

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

SAMSUNG ELECTRONICS AMERICA, INC.,  
SAMSUNG ELECTRONICS CO., LTD.,  
Petitioners,

v.

COLLISION COMMUNICATIONS, INC.,  
Patent Owner.

---

Case No. IPR2024-01247  
U.S. Patent No. 7,593,492

---

**PATENT OWNER'S PRELIMINARY RESPONSE  
PURSUANT TO 37 C.F.R. § 42.107(a)**

**TABLE OF CONTENTS**

|      |                                                                                                                                                                                                           |    |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| I.   | Introduction.....                                                                                                                                                                                         | 1  |
| II.  | Wireless Communication Background.....                                                                                                                                                                    | 3  |
|      | A.    Wireless Channels .....                                                                                                                                                                             | 4  |
|      | B.    Detectors.....                                                                                                                                                                                      | 5  |
|      | C.    Multi-User Detection Algorithms .....                                                                                                                                                               | 6  |
| III. | The Challenged '492 Patent .....                                                                                                                                                                          | 7  |
|      | A.    “Multi-User Detector Decision Unit” .....                                                                                                                                                           | 8  |
|      | B.    Dividing A Received Signal Into Windows Of Data And<br>Selecting The MUD Most Appropriate To Process That<br>Particular Window.....                                                                 | 13 |
| IV.  | The Petition Should be Denied Because Each Asserted Ground Fails<br>to Establish the Required Reasonable Likelihood of Success.....                                                                       | 14 |
|      | A.    Ground 1.....                                                                                                                                                                                       | 16 |
|      | 1.    The Challenged Claims All Require the Inventive “multi-<br>user detector decision unit” .....                                                                                                       | 16 |
|      | 2.    The Construction Of “Multi-User Detector Decision<br>Unit” .....                                                                                                                                    | 17 |
|      | 3.    The Petition Does Not Allege or Establish That<br><i>Onggosanusi</i> Discloses the Claimed “multi-user detector<br>decision unit” Under the Correct—and Undisputed—<br>Construction .....           | 21 |
|      | B.    Ground 2.....                                                                                                                                                                                       | 24 |
|      | 1.    Challenged Claims 17 and 18 Require Dividing a<br>Received Signal Into Small Windows Of Data and, for<br>Each Window, Selecting the MUD Most Appropriate to<br>Process that Particular Window ..... | 24 |

|     |                                                                                                                                                                                                                 |    |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2.  | Petitioner Concedes That None Of The References Disclose Dividing A Received Signal Into Small Windows Of Data And, For Each Window, Selecting The MUD Most Appropriate To Process That Particular Window ..... | 25 |
| 3.  | The Petition Does Not Identify Adequate Evidence to Support Its Obviousness Assertions .....                                                                                                                    | 26 |
| 4.  | A POSITA Would Not Combine <i>Egnor</i> with <i>Onggosanusi</i> Because the Proposed Combination Teaches Away From <i>Egnor</i> .....                                                                           | 28 |
| V.  | On Balance the <i>Fintiv</i> Factors Favor Discretionary Denial of Institution Under § 314(A) .....                                                                                                             | 29 |
| A.  | Factor 1: Whether a stay exists or is likely to be granted if a proceeding is instituted.....                                                                                                                   | 30 |
| B.  | Factor 2: Proximity of the Court’s Trial Date to the Board’s Projected Statutory Deadline.....                                                                                                                  | 31 |
| C.  | Factor 3: Investment in the parallel proceeding by the court and parties .....                                                                                                                                  | 32 |
| D.  | Factor 4: Overlap between issues raised in the petition and in the parallel proceeding .....                                                                                                                    | 34 |
| E.  | Factor 5: Whether the petitioner and the defendant in the parallel proceeding are the same party.....                                                                                                           | 35 |
| F.  | Factor 6: Other circumstances that impact the Board’s exercise of discretion, including the merits / compelling merits .....                                                                                    | 35 |
| VI. | Conclusion .....                                                                                                                                                                                                | 36 |

**TABLE OF AUTHORITIES**

**Page(s)**

**Federal Cases**

|                                                                                                                                    |            |
|------------------------------------------------------------------------------------------------------------------------------------|------------|
| <i>Apple Inc. v. Fintiv, Inc.</i> ,<br>IPR2020- 00019, Paper 11 (PTAB Mar. 20, 2020) .....                                         | 32, 33     |
| <i>Comcast Cable Communications, LLC v. Touchstream Technologies, Inc.</i> ,<br>IPR2024-00324, Paper 13 (PTAB July 24, 2024) ..... | 32, 33, 35 |
| <i>Sotera Wireless, Inc. v. Masimo Corp.</i> ,<br>IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) .....                                | 35         |
| <i>Verizon Bus. Network Servs. LLC v. Huawei Techs. Co. Ltd.</i> ,<br>IPR2020-01292, Paper 13 (PTAB Jan. 25, 2021) .....           | 32         |
| <i>Williamson v. Citrix Online, LLC</i> ,<br>792 F.3d 1339 (Fed. Cir. 2015) .....                                                  | 18, 19, 20 |

