

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

~~Zebra Technologies Corporation~~
LENOVO (UNITED STATES) INC.
Petitioner

v.

~~Intellectual Ventures~~INTELLECTUAL VENTURES I LLC
Patent Owner

Inter Partes Review No.
IPR2024-~~XXX~~01224

Patent No. 7,623,439
Filing: May 4, 2005
Issue Date: November 24, 2009

PETITION FOR *INTER PARTES* REVIEW

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 7,623,439
1002	Prosecution History of U.S. Patent No. 7,623,439
1003	Declaration of Zhi Ding
1004	Curriculum Vitae of Zhi Ding
1005	“On the Equivalence of Space-Time Block Coding with Multipath Propagation and/or Cyclic Delay Diversity in OFDM” by Dammann <i>et al.</i>
1006	U.S. Patent No. 5,961,575 to Hervin <i>et al.</i>
1007	U.S. Publication No. 2002/0122499 to Kannan <i>et al.</i>
1008	Complaint in <i>Intellectual Ventures I LLC, et al. v. Zebra Technologies Corp.</i> , No. 6:23-cv-00292-ADA
1009	Return of Service in <i>Intellectual Ventures I LLC, et al. v. Zebra Technologies Corp.</i> , No. 6:23-cv-00292-ADA
1010	Cover Document for Patent Owner’s Preliminary Infringement Contentions in <i>Intellectual Ventures I LLC, et al. v. Zebra Technologies Corp.</i> , No. 6:23-cv-00292-ADA
1011	Cover Document for Patent Owner’s Amended Preliminary Infringement Contentions in <i>Intellectual Ventures I LLC, et al. v. Zebra Technologies Corp.</i> , No. 6:23-cv-00292-ADA
1012	Scheduling Order in <i>Intellectual Ventures I LLC, et al. v. Zebra Technologies Corp.</i> , No. 6:23-cv-00292-ADA
1013	United States District Courts — National Judicial Caseload Profile, Dec. 2023 Edition
1014	Webpage for European Wireless 2002 Conference, archived by WayBackMachine on Oct. 28, 2002
1015	Webpage for European Wireless 2002 Conference - Summary, archived by WayBackMachine on May 23, 2003
1016	Webpage for European Wireless 2002 Conference - Schedule, archived by WayBackMachine on Nov. 23, 2004

<u>1017</u>	<u>Complaint in <i>Intellectual Ventures I LLC et al. v. Lenovo Group Limited</i>, 6:23-cv-307 (W.D. Tx)</u>
<u>1018</u>	<u>Comparison between the Current Petition and Petition in IPR2024-00883</u>

I. Mandatory Notices

A. Real Party-in-Interest (37 C.F.R. § 42.8(b)(1))

~~Zebra Technologies Corporation is the real party-in-interest for this Petition.~~

Petitioner hereby names Lenovo (United States) Inc. as a real-party-in-interest and, solely because it is named as a defendant in the parallel district court case listed below, further identifies Lenovo Group Ltd. as a real party-in-interest.

- *Intellectual Ventures I LLC et al. v. Lenovo Group Limited*, 6:23-cv-307 (W.D. Tex., filed April 26, 2023) (“co-pending litigation”).

B. Related Matters (37 C.F.R. § 42.8(b)(2))

~~The ’439 Patent is asserted against Petitioner in *Intellectual Ventures I LLC et al. v.*~~ The ’439 patent is the subject of an *inter partes* review proceeding—*Zebra Technologies, Corporation v. Intellectual Ventures I LLC*, Case No. IPR2024-00883 (“the Zebra IPR”), which was filed on May 1, 2024; the Patent Trial and Appeal Board (“the Board”) has not yet ruled on whether to institute the Zebra IPR. Should the Board institute the Zebra IPR, Petitioner will file a Motion for Joinder no later than one month after the institution date of the Zebra IPR (37 C.F.R. § 42.122(b)), requesting joinder with the aforementioned Zebra IPR proceeding as the present petition is substantially identical to the Zebra IPR (Ex. 1018); both seek *inter partes* review of the same claims of the same patent on the

Petition for *Inter Partes* Review
U.S. Patent 7,623,439

same grounds. ~~*Zebra Technologies Corporation*, No. 6:23-cv-00292-ADA (W.D. Tex., filed Apr. 20, 2023) (the “Underlying Litigation”).~~

The '439 Patent is also asserted in the following cases:

- *Intellectual Ventures I LLC et al v. OnePlus Technology (Shenzen) Co.*, No. 6:23-cv-00290-ADA (W.D. Tex., filed Apr. 20, 2023);
- *Intellectual Ventures I LLC et al. v. ~~Lenovo Group Limited~~, No. 6:23-cv-00307-ADA (W.D. Tex., filed Apr. 26, 2023).* *Zebra Technologies Corporation*, No. 6:23-cv-00292-ADA (W.D. Tex., filed Apr. 20, 2023); and
- *Intellectual Ventures I LLC v. TCL Electronics Holdings Ltd. et al.*, No. 6:23-cv-00309-ADA (W.D. Tex., filed Apr. 26, 2023).

C. Payment of Fees (37 C.F.R. § 42.103)

This Petition requests review of thirteen (13) claims of the '439 Patent and is accompanied by payment of \$41,500, which includes the \$19,000 IPR request fee and the \$22,500 post-institution fee. *See* 37 C.F.R. § 42.15(a). Thus, this Petition meets the fee requirements under 35 U.S.C. § 312(a)(1). The Board is hereby authorized to charge any additional fees required by this action to Deposit Account No. ~~20-1430-50-5906~~.

D. Designation of Lead and Backup Counsel (37 C.F.R. § 42.8(b)(3)) and Service Information (37 C.F.R. § 42.8(b)(4))

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Petitioner may be served via email to its lead and backup counsel at the email addresses above and to: ~~Zebra1387922-~~

~~KTS@kilpatricktownsend.com.docketing@bomcip.com.~~

II. Introduction

The challenged claims of the '439 Patent are invalid. The independent claims recite little more than cyclically shifting a first OFDM packet to generate a shifted OFDM packet, and then transmitting the two packets at substantially the same time. The patent acknowledges that this process had been well-known long before its filing date as "cyclic delay," a process where one packet is delayed in time relative to another packet. The '439 Patent suggests that it improves upon cyclic delay through what it terms cyclic advancement, i.e., wherein one packet is shifted forward of the other packet, as opposed to delaying transmission of the second packet. Yet the '439 Patent acknowledges that there is no difference at all

between cyclic delay and cyclic advancement. As the '439 Patent itself explains, “[d]ue to the periodic nature of OFDM subcarriers, mathematically, a small cyclic advance of 100 nsec is identical or equivalent to a large delay of 3100 nsecs (the OFDM symbol waveform repeats with a period of 3.2 μ sec or 3200 nsec).” Ex. 1001 at 8:5-9. Thus, the sole purported point of novelty, “cyclic advancement,” is no different than the well-known process of cyclic delay. Cyclic advancement was also well-known in the art. As demonstrated further below, Hervin confirms that cyclic advancement was a well-known equivalent to cyclic delay. In particular, Hervin notes that, “[i]n a circular shift operation, also known as a rotate,” ... “[the] rotate operation *may be a rotate left (or “ROL”) operation*” (i.e., cyclic advancement) or *“a rotate right (or “ROR”) operation*” (i.e., cyclic delay). Ex. 1006 at 1:19-30. Further, Hervin describes that the same prior art circuitry that could be used to perform cyclic delay could also perform cyclic advancement, and Dr. Ding explains why a person of ordinary skill in the art would have been motivated to use cyclic advancement.

The challenged claims should be cancelled as obvious.

III. IPR REQUIREMENTS

Petitioners certify that the '439 Patent is available for review and Petitioners are not barred/estopped from requesting review on these grounds. 37 C.F.R. § 42.104(a).

A. Standing (37 C.F.R. § 42.104(a))

Petitioner certifies that the '439 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR. The '439 Patent issued on November 24, 2009. The Complaint against Petitioner alleging infringement of the '439 Patent (Ex. 1008) was served on May 12, 2023 (Ex. 1009), and thus this Petition is not barred under 35 U.S.C. §315(b).

B. Challenge Under 37 C.F.R. § 42.104(b)

Pursuant to 35 U.S.C. § 311 and 37 C.F.R. § 42.104(b), this Petition requests cancellation of claims 1-3, 7-11, 13-16, and 18 of the '439 Patent (the “Challenged Claims”) as obvious under 35 U.S.C. § 103 based on the following prior art references:

- “On the Equivalence of Space-Time Block Coding with Multipath Propagation and/or Cyclic Delay Diversity in OFDM” by Dammann *et al.* (“Dammann”) (Ex. 1005);
- U.S. Patent No. 5,961,575 to Hervin *et al.* (“Hervin”) (Ex. 1006); and
- U.S. Publication No. 2002/0122499 (“Kannan”) (Ex. 1007).

The statutory grounds for the challenge of each claim are set forth below:

Ground	35 U.S.C. §	Claims	References
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1	103	1, 3, 7–10, 13–14, 16	Dammann and Hervin in view of the knowledge of a POSITA
2	103	2, 11, 15, 18	Dammann, Hervin, and Kannan in view of the knowledge of a POSITA

The record establishes a reasonable likelihood of prevailing as to each ground of invalidity with respect to the Challenged Claims.

IV. Considerations under 35 U.S.C. §§ 314(a) and 325(d)

Petitioner respectfully requests that the Board decline to exercise its discretion to deny institution under §§ 314(a) or 325(d).

A. 35 U.S.C. § 314(a)

Petitioner intends, should the Board institute the Zebra IPR, to file a Motion for Joinder, requesting joinder with the Zebra IPR. This Petition raises identical issues to those in the Zebra IPR and is supported by the same expert. To alleviate any concerns of duplicative efforts between the district court in the co-pending litigation and the Board, Petitioner hereby stipulates that it will not pursue, in district court, invalidity based on any instituted IPR ground. Accordingly, there is no basis to deny institution of the present Petition under §314(a). Dir. Vidal, *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* (June 21, 2022).

B. 35 U.S.C. § 325(d)

Where a petitioner files a “me-too” or “copycat” petition in conjunction with a timely motion for joinder and agrees to assume a “passive understudy role,” the *General Plastic* factors are “effectively neutraliz[ed].” *Apple Inc. v. Uniloc 2017 LLC*, IPR2018-00580, Paper 13 at 10 (Aug. 21, 2018); *see also id.* at 10-11 (discussing lack of burden or prejudice). The concerns identified in *Apple Inc. v. Uniloc 2017 LLC*, IPR2020-00854, Paper 9 at 4 (Oct. 28, 2020) (precedential), where a copycat petition was a petitioner’s second challenge to a patent, do not apply here. Lenovo US has not previously challenged the ’439 patent, and merely seeks to join an already instituted proceeding as an “understudy.” Accordingly, there is no basis to deny institution of the present Petition under §325(d).

IV.V. Background

A. Priority Date and Family

The application underlying the ’439 Patent (U.S. Application No. 11/121,661) was filed on May 4, 2005 and issued as the ’439 Patent on November 24, 2009. The ’439 Patent claims priority to U.S. Provisional Application No. 60/572,481, which was filed on May 20, 2004. Accordingly, the earliest possible effective filing date of the ’439 Patent is May 20, 2004. The ’439 Patent is thus subject to pre-AIA 35 U.S.C. §§ 102 and 103.

B. The ’439 Patent

1. Cyclic Diversity

The '439 Patent describes and claims “cyclic diversity systems and methods” for a wireless communication system and methods. Ex. 1001 at Abstract, 1:14-16. In one embodiment, the “cyclic diversity system comprises a multiple antenna, 802.11 compliant (e.g., 802.11a, 802.11g, proposed 802.11n) transmitter device configured with cyclic extension logic that provides cyclic advance diversity, among other diversity (e.g., cyclic delay, linear delay, etc.) to one or more sections of orthogonal frequency division multiplexing (OFDM) packet structures or OFDM continuous data streams.” *Id.*, 5:24-30. In the claimed systems and methods, a logic is “configured to cyclically advance... one or more sections of an orthogonal frequency division multiplexing (OFDM) packet relative to [an] OFDM packet to be transmitted on a first transmit antenna.” *Id.*, Abstract, 1:14-16. Further, “the packet having the one or more cyclically advanced sections [is] to be transmitted on a second transmit antenna.” *Id.* The OFDM packets have both “a guard interval portion and a symbol data portion.” *Id.*, Claim 8. The “duration of the cyclic advance” for the shifted packet is to “hav[e] a duration less than a guard interval.” *Id.*, Abstract. The first OFDM packet and the shifted version of the OFDM packet are to be transmitted “substantially simultaneously.” *Id.*, Claim 1. “FIG. 6 is a block diagram that illustrates a communication system 600 comprising an embodiment of an enhanced, multiple-antenna (EMA) transmitter device and a single-input, single-output (SISO) receiver device.” *Id.*, 5:42-45.

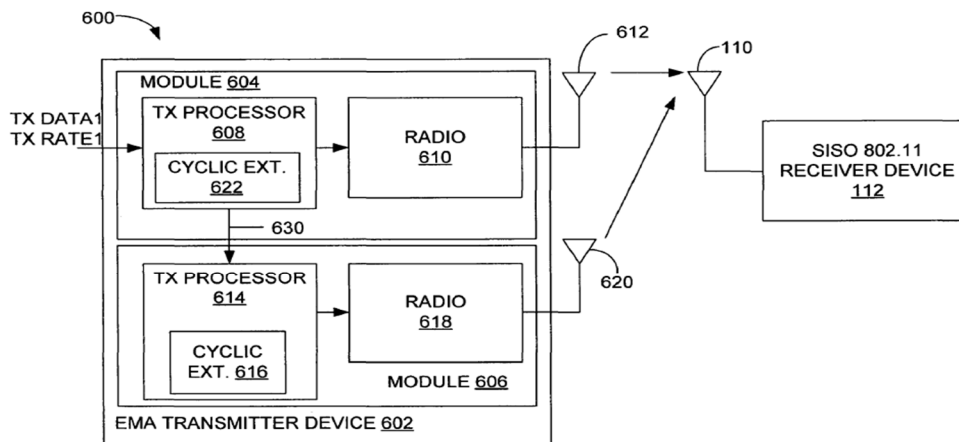
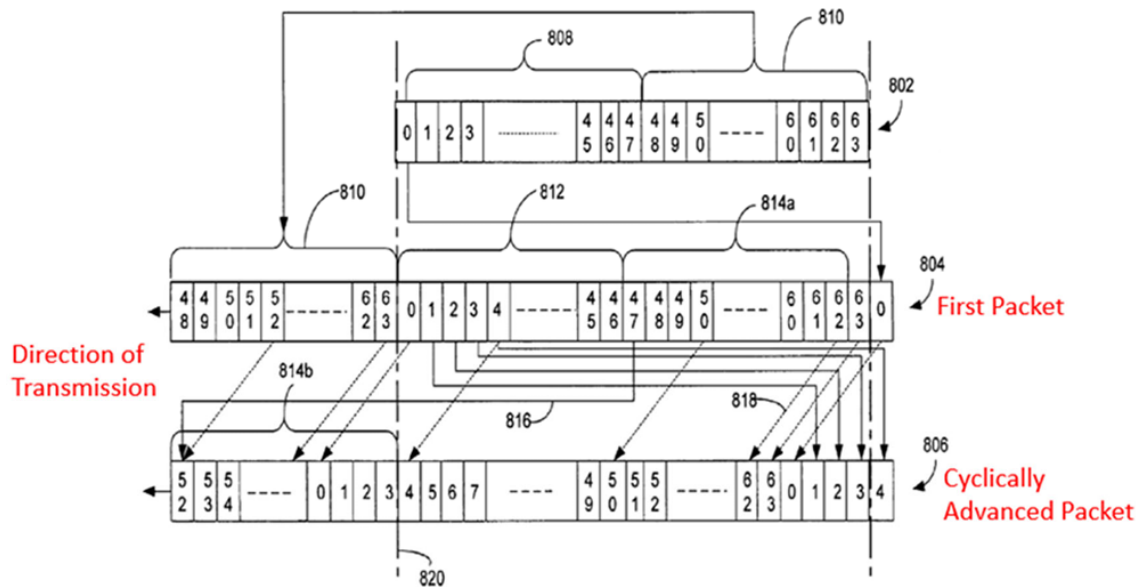


FIG. 6

“FIG. 8 is a schematic diagram that illustrates 4-sample cyclic advance diversity as implemented by the communication system 600 shown in FIG. 6. The first tier 502 represents 80 total samples comprising 64 samples of symbol data 508 and 16 samples that are used for a guard interval 510. The second tier 504 is simply an extension of the first tier, showing the guard interval 510 corresponding to samples 510 adjacent to the next set of samples. This next set of samples comprises 64 samples of symbol data 512 and 16 samples corresponding to the guard interval 514 a. The third tier 506 represents a 1-sample cyclic delay shift. As shown, a delay of 1 sample results in the guard interval 514 b preceding the 80 sample symbol in the third tier 506, starting with sample 4/7, as indicated by line 516. All of the other samples are likewise shifted as represented by the dotted arrow-head lines 518.” *Id.*, 7:31-46.



