); EX2013 (Final Invalidity Contentions) at 18 (incorporating the IPR2023-00863 Petition). The list of challenged claims is almost identical as well. *See* EX2013 at 2 (addressing Claims 1-6, 8-16, and 18-20). Thus, instituting this

proceeding would lead to duplicative efforts here and in the District Court Proceeding.

Petitioner suggests this factor weighs against denial because it states: “if *inter partes* review is instituted on Grounds 1-3 in this proceeding, Petitioners will not pursue Grounds 1-3 in the Texas Litigation.” Pet. at 9. However, this stipulation is far narrower than in *Sotera Wireless, Inc. v. Masimo Corporation*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020), where the “Petitioner broadly stipulates to not pursue ‘any ground raised ***or that could have been reasonably raised.***’” *Id.* at 19 (emphasis in original); *see also* Director’s Guidance at 7-8.

Petitioner’s offer to conditionally litigate one set of invalidity theories in the PTAB and a separate set of invalidity theories in the district court proceeding (*i.e.*, those that are not *exactly* the same as the PTAB grounds, but nonetheless reasonably could have been raised in the Petition) does little to provide an “inexpensive resolution of every proceeding.” *See* 37 CFR §42.1(b). In fact, Petitioner’s approach simply increases the costs for all parties, creating a duplication of litigation rather than the desired “cost-effective alternative to litigation.” *See* 77 Fed. Reg. 48680-01 (Aug. 14, 2012). Petitioner’s limited stipulation effectively amounts to an empty promise that is unlikely to significantly prevent duplication of work, especially given that its opening validity expert report will potentially have been served before an

Institution Decision issues. *See Ericsson Inc. and Nokia of America Corp. v. Godo Kaisha IP Bridge 1*, IPR2022-00725, Paper 10 (PTAB Nov. 2, 2022) at 11.

Factor 5: Petitioner Zyxel and Patent Owner Atlas are both parties in the co-pending District Court Proceeding. Under the Board’s precedential *Sotera* opinion, when the parties are the same this factor supports denying institution. *Sotera*, IPR2020-01019, Paper 12 at 19.

Petitioner makes the baffling statement that this factor supports institution because “institution offers a unique opportunity to adjudicate the grounds of this Petition exclusively at the PTAB.” Pet. at 10. If Petitioner actually believed that to be true, then it would not have delayed filing its Petition for six months after identifying its invalidity theories. Nor would it have declined to make a *Sotera* stipulation, which would have disposed of the *Fintiv* inquiry and put the matter exclusively in front of the PTAB as Petitioner ostensibly suggests it is seeking. *See* Director’s Guidance at 3.

Factor 6: As discussed above, the merits of this Petition are weak. Petitioner relies on references which fail to even mention the claimed concepts (such as the claimed “resource units”), much less render them obvious in the context of the claimed invention.

Furthermore, the same invalidity references are also being asserted against the '520 in yet another parallel proceeding.⁷ See EX2020 at 17-18. That proceeding is currently scheduled for trial on November 27, 2023. EX2021 at 2. Thus, it is highly likely that the proposed invalidity merits will also be tried in at least one additional district court proceeding well before a final written decision would be likely to issue in this proceeding. This further demonstrates that institution of this Petition would not be an efficient use of the Board's resources.

On balance, the *Fintiv* factors favor discretionary denial.

VI. Conclusion

Patent Owner respectfully requests that the Board refuse to institute *inter partes* review for the reasons stated herein.

Dated: August 11, 2023

Respectfully submitted,

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⁷ *Atlas Global Techs. LLC v. Sercomm Corp.*, Case No. 6:21-cv-818 (W.D. Tex.).

CERTIFICATE OF SERVICE

The undersigned certifies that pursuant to 37 C.F.R. § 42.6(e), a copy of the foregoing was served via email to counsel of record for Petitioners as follows:

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that this brief complies with the type-volume limitation of 37 C.F.R. § 42.24 because this brief contains 11,349 words as calculated by Microsoft Word, excluding the items exempted under 37 C.F.R. § 42.24.

Dated: August 11, 2023

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