Ex. 1001, Fig. 8 (annotated).

The '439 Patent contends that “[b]y providing cyclic advances, cyclic shift diversity is employed which enables legacy receivers to experience improved packet error rate performance when compared to conventional diversity mechanisms.” *Id.*, 5:37-41. Further, the '439 Patent states that “small cyclic advances are preferred over small cyclic delays.” *Id.*, 7:59-60. This, the '439 Patent states, is because “[d]ue to the periodic nature of OFDM subcarriers, mathematically, a small cyclic advance of 100 nsec is identical or equivalent to a large delay of 3100 nsecs” while “[e]xperimental testing has shown that legacy radios show significant performance gains in packet error rate with small advancements (e.g., 100 nsec) as opposed to large delays.” *Id.*, 8:5-9, 8:24-26.

2. The '439 Patent's Acknowledgement of the Prior Art, Including Cyclic Delay

The '439 Patent includes a total of thirteen figures, but acknowledges that the majority of those figures simply show what was in the prior art. In particular, the '439 Patent describes that each of Figures 1-2, 3A, 3B, 4A, 4B, and 5 are all prior art, including for each of those figures, an express notation that the Figure itself is prior art. An example of this admission is shown below, with respect to Figure 5 (labeled "PRIOR ART").

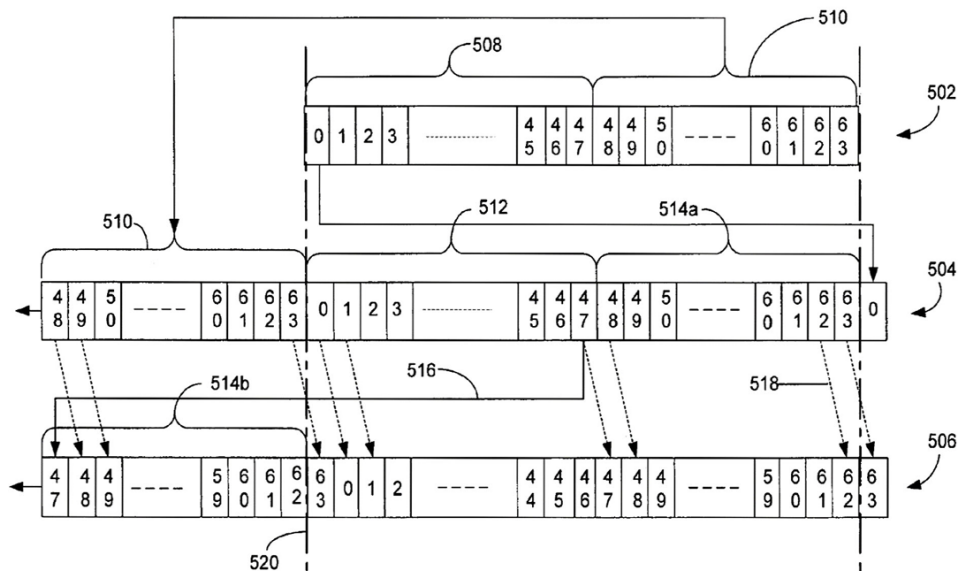


FIG. 5 (PRIOR ART)

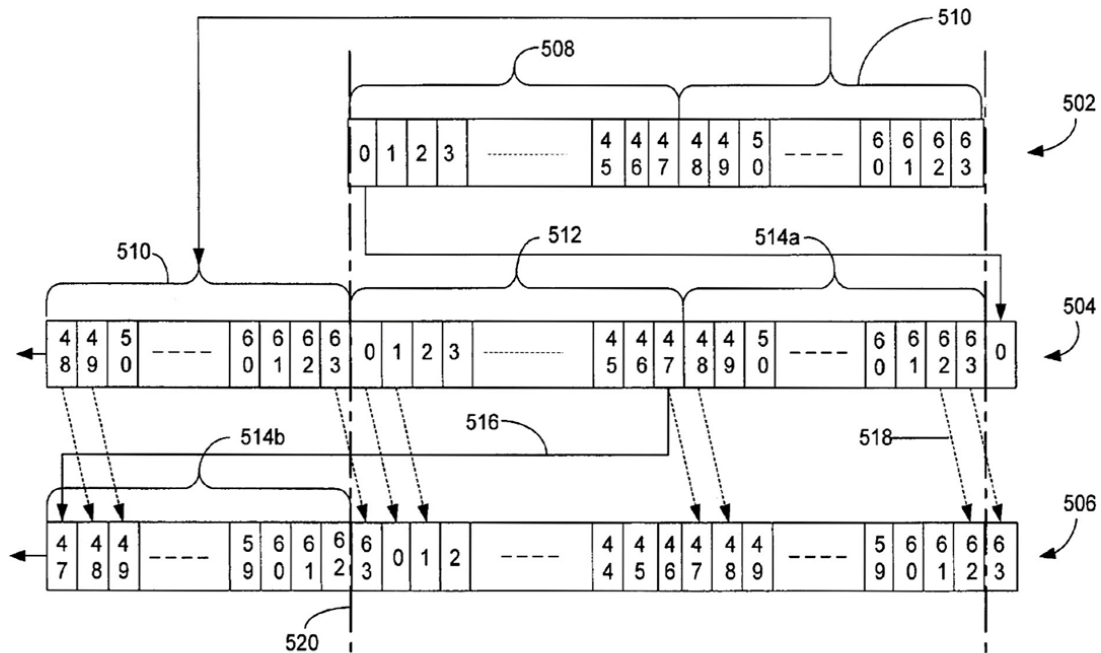


FIG. 5 (PRIOR ART)

'439 Patent, Fig 5. Importantly, this includes an express acknowledgement that diversity through *cyclic delay or cyclic shift*, was well known in the art. Ex. 1003 at ¶50. The '439 Patent explains that Figure 1 below (labeled "PRIOR ART") is "a block diagram that illustrates ... a mixed antenna transmitter device/legacy environment" with two antennas 104 and 106, and a time delay element 108 placed in line with the second antenna, antenna 106.

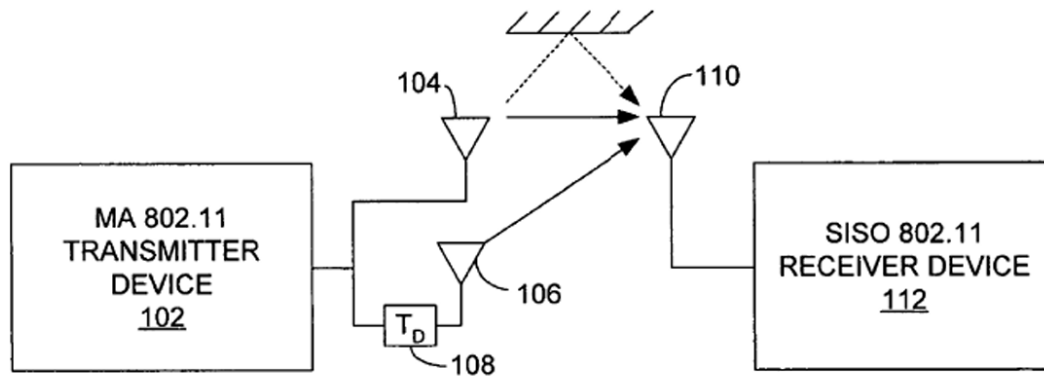


FIG. 1
(PRIOR ART)

'439 Patent, Fig. 1.

Then, with respect to Figure 1 (labeled "PRIOR ART"), the '439 Patent provides an introduction concerning cyclic delay and its well-known benefits. The

'439 Patent notes, with respect to prior art Figure 1, that:

The same signals transmitted from antennas 104 and 106 may follow direct paths and multi-paths to antenna 110." Normally, multiple-path signals (e.g., resulting from reflections off of objects in the environment or from multiple antennas) can result in either partial or complete constructive interference or destructive interference of the same signals in a SISO receiver. One mechanism to avoid or mitigate completely destructive interference from multi-path signals is to equip one of the antennas 104 and 106 with a time delay element 108 (or provide a delay through a baseband processing section of the MA transmitter device 102). From the perspective of the SISO receiver device 112, the time delay element 108 appears to cause the signal sent from antenna 106 to

reach antenna 110 later than the same signal sent from antenna 104.

This technique is often referred to as linear delay diversity

'439 Patent, col. 1:40-55.

3. Cyclic Delay Accomplishes the Same Effect as Cyclic Advancement

As the '439 Patent itself explains, cyclic delay and cyclic advancement both accomplish the exact same result because of their cyclic nature.¹ Ex. 1003 at ¶43. The cyclic guard intervals and the OFDM symbols are periodic, as shown in Figure 3A below (labeled "PRIOR ART"). Ex. 1003 at ¶43.

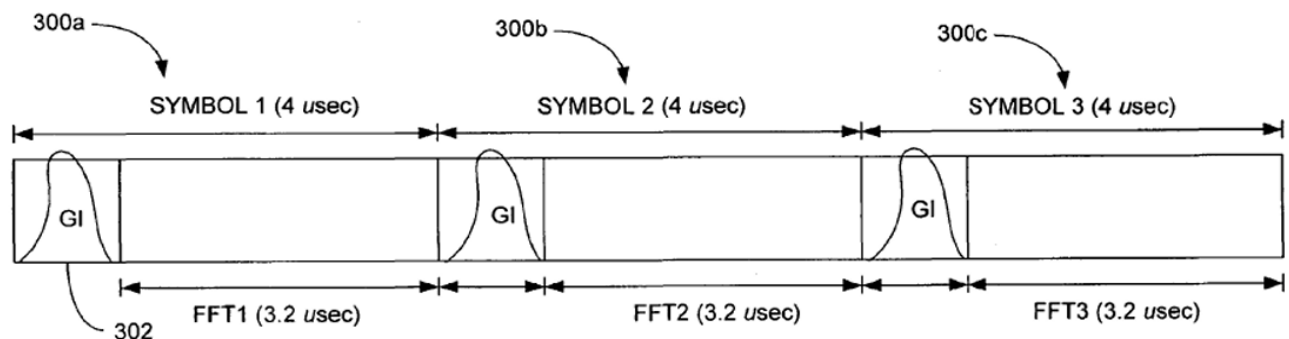


FIG. 3A (PRIOR ART)

Thus, from the viewpoint of the recipient, “[d]ue to the periodic nature of OFDM subcarriers, mathematically, *a small cyclic advance* of 100 nsec is

¹ Indeed, as Hervin explains, given the circular nature of a cyclic shift, the same circuit can perform both “rotate left and rotate right” operations. Ex. 1006 at 8:61-65.

identical or equivalent to a large delay of 3100 nsecs (the OFDM symbol waveform repeats with a period of 3.2 μ sec or 3200 nsec).” Ex. 1001 at 8:5-9 (emphasis added); Ex. 1003 at ¶44. “Likewise, a small delay of 100 nsec is identical to an advance of 3100 nsec, again due to the periodic nature of the OFDM symbol 300 (e.g., FIG. 3).” Ex. 1001 at 8:10-13; Ex. 1003 at ¶44.

4. Claims of the '439 Patent

The '439 Patent includes three independent claims and eighteen dependent claims. This petition challenges two of those independent claims, claims 1 and 8. An example independent claim, Claim 1, is set forth below:

[Claim 1 Preamble] A method for transmitting orthogonal frequency division multiplexing (OFDM) signals comprising:

[1A] generating a first OFDM packet for transmission including a guard interval portion and a symbol data portion each comprised of a plurality of samples;

[1B] cyclically advancing the first OFDM packet by shifting the samples in a first direction an amount less than a sample duration of the guard interval portion to generate a shifted version of the first OFDM packet for transmission in which at least a non-zero number of the samples from the symbol data portion of the first OFDM packet are shifted into the guard interval portion of the shifted version and a same non-zero number of

samples from the guard interval portion of the first OFDM packet are shifted out of the guard interval portion of the shifted version; and

[1C] substantially simultaneously transmitting the first OFDM packet and the shifted version of the OFDM packet.

C. Relevant Prosecution History of the '439 Patent

During examination, the Examiner issued several rejections based on U.S. Patent No. 6,842,487 to Larsson ("Larsson"). *See* Ex. 1002, at 145 (May 20, 2008 Non-Final Rejection). In response to the first rejection, where the Examiner found the claims were anticipated by Larsson, the Applicant argued that: "Claim 1, as amended, explicitly recites: '*cyclically advancing* the first OFDM packet'. Conversely, Larsson discloses 'employing a cyclic delay'. (Larsson, col. 6, lines 26-29.) As illustrated, based on this passage, Larsson fails to teach the claimed feature '*cyclically advancing* the first OFDM packet'." Ex. 1002, at 135 (August 14, 2008 Applicant Remarks) (emphasis in original).

The Examiner responded to the Applicant's arguments with another rejection, stating that Larsson disclosed "shifting the OFDM samples, as described... therefore advancing the other portion of the OFDM signal... as delaying one portion of the signal will advance the other portion of the same signal." *Id.* at 122 (October 27, 2008 Final Rejection). -The Examiner also rejected the claims under 35 U.S.C. 112 "as being indefinite for failing to particularly point

out and distinctly claim the subject matter which applicant regards as the invention” because “it is not understood what ‘advancing’ means in the context of the claims.” *Id.* at 121. In particular, the rejection stated that “Examiner believes that advancing a portion of the signal is always relative to the other copy/duplicate of the signal, which is delayed, as advancing signal in time is physically impossible.” *Id.*

In response, the Applicant cancelled all the previously pending claims and added new claims. *Id.* at 99 (January 27, 2009 Applicant Remarks). The Applicant argued that Larsson did not disclose elements of the new claims, including an FFT window that is “adjusted as the shifted versions of the OFDM packet are received” or that “that the OFDM signals are transmitted to ‘a legacy OFDM receiver that aligns a Fast Fourier Transform (FFT) window based on detecting shifted versions of the OFDM signals.” *Id.* at 99-100. In response to the Section 112 rejection, the Applicant stated that the claims were allowable because “the ‘cyclical advancement’ set forth in the claims is accomplished by shifting the samples of the OFDM symbol in a direction opposite to that described by the prior art. Such ‘cyclical advancement’ is imparted to the ‘one or more shifted versions of the OFDM packet’ relative to the original OFDM packet. As further recited in claim 24, for a legacy receiver that aligns the FFT window based on detecting shifted versions of the OFDM signals, such cyclical advancement cause ‘an FFT window

alignment to be substantially coincident with the symbol boundary of the OFDM packet.”” *Id.*

The Examiner then issued another non-final rejection under 35 U.S.C. 103 based on Larsson in view of the admitted prior art. *Id.* at 66 (March 9, 2009 Non-Final Rejection). The Examiner also upheld the earlier Section 112 objection because the specification “contains no disclosure of FFT window alignment to be substantially coincident with the symbol boundary of the OFDM packet.” *Id.*

In response, to the Section 112 rejection, the Applicant amended the claims so the claim element “cause an FFT window alignment to be substantially coincident with the symbol boundary of the OFDM packet” was removed from the claims. *Id.* at 52 (June 9, 2009 Applicant Remarks). With respect to the obviousness rejection, the Applicant argued that Larsson did not suggest cyclic advancement applied to an OFDM packet as in the claims because “the ‘cyclic delay’ described by Larsson would cause the legacy receiver to shift the FFT window into the subsequent symbol and thereby cause intersymbol interference since the intentional cyclic delay is ‘indistinguishable from the sample shifting that occurs in linear delay diversity’ from the receiver standpoint.” *Id.* at 52. However, “during the acquisition process of the claimed invention, the cyclical advancement as set forth in claim 24 would cause the impulse responses corresponding to the shifted versions of the OFDM packet to occur before the impulse response of the

unshifted OFDM packet, thereby preventing the erroneous alignment of the FFT window.” *Id.*

Thereafter, the Office mailed a Notice of Allowance, which included an Examiner’s amendment to the independent claims. *Id.* at 30 (August 21, 2009 Notice of Allowance). Exemplary Claim 24, which ultimately issued as independent claim 1, is set forth below:

24. (Currently Amended) A method for transmitting orthogonal frequency division multiplexing (OFDM) signals comprising:

- generating a first OFDM packet for transmission including a guard interval portion and a symbol data portion each comprised of a plurality of samples;
- cyclically advancing the first OFDM packet by shifting the samples in a first direction an amount less than a sample duration of the guard interval portion to generate a shifted version of the first OFDM packet for transmission in which at least a non-zero number of the samples from the symbol data portion of the first OFDM packet are shifted into the guard interval portion of the shifted version and a same non-zero number of samples from the guard interval portion of the first OFDM packet are shifted out of the guard interval portion of the shifted version; and
- substantially simultaneously transmitting the first OFDM packet and the shifted version of the OFDM packet, ~~wherein during a period in which the guard interval portion of the first OFDM packet is being transmitted, the shifted version of the OFDM packet transmits~~

~~the first 'n' samples of the symbol data portion of the first OFDM packet, where 'n' is equal to the amount of shift of the shifted version of the OFDM packet relative to the first OFDM packet.~~

Id. at 37.

V.VI. The '439 Patent's Admissions Regarding the Prior Art Demonstrate the Knowledge of a POSITA and Can Be Used in a Ground

Under guidance issued by former Director Iancu, “[s]tatements made in the specification of the patent that is being challenged in an IPR can be used as evidence of such general knowledge, and thus, provided the basis of the IPR is one or more prior art patents or printed publications, can be used to (1) supply missing claim limitations that were generally known in the art prior to the invention (for pre-AIA patents) or the effective filing date of the claimed invention (for post-AIA patents); (2) support a motivation to combine particular disclosures; or (3) demonstrate the knowledge of the ordinarily-skilled artisan at the time of the invention (for pre-AIA patents) or the effective filing date of the claimed invention (for post-AIA patents) for any other purpose related to patentability.” Dir. Iancu, *Memorandum Regarding Treatment of Statements of the Applicant in the Challenged Patent in Inter Partes Reviews Under § 311* (August 18, 2020).

Since Director Iancu’s guidance, Director Vidal has issued new guidance, addressing the Federal Circuit decision in *Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367 (Fed. Cir. 2022), and explaining that “Board panels should determine

whether the petition relies on admissions in the specification in combination with reliance on at least one prior art patent or printed publication. If an IPR petition relies on admissions in combination with reliance on one or more prior art patents or printed publications, those admissions do not form ‘the basis’ of the ground and must be considered by the Board in its patentability analysis.” Dir. Vidal, *Updated Guidance on the Treatment of Statements of the Applicant in the Challenged Patent In Inter Partes Reviews Under §311* (June 18, 2022) (citation omitted). In particular:

A patentee’s admissions regarding the scope and content of the prior art under § 103 can be used, for example, to: (1) supply missing claim limitations that were generally known in the art prior to the invention (for pre-America Invents Act (AIA) patents) or the effective filing date of the claimed invention (for post-AIA patents); (2) support a motivation to combine particular disclosures; or (3) demonstrate the knowledge of the ordinarily-skilled artisan at the time of the invention (for pre-AIA patents) or the effective filing date of the claimed invention (for post-AIA patents) for any other purpose related to patentability.

Id.

Similarly, the Federal Circuit has explained that “[a]dmissions in the specification regarding the prior art are binding on the patentee for purposes of a later inquiry into obviousness.” *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1362 (Fed. Cir. 2007); *see also In re Nomiya*,

509 F.2d 566, 570-71 (CCPA 1975); *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1570 (Fed. Cir. 1988).

This petition relies on admissions of what is in the prior art in the '439 Patent, but in accordance with controlling guidance and precedent, these do not form the basis of any ground.

VI.VII. Expert Testimony, Level of Skill in the Art, and Claim Construction

A. Declaration Evidence

This Petition is supported by the declaration of Zhi Ding, Ph.D, an expert with extensive experience in the relevant industry. Dr. Ding has more than three decades of research experience on a wide range of topics related to data communications and signal processing. Ex. 1003, ¶¶6-27.

B. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) with respect to '439 Patent, as of the date of the purported invention, would have had a bachelor’s degree in electrical engineering, computer engineering, or the equivalent, from an accredited program, and two or more years of experience with wireless communications networks. More practical experience could qualify one not having the aforementioned education as a POSITA, while a higher level of education could offset lesser experience. Ex. 1003, ¶38.

C. Claim Construction

1. “cyclically advancing the first OFDM packet by shifting the samples in a first direction” (Claims 1 and 8)

During the Underlying Litigation, Petitioner explained that this term should be construed to mean “cyclically advancing the first OFDM packet by shifting the samples in the direction of transmission.” Patent Owner argued that the correct construction is plain and ordinary meaning. The construction Petitioner presented during the Underlying Litigation is correct, because that construction is the plain and ordinary meaning. However, as explained in further detail below, the scope of the claims includes the prior art under any reasonable construction. Thus, the Board does not need to construe any claim term for purposes of evaluating whether the claims cover the prior art addressed in this Petition.

~~VII.~~VIII. Prior Art

A. Dammann

1. Dammann Is Prior Art Under At Least Section 102(b)

Dammann is a technical paper, which was presented at the European Wireless 2002 conference titled “Next Generation Wireless Networks: Technologies, Protocols, Services and Applications,” in Florence, Italy on February 27, 2002. Ex. 1014; Ex. 1016 at 1, 6. “The conference ... [brought]

together researchers and practitioners presenting the most up-to-date results and achievements primarily in the following fields: advancement in physical layers and MAC protocols for indoor/cellular narrowband networks and broadband radio access systems; architectures and related protocols for the interworking of fixed and wireless (terrestrial and satellite) networks; Quality of Service (QoS) in wireless networks and/or in the internetworking environment; [and] Personal Communication Systems beyond the third generation.” Ex. 1014. The conference was sponsored by at least Alcatel, Ericsson, IAT, Omnitel, Vodafone, Siemens, and Telecom Lab Italia. Ex. 1014. 152 papers, including Dammann, were accepted for presentation in the conference and publication in the proceedings. Ex. 1015; Ex. 1016 at 1, 6.

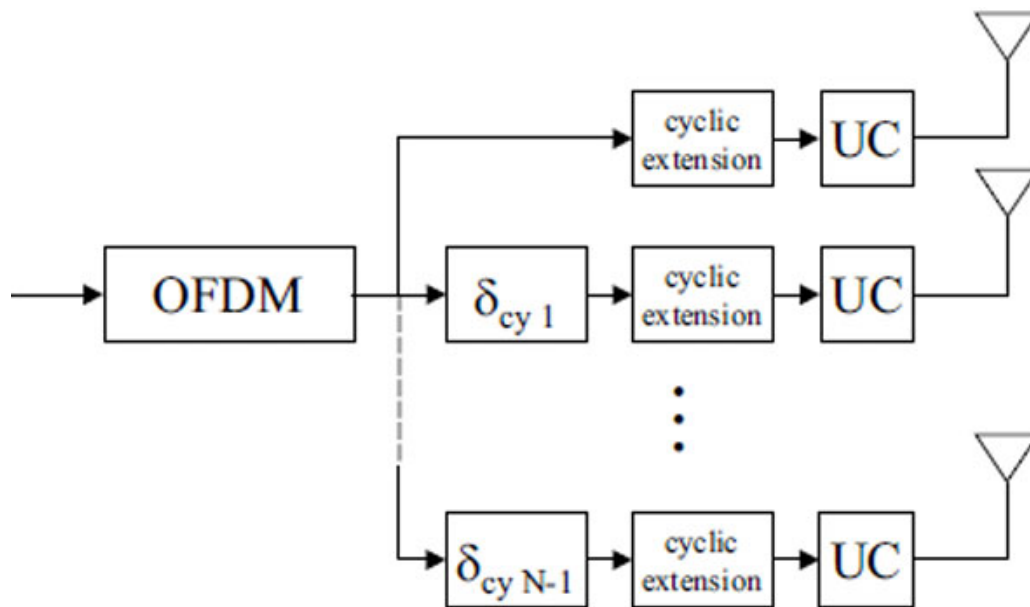
Thus, Dammann is prior art to the ’439 Patent under at least Section 102(b).

2. Dammann Discloses Spatial Diversity

Dammann begins by acknowledging “the poor error performance of OFDM in multipath environments.” Ex. 1005 at §1. Dammann teaches that “spatial diversity is [an] effective way to improve the error performance of wireless radio systems,” and proposes the same for use in an OFDM wireless system such as IEEE 802.11a Wi-Fi. Ex. 1005 at §1. Dammann teaches “[an] approach to achieve spatial diversity effects for OFDM systems are techniques like Delay Diversity,

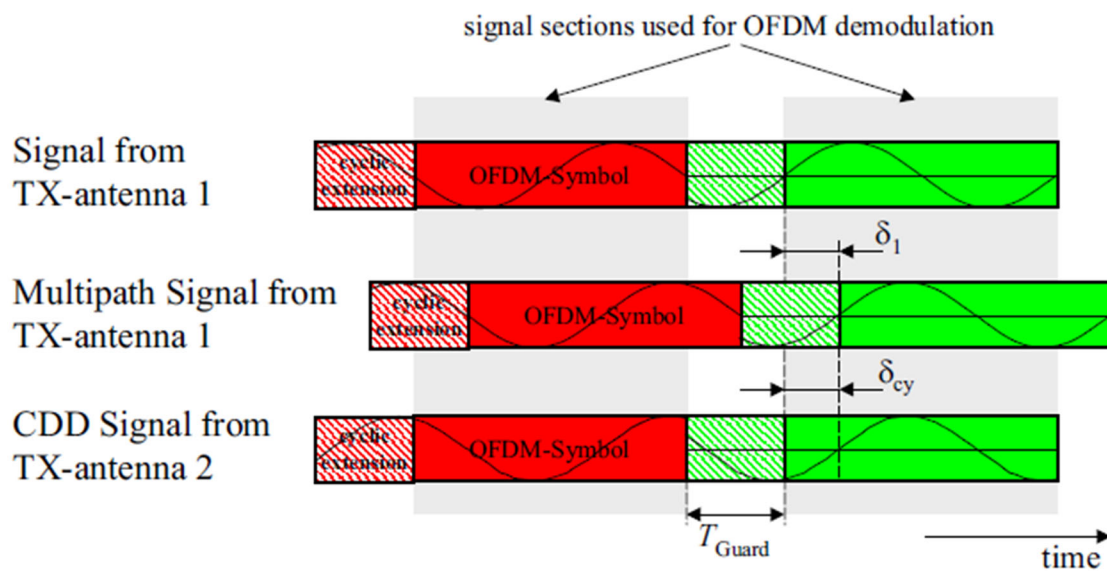
Cyclic Delay Diversity or Phase Diversity” Dammann focuses on the Cyclic Delay Diversity (“CDD”) technique. Ex. 1005 at §1; Ex. 1003 at ¶46.

According to Dammann, “Fig. 1 [below] shows the block diagram of an N -antenna OFDM transmitter with CDD. The OFDM modulated signal is transmitted over N antennas, whereas the particular signals only differ in an antenna specific cyclic shift. After cyclic shifting, a cyclic prefix is inserted to avoid intersymbol interference and maintain subcarrier orthogonality for multipath channels. The functional block “UC” performs an upconversion of the signals from the baseband into RF-band. $\delta_{cy\ n}$, $n = 1, \dots, N - 1$, denote cyclic shifts of the OFDM symbol in the time domain.” Ex. 1005 at §2.1; Ex. 1003 at ¶47.



Ex. 1005 at Fig. 1.

Dammann further teaches transmitting an OFDM time signal from a first antenna, called TX-antenna 1, and at the same time, transmitting a cyclically shifted version of that OFDM time signal from a second antenna, called TX-antenna 2. Ex. 1005 at §2.2. Figure 2 of Dammann depicts these transmissions and the cyclic extensions that a POSITA would have understood to be the cyclic guard intervals. Ex. 1003 at ¶48.



Ex. 1005 at Fig. 2.

B. Hervin

Hervin is a U.S. Patent that issued on October 5, 1999. Thus, Hervin is prior art to the '439 Patent under at least Section 102(b).

Hervin teaches a “[c]ircuit for performing arithmetic operations in a 32-bit architecture,” which includes “a five stage shift and rotate circuit coupled between

first and second 32-bit busses in the following sequence: an 8-bit shift and rotate circuit, a 16-bit shift and rotate circuit, a 1-bit shift and rotate circuit, a 2-bit shift and rotate circuit and a 4-bit shift and rotate circuit.” Ex. 1006 at Abstract; Ex. 1003 at ¶53.

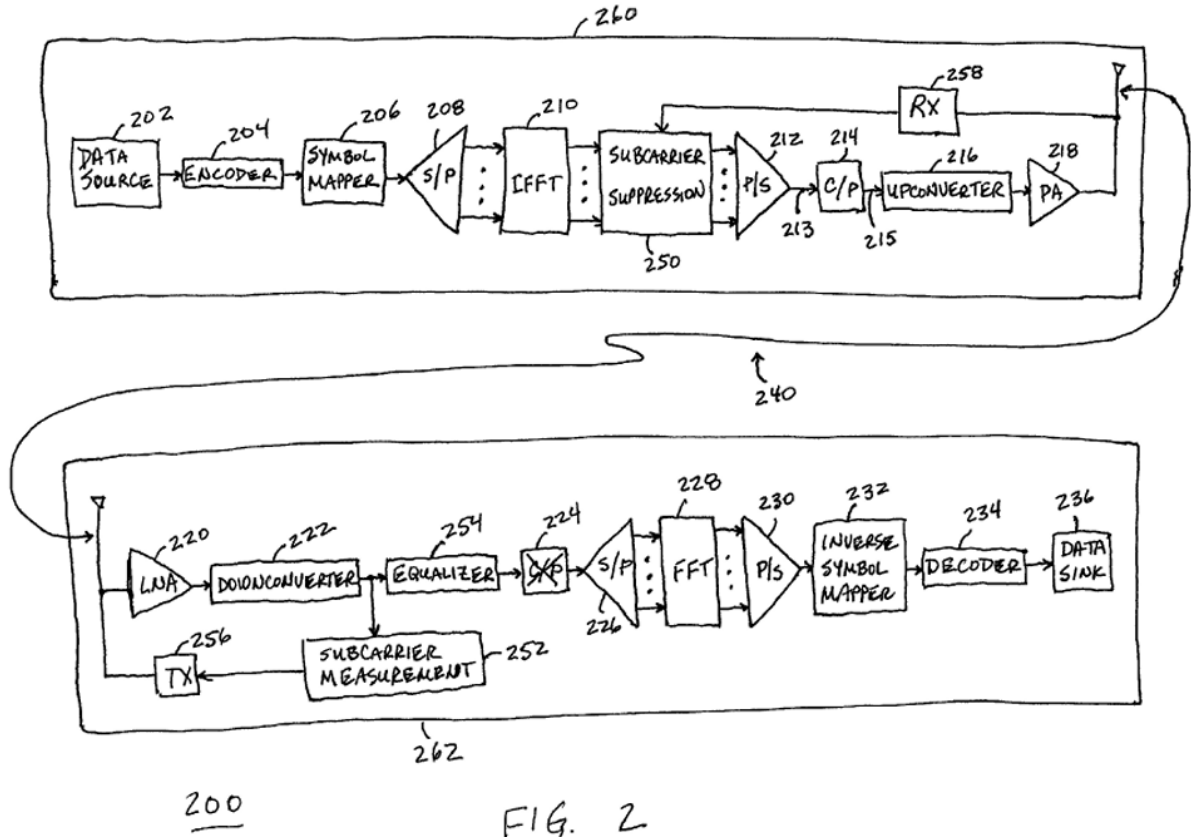
Hervin notes that, “[i]n a circular shift operation, also known as a rotate,” ... “[the] rotate operation may be a rotate left (or “ROL”) operation in which all of the bits of an operand are shifted left by one or more positions and the most significant bits are shifted around to become the least significant bits or a rotate right (or “ROR”) operation in which all of the bits of the operand shifted right by one or more positions and the least significant bits are shifted around to become the most significant bits.” Ex. 1006 at 1:19-30. And, given the circular nature of a cyclic shift, Hervin further notes that the same circuit can perform both “rotate left and rotate right” operations. Ex. 1006 at 8:61-65; Ex. 1003 at ¶54.

C. Kannan

Kannan is a U.S. Patent Publication that published on September 5, 2002. Thus, Kannan is prior art to the ’439 Patent under at least Section 102(b).

Kannan teaches a “method and apparatus for error reduction in an orthogonal modulation system.” Kannan, Title. Specifically, Kannan teaches a “communication system 200,” depicted in Figure 2 below, which “includes a

transmit side 260 and a receive side 262, as shown.” Ex. 1007 at [0025]; Ex. 1003 at ¶56.



Ex. 1007 at Fig. 2.

Kannan further teaches that its “signal processing unit 308 performs the functions of each of blocks 204-214, 224-234, and 250-254” in Figure 2, which include, among other things, “orthogonal modulator 210” for performing “inverse fast Fourier transform (IFFT),” cyclic prefix (C/P) adder 214 that appends a guard band interval, or cyclic prefix, to signal 213 to produce output signal 215,” and “C/P adder 214” which “conveys output signal 215 to an upconverter 216 that

upconverts signal 215 from a baseband frequency to a transmit frequency.” Ex. 1007 at [0026]; Ex. 1003 at ¶57.

VIII.IX. Motivation To Combine the Prior Art

A combination of familiar elements according to known methods which yields no more than predictable results is likely obvious to one of skill in the art. One rationale to support a conclusion of obviousness is the use of a known technique to improve similar devices (methods, or products) in the same way. MPEP 2143(C). To establish that a combination and/or modification is the use of a known technique to improve similar devices and methods in the same way, it is necessary to establish (1) that the prior art contained a “base” device/method upon which the claimed invention can be seen as an “improvement,” (2) a finding that the prior art contained a “comparable” device/method that is not the same as the base device/method and that has been improved in the same way as the claimed invention, and (3) that the skilled artisan could have applied the known “improvement” in the same way to the base device/method with predictable results. *See* MPEP 2143(C).

A. A POSITA Would Have Been Motivated to Modify Dammann Based on the Disclosure of Hervin

A person of ordinary skill in the art would have been motivated to modify Dammann based on the disclosure of Hervin. Ex. 1003 at ¶58. Dammann teaches

cyclically shifting an “OFDM time signal” to be transmitted by “TX-antenna 1” (the recited “first OFDM packet for transmission”) by shifting the samples therein an amount of time defined as δ_{cy} to generate a “2nd CDD OFDM time signal” to be transmitted by “TX-antenna 2.” Ex. 1005 at §2.2; Ex. 1003 at ¶58. As acknowledged by the ’439 Patent, owing to their cyclic nature, left cyclic shifts (i.e., cyclic advances) were well known to be equivalent to right cyclic shifts (i.e., cyclic delays) as taught by Dammann:

Due to the periodic nature of OFDM subcarriers, mathematically, a small cyclic advance of 100 nsec is identical or equivalent to a large delay of 3100 nsecs (the OFDM symbol waveform repeats with a period of 3.2 μ sec or 3200 nsec). In other words, 3100 nsec is a periodic equivalent to 100 nsec. Likewise, a small delay of 100 nsec is identical to an advance of 3100 nsec, again due to the periodic nature of the OFDM symbol 300 (e.g., FIG. 3). Thus, a signal received by the SISO receiver device 112 (FIG. 6) having a cyclic advance of 100 nsec or a signal having a cyclic delay of 3100 nsec is processed as an identical signal from the perspective of the SISO receiver device 112, since the EMA transmitter device 602 (FIG. 6) transmits the identical signal in each case. Since a circular shift is indeed circular, the FFT placement is at the same position shifting in either direction (100 nsec advance, 3100 nsec delay).

Ex. 1001 at 8:5-21; Ex. 1003 at ¶58.

It was thus well known in the art that cyclic delay performs the equivalent operation as a cyclic advancement. Ex. 1003 at ¶59. And, it would have been obvious to modify Dammann based on the disclosure of Hervin, which expressly discloses both left cyclic shifts (i.e., cyclic advances) and right cyclic shifts (i.e., cyclic delays) to include cyclic advancement rather than cyclic delay. Ex. 1003 at ¶59.

In particular, Hervin notes that, “[i]n a circular shift operation, also known as a rotate,” ... “[the] rotate operation may be a rotate left (or “ROL”) operation in which all of the bits of an operand are shifted left by one or more positions and the most significant bits are shifted around to become the least significant bits or a rotate right (or “ROR”) operation in which all of the bits of the operand shifted right by one or more positions and the least significant bits are shifted around to become the most significant bits.” Ex. 1006 at 1:19-30; Ex. 1003 at ¶60.

Thus, Hervin expressly discloses cyclic advancement, and as Dr. Ding testifies, a POSITA would have been motivated to include cyclic advancement in the system described by Dammann because doing so provides additional cyclic diversity. Ex. 1003 at ¶61. Such cyclic diversity improves data transmission in multi-input/multi-output antennas through reducing collisions and thereby increasing transmission quality and speed. Ex. 1003 at ¶61. Additionally, there would have been a finite number of identified, predictable solutions for

equivalently implementing cyclic shift diversity – indeed only two solutions: cyclical delay and cyclical advancement. Ex. 1003 at ¶61. Thus, it would have been obvious to a person of ordinary skill in the art to try cyclic advancement, in particular given that the other solution, cyclic delay, is admitted to be in the prior art by the '439 Patent.

Further, a person of ordinary skill in the art would have been motivated to make this modification because the change can be made without changing any of the hardware. Ex. 1003 at ¶62. Indeed, as Hervin explains, given the circular nature of a cyclic shift, the same circuit can perform both “rotate left and rotate right” operations. Ex. 1006 at 8:61-65; Ex. 1003 at ¶62. Thus, a person of ordinary skill in the art would have known how to make this change, e.g., through altering transmission firmware to advance a signal, and would have been motivated to do so to provide additional cyclic diversity. Ex. 1003 at ¶62.

B. A POSITA Would Have Been Motivated to Modify the Dammann-Hervin Combination According to the Disclosure of Kannan

A person of ordinary skill in the art would have been motivated to modify the Dammann-Hervin combination based on the disclosure of Kannan. Ex. 1003 at ¶63. *First*, Dammann and Kannan are in the same field of endeavor, i.e., OFDM wireless systems. *See, e.g.*, Ex. 1005 at §1; Ex. 1007 at Abstract; Ex. 1003 at ¶63. Consequently, a POSITA would have had a reasonable expectation of success in

combining their various disclosures to produce a more reliable OFDM wireless system by utilizing cyclic shift diversity with multiple transmit antennas. Ex. 1003 at ¶63. Furthermore, it was well within the technical ability of a POSITA at the time to combine the improvements to OFDM wireless systems described in Dammann and Kannan. Ex. 1003 at ¶63.

Second, Dammann recognizes certain major challenges with OFDM wireless transmission in multipath environments, such as poor error performance. Ex. 1003 at ¶64. Damman notes that “[f]or many scattering environments, spatial diversity is another effective way to improve the error performance of wireless radio systems.” Ex. 1005 at §1; Ex. 1003 at ¶64. Those same challenges are also recognized in Kannan. Ex. 1007 at [0008]-[0010]; Ex. 1003 at ¶64. For example, Kannan notes that there was a need “for a method and apparatus that can reduce error in a transmitted signal and maintain a symbol error rate at an acceptable level under conditions of excessive multipath delay.” Ex. 1007 at [0010]; Ex. 1003 at ¶64. Kannan aims to address those challenges by using components such as an Inverse Fast Fourier Transform module, a cyclic prefix adder, and a baseband signal upconverter. *See, e.g.*, Ex. 1007 at [0026]; Ex. 1003 at ¶64. Those same components are used in Dammann as well. *See, e.g.*, Ex. 1005 at §2.1; Fig. 1; Ex. 1003 at ¶64. A person of ordinary skill in the art would have been motivated to include the additional functionality taught by Kannan to the Dammann-Hervin

combination to overcome those major challenges, including increasing error performance and improving data reception accuracy. Ex. 1003 at ¶64.

Additionally, as discussed herein, Kannan provides numerous hardware implementation details that are directly applicable to the system of Dammann, but which lack implementation details in Dammann. *See, e.g.*, Ex. 1007 at [0026]; Ex. 1003 at ¶64.

A POSITA thus would have been motivated and found it obvious to combine Dammann and Kannan. Ex. 1003 at ¶65.

IX.X. Full Statement Of The Reasons For The Relief Requested

A. Ground 1 - Claims 1, 3, 7-10, 13, 14 and 16 Are Obvious Under 35 U.S.C. § 103 Over the Combination of Dammann and Hervin in View of the Knowledge of a POSITA

1. Independent Claim 1

[Claim 1 Preamble] A method for transmitting orthogonal frequency division multiplexing (OFDM) signals comprising:

A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. Ex. 1003 at ¶67. That this element was well-known is confirmed by Dammann, which discloses that “(OFDM) ... is a suitable technique for broadband transmission in multipath fading environments and is implemented in new broadcast standards like terrestrial digital video broadcasting (DVB-T) ... as well as wireless local area network (WLAN) standards ... such as HIPERLAN/2 or IEEE 802.11a.” Ex. 1005 at §1;

Ex. 1003 at ¶67. Dammann further discloses that “[t]he **OFDM modulated signal is transmitted over N antennas**, whereas the particular signals only differ in an antenna specific cyclic shift.” Ex. 1005 at §2.1; Ex. 1003 at ¶67.

Further, the '439 Patent admits that this claim element was known in the prior art, including with respect to admitted prior art Figure 5, a schematic diagram showing cyclically shifting a first OFDM signal 504 by one sample to generate a second OFDM signal 506, each for transmission. Ex. 1001 at 3:57-58; Ex. 1003 at ¶68. Both 504 and 506 are cyclically generated from an original OFDM signal 502 of 64 samples (“0” to “63”). Ex. 1003 at ¶68. By adding a cyclic shifted guard interval 510 (or 514a) consisting of 16 samples (“48” to “63”), the first OFDM signal 504 of 80 samples is generated, which is cyclic-shifted by one sample delay (i.e., to the right) to generate the second OFDM signal 506, also of 80 samples. Ex. 1003 at ¶68.

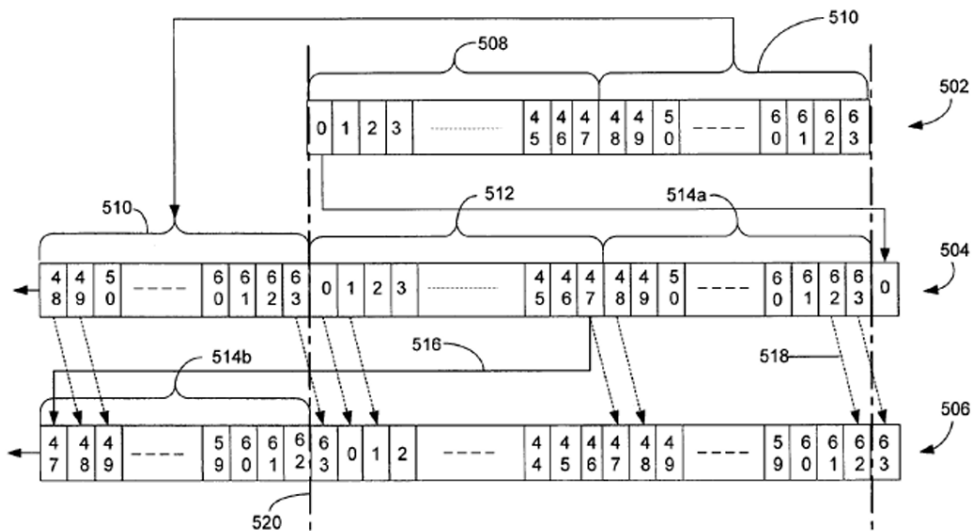


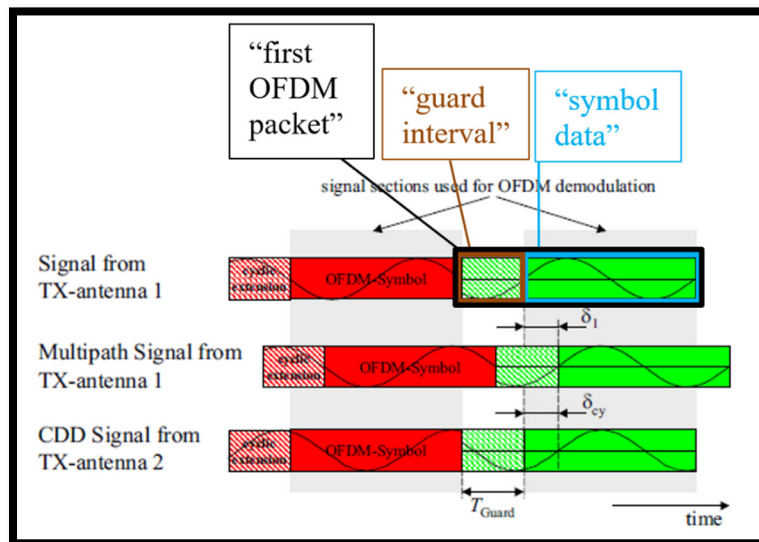
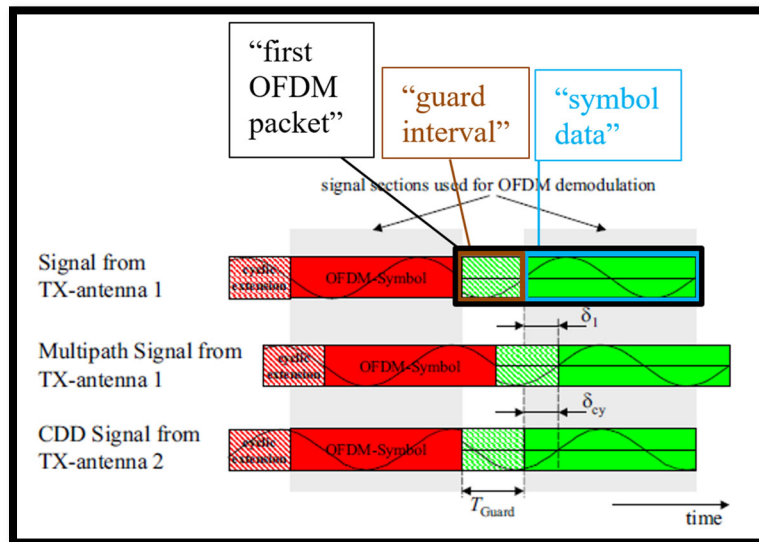
FIG. 5 (PRIOR ART)

The patent notes that the “first tier 502 represents 80 total samples comprising 64 samples of symbol data 508 and 16 samples that are used for a guard interval 510” and “[t]he third tier 506 represents a 1-sample cyclic delay shift” of the OFDM signal of first tier 502. Ex. 1001 at 3:58-66; Ex. 1003 at ¶69.

[Claim 1A] generating a first OFDM packet for transmission including a guard interval portion and a symbol data portion each comprised of a plurality of samples;

A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. Ex. 1003 at ¶70. Dammann discloses generating and transmitting “an OFDM time signal” from “TX-antenna 1” (the recited “first OFDM packet for transmission”) including a “cyclic extension” with a period of “ T_{Guard} ” (the recited “guard interval portion”) and a “signal section” (the recited “symbol data portion”) each comprised of “OFDM

time domain symbols” (the recited “plurality of samples”). Ex. 1005 at §2.2; Ex. 1003 at ¶70.



Ex. 1005 at Fig. 2 (annotated).

Further, the '439 Patent admits that this claim element was known in the prior art, including with respect to admitted prior art Figure 5, a schematic diagram

showing cyclically shifting a first OFDM signal by one sample to generate a second, shifted OFDM signal, each for transmission. Ex. 1001 at 3:57-58; Ex. 1003 at ¶71.

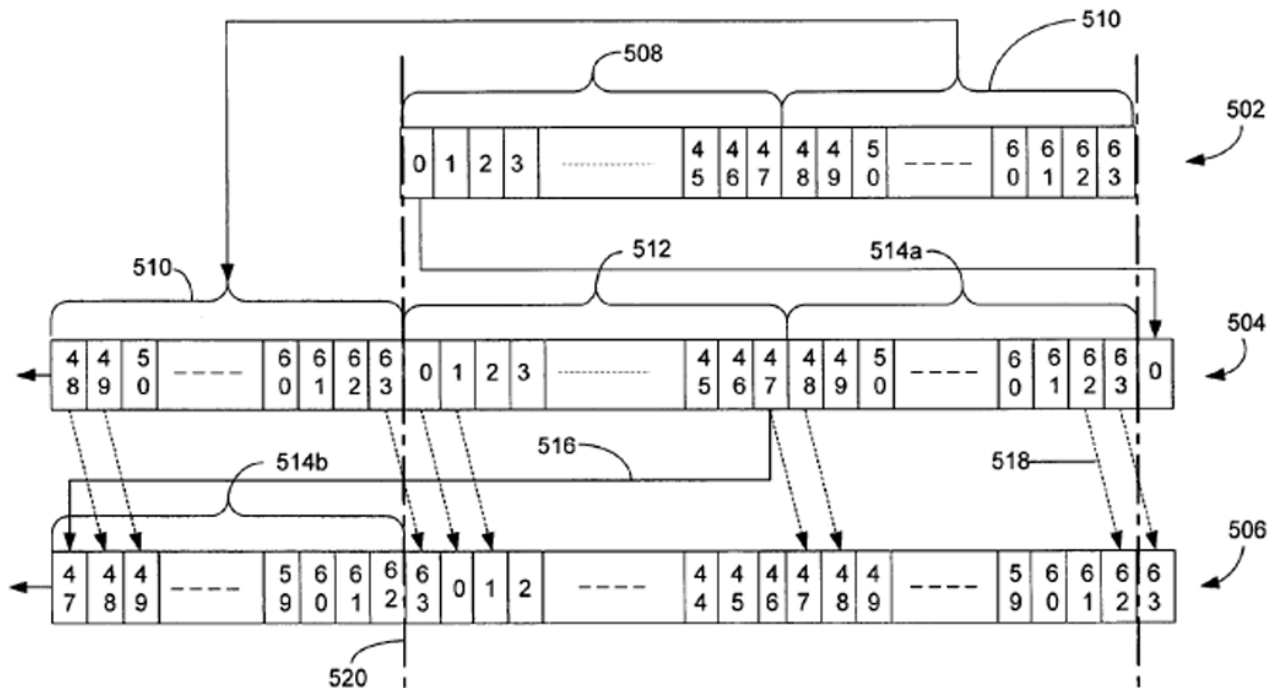


FIG. 5 (PRIOR ART)

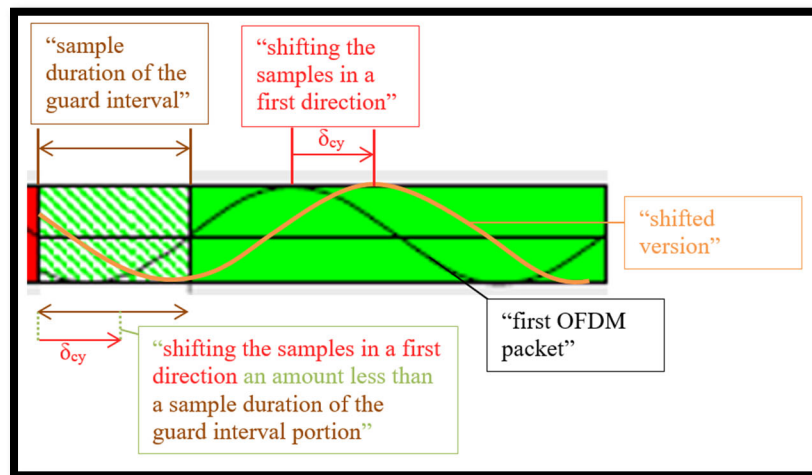
The '439 Patent notes that the “first tier 502 represents 80 total samples comprising 64 samples of symbol data 508 and 16 samples that are used for a guard interval 510” and “[t]he third tier 506 represents a 1-sample cyclic delay shift” of the OFDM signal of first tier 502. Ex. 1001 at 3:58-66; Ex. 1003 at ¶72.

[Claim 1B] cyclically advancing the first OFDM packet by shifting the samples in a first direction an amount less than a sample duration of the guard interval portion to generate a shifted version of the first OFDM packet for transmission in which at least a non-zero number of the samples from the symbol

data portion of the first OFDM packet are shifted into the guard interval portion of the shifted version and a same non-zero number of samples from the guard interval portion of the first OFDM packet are shifted out of the guard interval portion of the shifted version; and

A POSITA would have recognized that this claim element is obvious in view of the combination of Dammann and Hervin in view of the knowledge of a POSITA. Ex. 1003 at ¶76. Dammann teaches cyclically shifting the “OFDM time signal” to be transmitted by “TX-antenna 1” (the recited “first OFDM packet for transmission”) by shifting the samples therein an amount of time defined as δ_{cy} to generate a “2nd CDD OFDM time signal” to be transmitted by “TX-antenna 2.” Ex. 1005 at §2.2; Ex. 1003 at ¶76.

For ease of interpretation, the below figure was produced by taking the “CDD signal from TX-antenna 2” (the recited “shifted version of the first OFDM packet” in **yellow**) and superimposing the same on the “Signal from TX-antenna 1” (the recited “first OFDM packet” in **black**). Ex. 1003 at ¶77.



Ex. 1005 at Fig. 2 (altered as described). As shown, the cyclic shift/delay value δ_{cy} is less than the sample duration of the guard interval portion. Ex. 1003 at ¶78.

Additionally, as shown, in Dammann, a non-zero number of the samples from the symbol data portion of the first OFDM packet are shifted into the guard interval portion of the shifted version and the same non-zero number of samples from the guard interval portion of the first OFDM packet are shifted out of the guard interval portion into the data portion of the shifted version. Ex. 1003 at ¶79. This is simply describing the process of cyclic shifts/delays. As both the '439 Patent (see Ex. 1001 at Figure 5) and Dammann demonstrate, right cyclic shifts (i.e., cyclic delay) were well known in the art. Ex. 1003 at ¶79.

Further, as described in the '439 Patent, left cyclic shifts (i.e., cyclic advances) were well known to POSITAs to be equivalent to right cyclic shifts (i.e., cyclic delays):

Due to the periodic nature of OFDM subcarriers, mathematically, a small cyclic advance of 100 nsec is identical or equivalent to a large delay of 3100 nsecs (the OFDM symbol waveform repeats with a period of 3.2 μ sec or 3200 nsec). In other words, 3100 nsec is a periodic equivalent to 100 nsec. Likewise, a small delay of 100 nsec is identical to an advance of 3100 nsec, again due to the periodic nature of the OFDM symbol 300 (e.g., FIG. 3). Thus, a signal received by the SISO receiver device 112 (FIG. 6) having a cyclic advance of 100 nsec or a signal having a cyclic delay of 3100 nsec is processed as an identical signal from the perspective of the SISO receiver device 112, since the EMA transmitter device 602 (FIG. 6) transmits the identical signal in each case. Since a circular shift is indeed circular, the FFT placement is at the same position shifting in either direction (100 nsec advance, 3100 nsec delay).

Ex. 1001 at 8:5-21; Ex. 1003 at ¶80.

Thus, Dammann and the '439 Patent both disclose the concept of cyclic delay, and it was well known to POSITAs that cyclic delay performs the equivalent operation as a cyclic advancement. Ex. 1003 at ¶81. Thus, as Dr. Ding explains, a POSITA would have recognized that cyclic delay discloses or renders obvious cyclic advancement as recited by this claim. Ex. 1003 at ¶81.

Further, as discussed above, it would have been obvious to modify Dammann based on the disclosure of Hervin, which expressly discloses both left cyclic shifts (i.e., cyclic advances) and right cyclic shifts (i.e., cyclic delays). Ex.

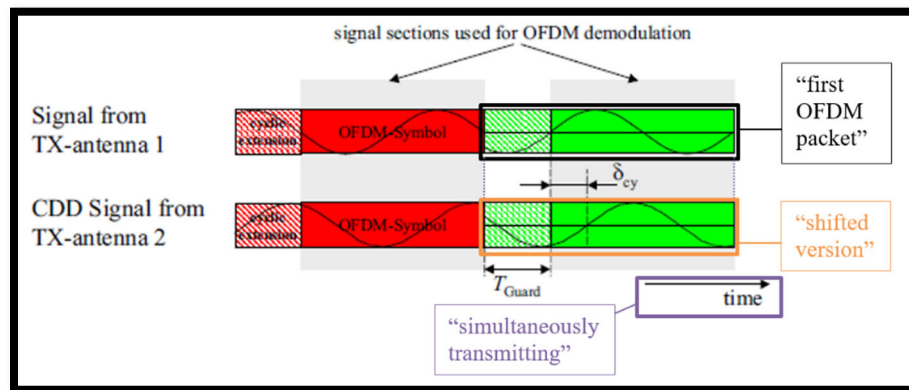
1003 at ¶82. In particular, Hervin notes that, “[i]n a circular shift operation, also known as a rotate,” ... “[the] rotate operation may be a rotate left (or “ROL”) operation in which all of the bits of an operand are shifted left by one or more positions and the most significant bits are shifted around to become the least significant bits or a rotate right (or “ROR”) operation in which all of the bits of the operand shifted right by one or more positions and the least significant bits are shifted around to become the most significant bits.” Ex. 1006 at 1:19-30; Ex. 1003 at ¶82. Thus, Hervin expressly discloses cyclic advancement, and as Dr. Ding testifies, a POSITA would have been motivated to include cyclic advancement in the system including cyclic shift described by Dammann to achieve cyclic diversity. Ex. 1003 at ¶82. Indeed, as Hervin explains, given the circular nature of a cyclic shift, the same circuit can perform both “rotate left and rotate right” operations. Ex. 1006 at 8:61-65; Ex. 1003 at ¶82.

[*Claim 1C*] substantially simultaneously transmitting the first OFDM packet and the shifted version of the OFDM packet.

A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. Ex. 1003 at ¶90. Dammann teaches substantially simultaneously transmitting the “Signal from TX-antenna 1” (the recited “first OFDM packet”) and the “CDD signal from TX-antenna 2” (the recited “shifted version of the OFDM packet”). Ex. 1003 at ¶90. Dammann teaches

that “an OFDM time signal with cyclic extension – as commonly used for OFDM systems – is transmitted from antenna 1 (TXantenna 1)” and that “we transmit a 2nd CDD OFDM time signal from TX-antenna 2.” Ex. 1005 at §2.2; Ex. 1003 at ¶90.

Additionally, Dammann teaches that the two packets are transmitted substantially simultaneously from the two TX antennas. Ex. 1003 at ¶91. For ease of interpretation, the below figure was altered to show only the “Signal from TXantenna 1” and the “CDD signal from TX-antenna 2.” Ex. 1003 at ¶91.



Ex. 1005 at Fig. 2 (modified as described). Since the drawing for each packet shares the same time axis and scale, the two packets are transmitted at least substantially simultaneously. Ex. 1003 at ¶92.

Further, the '439 Patent admits that this claim element was known in the prior art, including with respect to admitted prior art Figure 5, a schematic diagram showing cyclically shifting a first OFDM signal by one sample to generate a second, shifted OFDM signal, each for transmission. Ex. 1001 at 3:57-58; Ex. 1003 at ¶93.

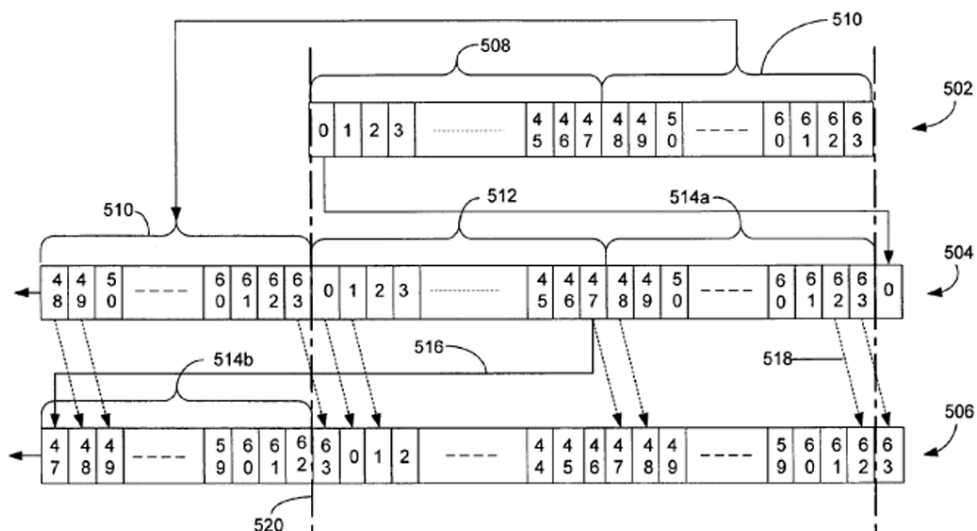


FIG. 5 (PRIOR ART)

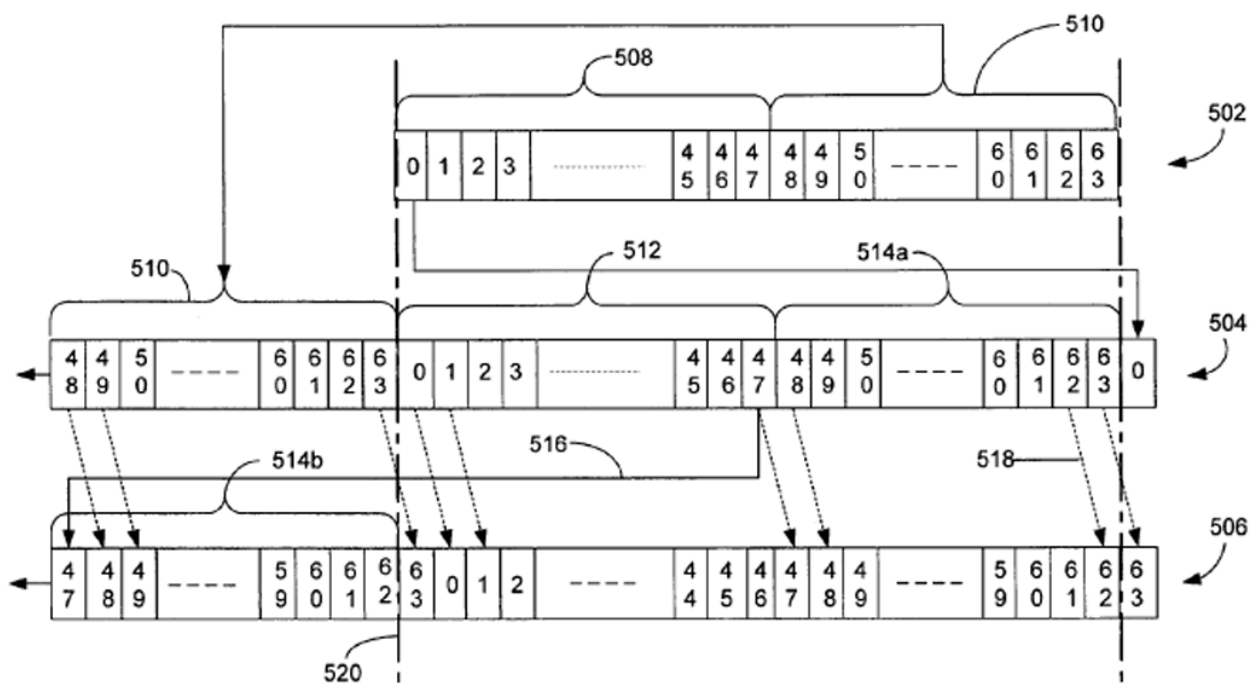


FIG. 5 (PRIOR ART)

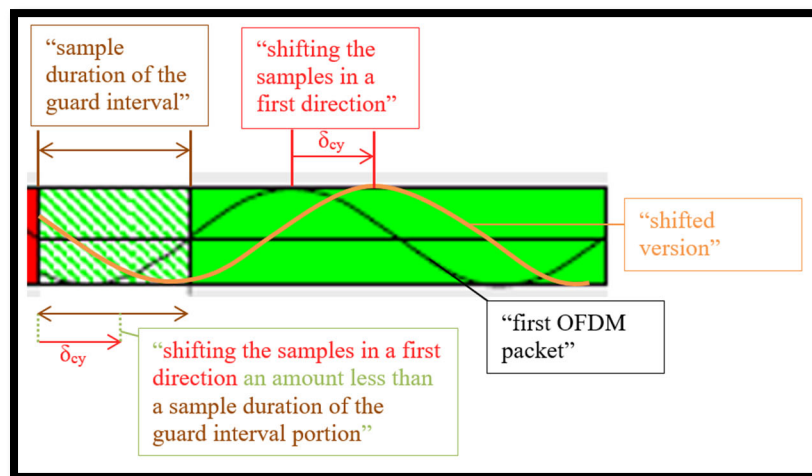
The patent notes that, “[f]rom a receiver standpoint, the guard intervals 510, 514 *b* remain aligned, as represented by the dashed line 520” (Ex. 1001 at 4:5-6),

meaning the first OFDM packet and the shifted version of the OFDM packet are transmitted at substantially the same time. Ex. 1003 at ¶94.

2. Claim 3

The method of claim 1, further comprising cyclically advancing the OFDM packet for a duration of less than one half of the sample duration of the guard interval portion.

A POSITA would have recognized that this claim element is obvious in view of the Dammann-Hervin combination and the knowledge of a POSITA. Ex. 1003 at ¶84. As explained with respect to Claim 1B, Dammann discloses cyclically shifting the OFDM packet an amount less than a sample duration of the guard interval portion, and can be seen in Dammann's Figure 2 below, this amount is also less than one half of the sample duration of the guard interval portion. Ex. 1003 at ¶84.



Ex. 1005 at Fig. 2 (annotated).

It would have been obvious to advance, rather than delay, the same amount (less than one half of the sample duration of the guard interval portion) because as explained, left cyclic shifts (i.e., cyclic advances) were well known to be equivalent to right cyclic shifts (i.e., cyclic delays). *See* Claim 1B; Ex. 1003 at ¶85.

Additionally, it was commonly known to select a cyclic shift duration that was less than one half of the sample duration of the guard interval portion. Ex. 1003 at ¶86. For example, Figure 5 of the '439 Patent (labeled “PRIOR ART”) depicts shifting the OFDM packet by a single sample, while the guard interval portion consists of 16 samples. Ex. 1001 at 3:57-61; Ex. 1003 at ¶86.

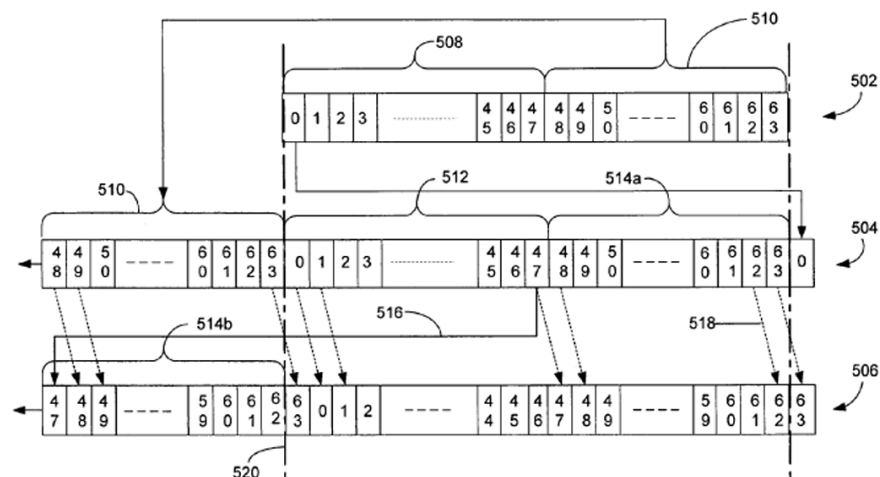
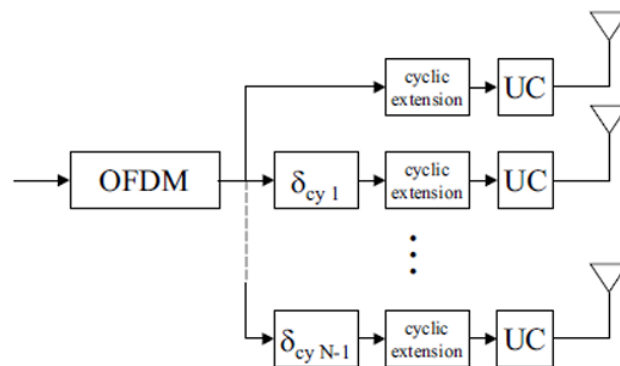


FIG. 5 (PRIOR ART)

3. Claim 7

The method of claim 1, further comprising transmitting the first OFDM packet and the shifted version of the OFDM packet from a multiple-antenna transmitter device.

A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. Ex. 1003 at ¶95. Dammann teaches “[w]e assume that an OFDM time signal with cyclic extension – as commonly used for OFDM systems – is transmitted from antenna 1 (TX-antenna 1).” Ex. 1005 at §2.2; Ex. 1003 at ¶95. Dammann further teaches “[n]ow we transmit a 2nd CDD OFDM time signal from TX-antenna 2” and that “the OFDM time domain symbols, transmitted from TX-antenna 2, are built by a cyclic shift δ_{cy} of the respective OFDM time domain symbols at TX-antenna 1.” Ex. 1005 at §2.2. Ex. 1003 at ¶95. Dammann depicts the multiple antennas in Figure 1.



Ex. 1005 at Fig. 1; Ex. 1003 at ¶95.

Further, the '439 Patent admits that this claim element was known in the prior art. Ex. 1003 at ¶96. The patent explains with respect to Figure 1 below (labeled “PRIOR ART”), that “an 802.11 compliant (e.g., 802.11a, 802.11g) **multi-antenna (MA) transmitter device 102 is shown** in communication with a SISO 802.11 receiver device 112,” that “[t]he MA transmitter device 102 comprises

antennas 104 and 106,” and that “[o]ne mechanism to avoid or mitigate completely destructive interference from multi-path signals is to equip one of the antennas 104 and 106 with a time delay element 108 (or provide a delay through a baseband processing section of the MA transmitter device 102).” Ex. 1001 1:34-50; Ex. 1003 at ¶96.

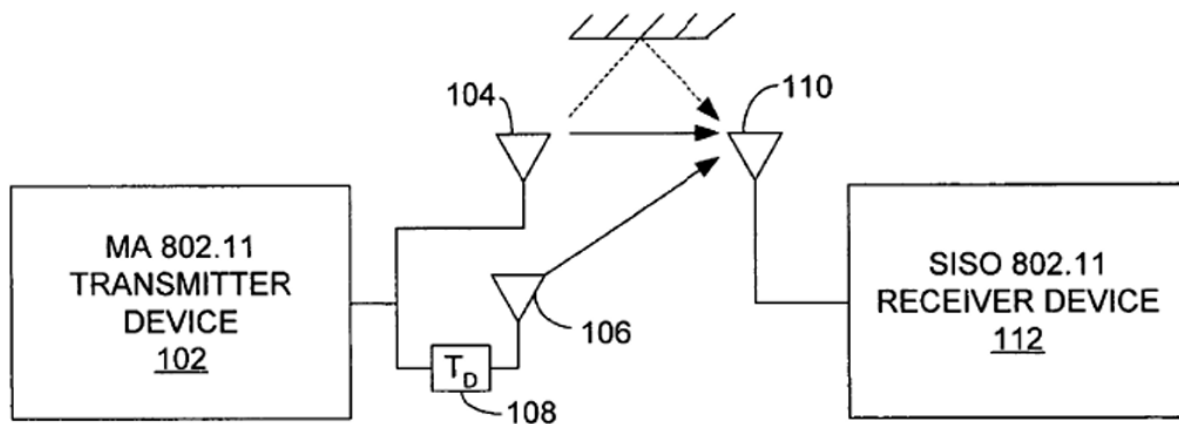


FIG. 1
(PRIOR ART)

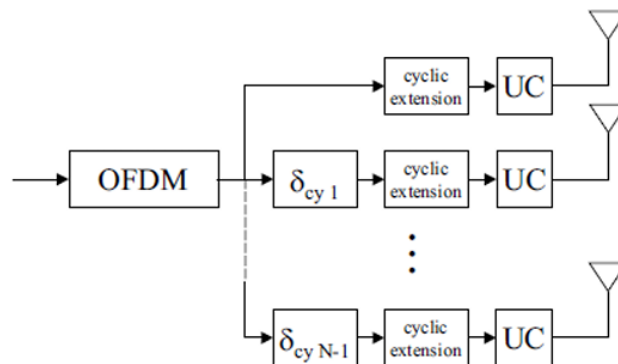
Thus, Dammann and the knowledge of a POSITA teach that the recited “the first OFDM packet” and the recited “shifted version of the OFDM packet” are transmitted from a transmitter device having multiple antennas. Ex. 1003 at ¶97.

4. Independent Claim 8

[Claim 8 Preamble] A signal transmitting system for transmitting orthogonal frequency division multiplexing (OFDM) signals comprising:

A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. *See* analysis of Claim 1 Preamble above.

Dammann discloses that “(OFDM) ... is a suitable technique for broadband transmission in multipath fading environments and is implemented in new broadcast standards like terrestrial digital video broadcasting (DVB-T) ... as well as wireless local area network (WLAN) standards ... such as HIPERLAN/2 or IEEE 802.11a.” Ex. 1005 at §1. Dammann further discloses that “[t]he OFDM modulated signal is transmitted over N antennas, whereas the particular signals only differ in an antenna specific cyclic shift.” Ex. 1005 at §2.1. Dammann depicts the recited signal transmitting system at Figure 1:

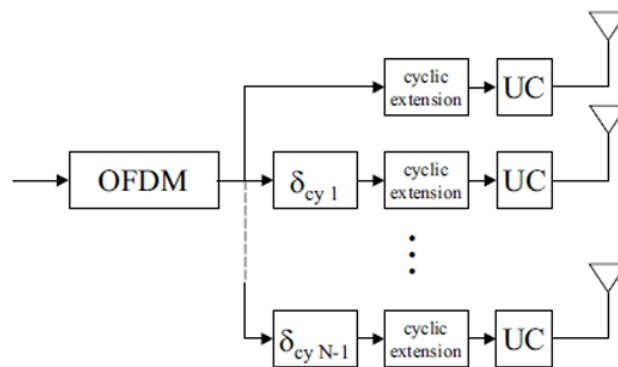


Ex. 1005 at Fig. 1.

[Claim 8A] a first transmit processor for generating a first OFDM packet for transmission including a guard interval portion and a symbol data portion each comprised of a plurality of samples;

A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. Dammann teaches “generating a first OFDM packet for transmission including a guard interval portion and a symbol data portion each comprised of a plurality of samples.” *See* Claim 1A.

A POSITA would have readily understood that each transmitter in Dammann’s OFDM system includes a transmit processor (e.g., a digital signal processing module) to perform functions such as modulating the signal, appending the cyclic prefix, cyclically shifting the signal, and causing transmission of the signal). Indeed, Figure 1 shows a separate cyclic shift module (labeled $\delta_{cy\ 1}$, $\delta_{cy\ N-1}$, etc.) and/or a separate cyclic extension module for each packet to be substantially simultaneously transmitted.



Ex. 1005 at Fig. 1.

Thus, Dammann teaches “a first transmit processor for generating a first OFDM packet for transmission including a guard interval portion and a symbol data portion each compromised of a plurality of samples.”

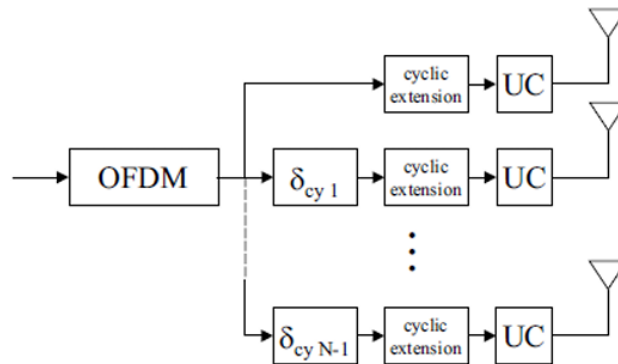
[Claim 8B] a second transmit processor for cyclically advancing the first OFDM packet by shifting the samples in a first direction an amount less than a sample duration of the guard interval portion to generate a shifted version of the first OFDM packet for transmission in which at least a non-zero number of the samples from the symbol data portion of the first OFDM packet are shifted into the guard interval portion of the shifted version and a same non-zero number of samples from the guard interval portion of the first OFDM packet are shifted out of the guard interval portion of the shifted version;

A POSITA would have recognized that this claim element is obvious in view of Dammann and Herving in view of the knowledge of a POSITA. *See* Claim 1B.

A POSITA would have readily understood that each transmitter in Dammann’s OFDM system includes a transmit processor (e.g., a digital signal

processing module) to perform functions such as modulating the signal, appending the cyclic prefix, cyclically shifting the signal, and causing transmission of the signal). Indeed, Figure 1 shows a separate cyclic shift module (labeled $\delta_{cy\ 1}$, $\delta_{cy\ N-1}$, etc.) and/or a separate cyclic extension module for each packet to be substantially simultaneously transmitted. Thus, Dammann teaches “a second transmit processor for cyclically advancing the first OFDM packet by shifting the samples in a first direction an amount less than a sample duration of the guard interval portion to generate a shifted version of the first OFDM packet for transmission in which at least a non-zero number of the samples from the symbol data portion of the first OFDM packet are shifted into the guard interval portion of the shifted version and a same non-zero number of samples from the guard interval portion of the first OFDM packet are shifted out of the guard interval portion of the shifted version.”

Further, a POSITA would have understood Dammann to teach a separate transmit processor for each transmitter, as each transmit processor must perform different functions substantially simultaneously in order to enable Dammann’s separate TX-antennas to transmit at least substantially simultaneously.



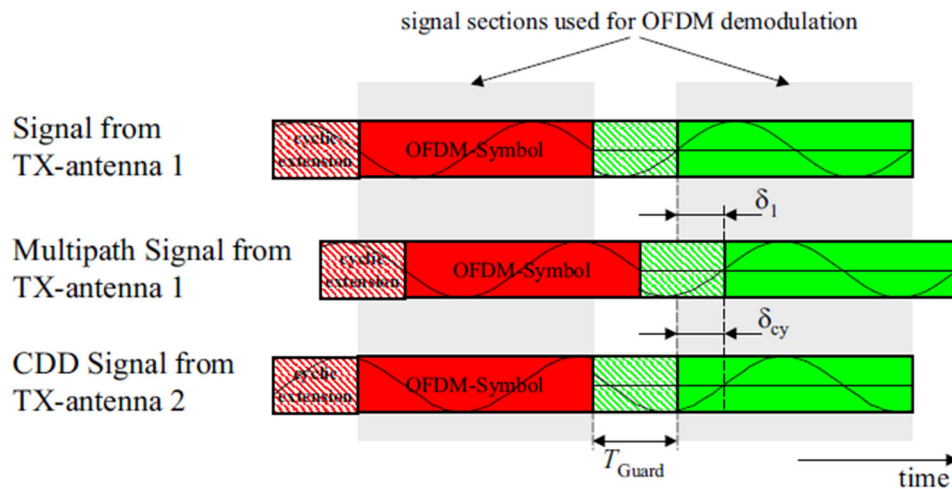
Ex. 1005 at Fig. 1.

Thus, Dammann teaches “a second transmit processor for cyclically advancing the first OFDM packet by shifting the samples in a first direction an amount less than a sample duration of the guard interval portion to generate a shifted version of the first OFDM packet for transmission in which at least a nonzero number of the samples from the symbol data portion of the first OFDM packet are shifted into the guard interval portion of the shifted version and a same nonzero number of samples from the guard interval portion of the first OFDM packet are shifted out of the guard interval portion of the shifted version.”

[Claim 8C] a plurality of radio transmitters for converting the OFDM packet and the shifted version of the OFDM packet to corresponding radio signals; and

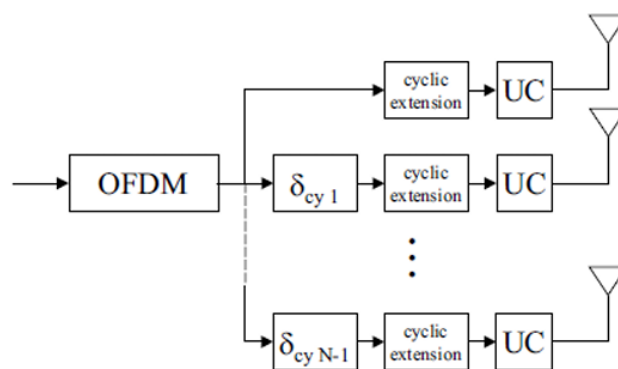
A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. *See* Claim 1A. Dammann teaches a plurality of radio transmitters (i.e., the transmitter of TX-antenna 1 and

the transmitter of TX-antenna 2 in Figure 2 below) for converting the OFDM packet and the shifted version of the OFDM packet to corresponding radio signals.



Ex. 1005 at Fig. 2.

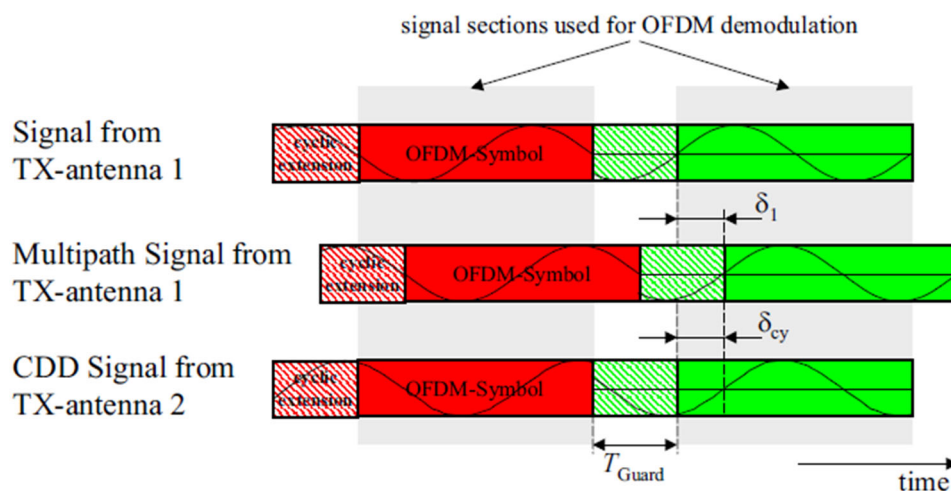
The recited radio transmitters are depicted as “functional block[s] ‘UC’” in Figure 1 below, which “perform[] an upconversion of the signals from the baseband into RF-band,” or “radiofrequency band.” Ex. 1005 at §2.1.



Ex. 1005 at Fig. 1.

[Claim 8D] a plurality of radio antennas correspondingly coupled to the plurality of radio transmitters for transmitting the radio signals;

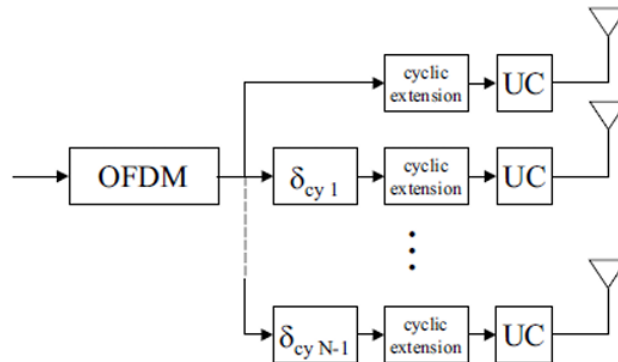
A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. Dammann teaches a plurality of radio antennas (i.e., TX-antenna 1 and TX-antenna 2 in Figure 2 below) correspondingly coupled to the plurality of radio transmitters for transmitting the radio signals.



Ex. 1005 at Fig. 2.

The recited radio antennas are depicted as the triangular symbols on the right side of Figure 1 below, and are shown to be “correspondingly coupled to the plurality of radio transmitters for transmitting the radio signals” given they are shown to receive the output from “functional block[s] ‘UC’” (the recited “plurality of radio transmitters for transmitting the radio signals”), which “perform[] an

upconversion of the signals from the baseband into RF-band,” or “radiofrequency band.” Ex. 1005 at §2.1.



Ex. 1005 at Fig. 1.

[Claim 8E] wherein the first transmit processor and the second transmit processor are configured to substantially simultaneously cause the transmission of the first OFDM packet and the shifted version of the OFDM packet via corresponding transmitters and antennas.

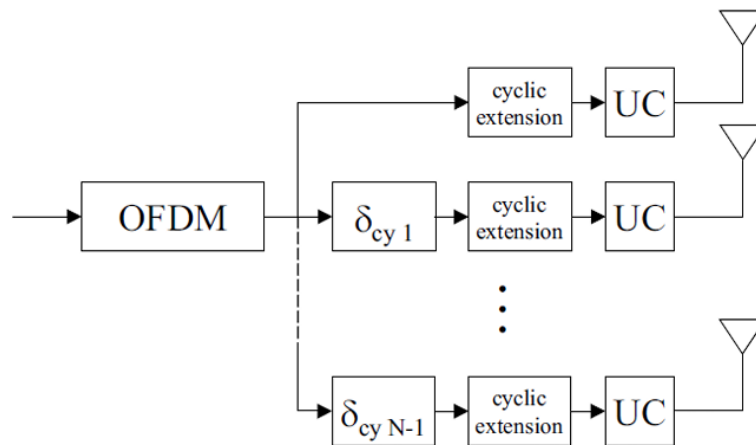
A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. *See* Claim 1C.

As discussed above in the analysis of Claims Elements 8A-8D, Dammann teaches an OFDM system with at least a “first transmit processor” and a “second transmit processor,” which among other functions, cause transmission of their respective signals, substantially simultaneously, via corresponding transmitters and antennas.

5. Claim 9

The system of claim 8, wherein each of the first and second transmit processors includes a cyclic extension module for performing cyclical advancements.

Figure 1 of Dammann below shows a separate cyclic extension module for each packet to be substantially simultaneously transmitted. Ex. 1003 at ¶83. A POSITA would have understood and found it obvious that each of these modules would have been included in the respective transmit processors recited in claim 8. Ex. 1003 at ¶83.



6. Claim 10

The system of claim 9, wherein each of the cyclic extension modules is configured to cyclically advance the OFDM packet for a duration of less than one half of sample duration of the guard interval.

See Claim 3.

7. Claim 13

The system of claim 8, wherein each of the plurality of transmit processors further includes an Inverse Fast Fourier (IFFT) module for generating OFDM symbols from incoming data.

A POSITA would have recognized that this claim element is obvious in view of Dammann and the knowledge of a POSITA. Ex. 1003 at ¶73. A POSITA would have understood that that an OFDM signal is modulated, or generated, using the Inverse Fast Fourier Transform process. Ex. 1003 at ¶73. Indeed, immediately following the words “Orthogonal frequency division multiplexing (OFDM)” in Dammann’s “Introduction” section, Dammann cites a paper entitled “Data Transmission by Frequency Division Multiplexing Using the Discrete Fourier Transform.” Ex. 1003 at ¶73. It was well known that the Discrete Fourier Transform refers to two implementations: the Fast Fourier Transform (FFT) and inverse Fast Fourier Transform (IFFT). Ex. 1003 at ¶73. Thus, a POSITA would have understood that Dammann discloses that each of Dammann’s “transmit processors further includes an Inverse Fast Fourier (IFFT) module for generating - 54 - OFDM symbols from incoming data.” Ex. 1003 at ¶73.

Further, the ’439 Patent admits that this claim element was known in the prior art. Ex. 1003 at ¶74. The patent explains with respect to Figure 2 below (labeled “PRIOR ART”), that “[t]he packet structure 200 is generated in a *baseband processing section* (e.g., in or in cooperation *with an inverse fast Fourier transform (IFFT) operation*) of the MA transmitter device 102” Ex.

1001 at 1:62-65; Ex. 1003 at ¶74. For example, Figure 2 of the '439 Patent admits that the packet 200 contains a signal segment C comprising a guard interval GI2 of $1.6\mu\text{sec}$ in duration and a data portion T1 plus T2 of $6.4\mu\text{sec}$ in duration. Ex. 1003 at ¶74.

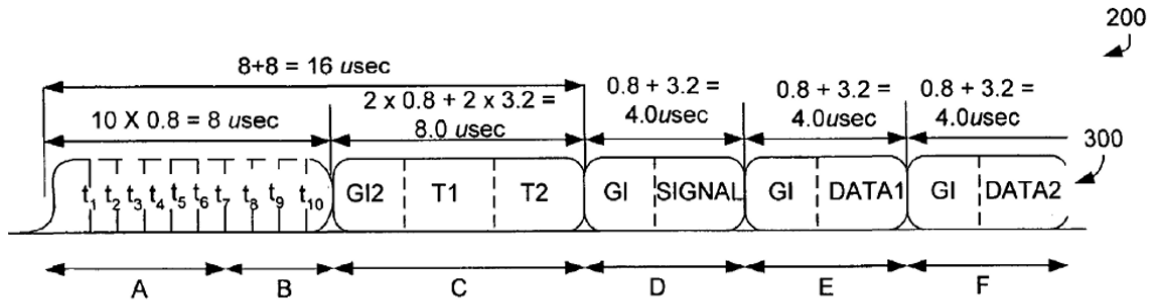


FIG. 2 (PRIOR ART)

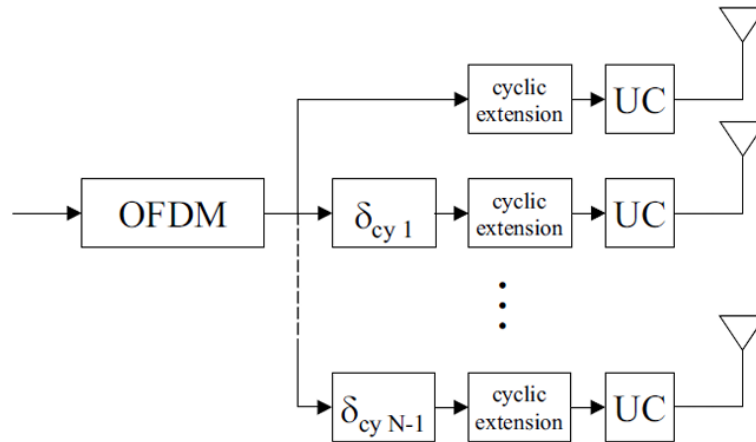
Thus, Dammann and the knowledge of a POSITA teach that “the plurality of transmit processors further includes an Inverse Fast Fourier (IFFT) module for generating OFDM symbols from incoming data.” Ex. 1003 at ¶75.

8. Claim 14

The system of claim 8, wherein the first and second transmit processors perform the cyclical advancements on baseband signals.

Dammann discloses that “functional block ‘UC’” in Figure 1 “performs an upconversion of the signals from the baseband into the RF-band.” Ex. 1005 at §2.1; Ex. 1003 at ¶98. Thus, a POSITA would have understood that the signals to

the left of functional blocks “UC” in Figure 1 are baseband signals that have undergone cyclical shifts. Ex. 1003 at ¶98.



9. Claim 16

The system of claim 8, wherein the transmitter is an 802.11 compliant device.

Dammann discloses that “[o]rthogonal frequency division multiplexing (OFDM) ... is a suitable technique for broadband transmission in multipath fading environments and is implemented in new broadcast standards like terrestrial digital video broadcasting (DVB-T) [3] as well as wireless local area network (WLAN) standards [4] such as HIPERLAN/2 or *IEEE 802.11a*.” Dammann at §1; Ex. 1003 at ¶99.

B. Ground 2 - Claims 2, 11, 15, and 18 Are Obvious Under 35 U.S.C. § 103 Over the Combination of Dammann, Hervin, and Kannan in View of the Knowledge of a POSITA

1. Claim 2

The method of claim 1, further comprising cyclically advancing the OFDM packet for a duration of less than approximately 800 nanoseconds.

A POSITA would have recognized that this claim element is obvious in view of the Dammann-Hervin combination as modified by Kannan and the knowledge of a POSITA. Ex. 1003 at ¶84. As explained with respect to Claim 1B, Dammann teaches that the duration of the cyclic shift is less than the guard interval. Ex. 1003 at ¶84. Guard intervals, such as those employed by the 802.11a standard, were commonly known to be 800 nanoseconds (same as 0.8 μ s) long. Ex. 1003 at ¶87. The '439 Patent acknowledges this, noting "an 802.11 compliant WLAN transmitter device may transmit a packet with a guard interval having a duration of approximately 800 nsec." Ex. 1001 at 7:66-8:2; Ex. 1003 at ¶87. Kannan further teaches that 0.8 μ s (same as 800 nanoseconds) was the standard duration for a guard interval by the time of the claimed invention:

Typically, the appending of a **cyclic prefix comprises an appending of the last T_g seconds** of each OFDM symbol as a prefix to itself. **Preferably T_g is a preassigned length of 16 taps, or 0.8 μ s;** however, those of ordinary skill in the art realize that the preassigned length of the cyclic prefix is up to the designer of the system as the designer weighs the greater protection afforded by a longer cyclic prefix against the inefficiency of a longer prefix.

Ex. 1007 at [0040]; Ex. 1003 at ¶87.

Preferably, composite communication channel 400 appears to be a communication channel with a multipath delay of, at most, **a length of the cyclic prefix** (i.e., 16 taps, wherein each tap corresponds to a sampling of a signal, and at a sampling rate of 20 MHz 16 taps corresponds to a delay of **0.8 μ s**), although, in the alternative, the design of composite communication channel 400 may be oriented to any tolerable multipath delay.

Ex. 1007 at [0044]; Ex. 1003 at ¶87.

A POSITA would have understood that shifting the OFDM packet for a duration of less than the guard interval (approximately 800 nanoseconds or 0.8 μ seconds) ensures that the two signals do not cause excessive inter-symbol interference at the recipient device. Ex. 1003 at ¶88. Indeed, as the '439 Patent explains with respect to Figure 3A (labeled "PRIOR ART"):

Each OFDM symbol 300 comprises a guard interval (GI) 302, which provides a buffer between symbols 300. That is, multipath is equivalent to echoes, and the guard intervals 302 comprise a Zone built into an OFDM symbol 300 into which echoes from a preceding OFDM symbol are positioned. Such echoes cause inter-symbol interference. The guard intervals 302 are inserted in the OFDM symbol 300 in the baseband processor portion of the MA transmitter device 102 (FIG. 1), and are used to capture unwanted multipath induced inter-symbol interference at the SISO receiver device 112 (FIG. 1).

Ex. 1001 at 2:16-26; Ex. 1003 at ¶88.

A POSITA would thus use a cyclic advancement or delay of less than the length of the cyclic prefix. Ex. 1003 at ¶89.

2. Claim 11

The system of claim 9, wherein each of the cyclic extension modules is configure [sic] to cyclically advance the OFDM packet for a duration of less than approximately 800 nanoseconds.

See Claim 2.

3. Claim 15

The system of claim 8, wherein the first and second transmit processors include application specific integrated circuits (ASICs).

A POSITA would have recognized that this claim element is obvious in view of the Dammann-Hervin combination as modified by Kannan and the knowledge of a POSITA. Ex. 1003 at ¶100. Although Dammann discloses the recited “first and second transmit processors,” it does not teach the physical architecture of those processors. *Id.* However, a POSITA would have been motivated to implement the recited transmit processors as application specific integrated circuits (“ASICs”). *Id.* An ASIC is an integrated circuit (“IC”) chip customized for a particular use, rather than intended for general-purpose use. *Id.* Indeed, Kannan teaches that, “[a]s those skilled in the art are aware, the various functions of signal processing unit 308 as described herein may be implemented in

hardware circuitry, such as a programmable logic array (PLA) or *an application specific integrated circuit (ASIC)*.” Ex. 1007 at [0026]; Ex. 1003 at ¶100.

Kannan teaches that its “signal processing unit 308 performs the functions of each of blocks 204-214, 224-234, and 250-254” in Figure 2, which include, among other things, “orthogonal modulator 210” for performing “inverse fast Fourier transform (IFFT),” cyclic prefix (C/P) adder 214 that appends a guard band interval, or cyclic prefix, to signal 213 to produce output signal 215,” and “C/P adder 214” which “conveys output signal 215 to an upconverter 216 that upconverts signal 215 from a baseband frequency to a transmit frequency.” Ex. 1007 at [0026]; Ex. 1003 at ¶101. Further, the ’439 Patent admits that this claim element was known in the prior art. Ex. 1003 at ¶102. The patent explains that, “[i]f implemented in hardware, [the] embodiments can be implemented with any or a combination of the following technologies, which are *all well known in the art*: a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, *an application specific integrated circuit (ASIC)* having appropriate combinational logic gates, a programmable gate array(s) (PGA), a field programmable gate array (FPGA), etc.” Ex. 1001 at 8:56-63; Ex. 1003 at ¶102.

4. Claim 18

The system of claim 8, wherein the first and second transmit processors include firmware stored in a memory device and executed by a suitable instruction execution system.

A POSITA would have recognized that this claim element is obvious in view of the Dammann-Hervin combination as modified by Kannan and the knowledge of a POSITA. Ex. 1003 at ¶103. Although Dammann discloses the recited “first and second transmit processors,” it does not teach the physical architecture of those processors. Ex. 1003 at ¶103. However, a POSITA would have been motivated to implement the recited transmit processors with “firmware stored in a memory device and executed by a suitable instruction execution system.” Ex. 1003 at ¶103. Indeed, Kannan teaches that, “as those skilled in the art are further aware, the functions of one or more of blocks 204-214, 224-234, and 250-254 may be implemented in signal processing unit 308 by software executed by a processor, such as a microprocessor or a digital signal processor (DSP), that executes instructions and programs that are stored in an associated memory.” Ex. 1007 at [0026]; Ex. 1003 at ¶103.

X.XI. Any Secondary Considerations Cannot Overcome The Strong Evidence Of Obviousness

The Board—at the institution phase—has repeatedly held that evidence of secondary considerations presented by the Patent Owner should be addressed in a trial where the parties may develop, and the Board may consider, a full record. *See*,

e.g., *Tristar Products, Inc. v. Choon's Design, LLC*, IPR2015-01883, Paper No. 6 at 26 (PTAB Mar. 9, 2016). That is the appropriate course here, especially given that “the inventions represent[] no more than ‘the predictable use of prior art elements according to their established functions,’” and, thus any “secondary considerations are inadequate to establish nonobviousness as a matter of law.” *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) (quoting *KSR*, 550 U.S. at 417).

~~XI.—This Petition Should Not Be Discretionarily Denied~~

~~The Underlying Litigation does not warrant discretionary denial under 35 U.S.C. § 314(a). The *Fintiv* framework favors institution of this proceeding. See *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020). As explained below, each of the *Fintiv* factors weighs against discretionary denial or is, at worst, neutral. The Board should institute IPR.~~

~~***Factor 1—Whether the Court Granted a Stay or Evidence Exists That One May Be Granted If a Proceeding Is Instituted.*** This factor favors institution or is, at worst, neutral. As discussed below, there has been little investment by the parties. The early stage of the litigation and potential simplification (resulting from the Board invalidating all asserted claims of the '439 Patent) weighs against the exercise of discretion.~~

~~**Factor 2 – Proximity of the Court’s Trial Date to the Board’s Projected Statutory Deadline for a Final Written Decision.**~~ This factor weighs against discretionary denial. This case is at its early stages, as the Complaint asserting the ‘439 Patent was filed on April 20, 2023 and served on May 12, 2023. *See* Exs. 1008, 1009. Patent Owner served infringement contentions on July 31, 2023 (Ex. 1010), and it supplemented those contentions on September 26, 2023 (Ex. 1011). The *Markman* hearing was recently reset to May 22, 2024, and fact discovery opened only within the past few weeks, on April 10, 2024.

Although trial is currently set for April 8, 2025 (Ex. 1012 at 4), Petitioner filed a motion to transfer the Underlying Litigation to the Eastern District of New York on October 27, 2023. Regardless, even if the case is not transferred, according to the latest court management statistics, the median time from complaint filing to trial in the Western District of Texas where the Underlying Litigation is Pending is approximately 28.3 months. Ex. 1013 at 37. Thus, conservatively, a jury trial would not occur in the underlying litigation until late August 2025. Thus, a Final Written Decision is likely to be issued no later than just after the jury trial, and likely will issue before any such trial. Put simply, much more of the Underlying Litigation lies ahead than behind.

~~**Factor 3 – Investment in the Parallel Proceeding by the Court and the Parties.**~~ This factor weighs against discretionary denial. The parties have made only

~~minimal investment in this litigation to date. Plaintiff's infringement contentions identifying the asserted claims were served on July 31, 2023. Ex. 1010. These contentions first identified the asserted claims, and Patent Owner supplemented these contentions on September 26, 2023. Ex. 1011. Further, no substantive orders have been entered. Under these facts discretionary denial is improper. See, e.g., *Nokia of America Corp and Ericsson Inc. v. IPCOM, GMBH & Co. KG*, IPR2021-00533, Paper 10 at (PTAB Aug. 12, 2021).~~

~~***Factor 4 – Overlap Between Issues Raised in the Petition and in the Parallel Proceeding.*** This factor is neutral. Petitioner challenges all the claims that are asserted, but this is common in nearly every Petition filed where there is a co-pending litigation.~~

~~***Factor 5 – Whether the Petitioner and the Defendant in the Parallel Proceeding Are the Same Party.*** This factor is neutral. The parties are the same, but this is common in nearly every Petition filed where there is a co-pending litigation.~~

~~***Factor 6 – Other Circumstances That Impact the Board's Exercise of Discretion, Including the Merits.*** As discussed in detail above, every element of the claims of the '439 patent is either expressly shown in the prior art or is obvious in view of well-known art. The strong merits of the grounds presented in this –64– Petition further support institution. *Fintiv*, Paper 11 at 14-15.~~

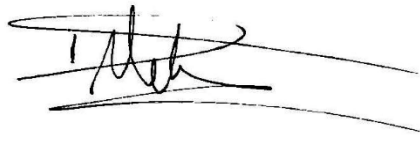
~~XII.~~ Denial Under Section 325(d) Is Inappropriate

~~This Petition does not present “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. §325(d). None of the prior art references used herein were cited in a substantive rejection during prosecution of U.S. Application No. 11/121,661, which issued as the ’439 Patent.~~

~~XIII.~~XII. Conclusion

In view of the foregoing, a reasonable likelihood exists that Petitioner will prevail with respect to the Challenged Claims of the ’439 Patent. Accordingly, the Board should institute this IPR.

Respectfully submitted,



Dated: ~~May 1~~August 2, 2024

By: _____

~~Michael Morlock~~
~~Registration~~Dinesh N. Melwani (Reg. No.
62,245-60,670)

~~Lead~~
~~Counsel~~Bookoff McAndrews, PLLC
2000 Pennsylvania Ave, NW, Suite 4001
Washington, D.C. 20006
202-808-3497

Attorney for Petitioner

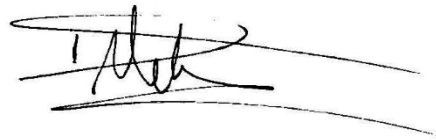
Lenovo (United States)

CERTIFICATE OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. § 42.24(d) that the foregoing Petition for *Inter Partes* Review excluding any table of contents, table of authorities, certificates of service or word count, or appendix of exhibits or claim listing, contains 11,~~790~~579 words according to the word-processing program used to prepare this paper (Microsoft Word). Petitioner certifies that this Petition for *Inter Partes* Review does not exceed the applicable type-volume limit of 37 C.F.R. § 42.24(a).

Dated: ~~May 1~~August 2, 2024

Respectfully submitted,



By:

Dinesh N. Melwani (Reg. No. 60,670)
Counsel for Petitioner

CERTIFICATE OF SERVICE

~~The undersigned~~Pursuant to 37 C.F.R. § 42.6(e) and 37 C.F.R. § 42.105(a), I
hereby ~~certifies~~certify that ~~a~~on August 2, 2024, I caused a true and correct copy of
~~this Petition for Inter Partes Review of~~the foregoing “PETITION FOR INTER
PARTES REVIEW OF U.S. Patent No. PATENT NO. 7,623,439, including its” and
~~supporting Exhibits (10011016), has been~~exhibits to be served via ~~USPS Priority~~
~~Mail~~Federal Express on ~~May 1, 2024 upon~~the Patent ~~Owner’s~~Owner at the following
correspondence address of record ~~for U.S.~~as listed in Patent ~~No. 7,623,439~~Center:

Foley & Lardner LLP
3000 K Street N.W., Suite 600
Washington, DC 20007

~~The Petition has also been served via email on Patent Owner’s counsel in the~~
~~Underlying Litigation, at IVZebra@princelobel.com.~~

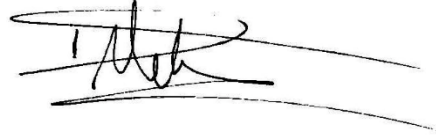
Respectfully,
And, via Federal Express upon counsel of record for Patent Owner in the
litigation pending before the U.S. District Court for the Western District of Texas
entitled Intellectual Ventures I LLC et al. v. Lenovo Group Limited, 6:23-cv-307
(W.D. Tex.) as follows:

Prince Lobel Tye LLP
One International Place
Suite 3700
Boston, MA 02110

Petition for *Inter Partes* Review
U.S. Patent 7,623,439

Dated: ~~May 1~~August 2, 2024

Respectfully submitted,



By: _____

Michael Morlock

RegistrationDinesh N. Melwani (Reg.

No. ~~62,245~~60,670)

LeadCounsel for Petitioner