**TABLE OF EXHIBITS**

| <b>Exhibit</b> | <b>Description</b>                                                                                                    |
|----------------|-----------------------------------------------------------------------------------------------------------------------|
| 2001           | Declaration of Dr. Giuseppe Caire                                                                                     |
| 2002           | CV of Dr. Giuseppe Caire                                                                                              |
| 2003           | U. Madhow, <i>Fundamentals of Digital Communication</i> , Cambridge University Press 2008                             |
| 2004           | R.G. Gallager, <i>Principles of Digital Communication</i> , Cambridge University Press 2008                           |
| 2005           | August 31, 2022 Claim Construction Order                                                                              |
| 2006           | Judge Rodney Gilstrap Motion to Stay Pending IPR Statistics                                                           |
| 2007           | June 30, 2024 Federal District Court Case Management Statistics                                                       |
| 2008           | <i>Collision Communications, Inc. v. Samsung Electronics Co., Ltd.</i> , No. 23-cv-00587 (E.D. Tex.) Docket           |
| 2009           | <i>Collision Communications, Inc. v. Samsung Electronics Co., Ltd.</i> , No. 23-cv-00587 (E.D. Tex.) Scheduling Order |

## I. Introduction

The Board should deny institution because (1) neither Petition Ground 1 nor Ground 2 establishes the required reasonable likelihood of success; and (2) the ongoing proceedings establish that institution should be discretionally denied under *Fintiv*.

**Lack of Reasonable Likelihood of Success:** The inventions of the '492 patent were developed in conjunction with the U.S. government and concern improved systems and methods for processing signals received in a wireless communications system. Specifically, the patent and the challenged claims concern improved systems and methods for selecting a “multi-user detector” (MUD) used to distinguish and process different signals sent on the same wireless channel by multiple users.

But because the asserted *Onggosanusi* and *Egnor* references do not disclose the claimed specific improvements, Petitioner mischaracterizes the inventions of the '492 patent, arguing that although “the '492 patent purports to introduce a system for selecting among a plurality of MUDs[,] the selection of a plurality of MUDs was known in the prior art.” (Pet. at 10).

But contrary to the Petition, the disclosed and claimed inventions are not the **generic** concept of selecting among a plurality of MUDs. Rather, the '492 patent discloses and claims **specific improved** systems and methods for selecting among

a plurality of MUD algorithms, systems and methods that the Petition does not even allege, much less prove, are disclosed in the asserted *Onggosanusi* and *Egnor* references.

**Ground 1:** For example, Ground 1 challenges claims 1-16, each of which recites an inventive “multi-user detector decision unit.” Two years ago, the District Court for the Eastern District of Texas correctly construed “multi-user detector decision unit” as the patent’s disclosed MUD decision unit 220 (or decision logic 520) configured to perform one or more of several specifically disclosed decision algorithms. Although Petitioner does not dispute or identify any fault in the Court’s construction, the Petition does not even try to meet it — nowhere does the Petition even allege that the asserted art discloses a “multi-user detector decision unit” under this undisputed construction. Instead, Petitioner and the Petition simply neglect to inform the Board of the District Court’s prior construction.

**Ground 2:** Ground 2 challenges claims 17 and 18, each of which recites dividing a received wireless signal into small windows of data and, for each window, selecting the MUD most appropriate to process that particular window. Neither *Egnor* nor *Onggosanusi* teaches this improvement and the Petition does not assert otherwise. Instead, the Petition tries to remedy this fatal gap in the asserted references by arguing it would have been obvious to modify *Egnor*’s

“window” processing to include the required selection of a MUD for each window.

But the Petition fails to prove that the modification was obvious, ignoring that *Egnor* itself teaches away from selecting a new MUD for processing each window.

**Discretionary Fintiv Denial:** The *Fintiv* factors heavily weigh in favor of discretionary denial. In an attempt to characterize every factor as either neutral or favoring institution, the Petition is rife with conclusory statements and misapplications of controlling PTAB precedent. Under the appropriate legal standards—and considering the totality of the record evidence—on balance, the *Fintiv* factors support discretionary denial of institution.

## **II. Wireless Communication Background**

The challenged claims generally concern the processing of wireless signals. More specifically, the claims are directed to improved systems and methods for selecting in real time which of a plurality of available multi-user detection algorithms should be used to process a particular received signal, so that each signal is processed using the appropriate available multi-user detection algorithm.

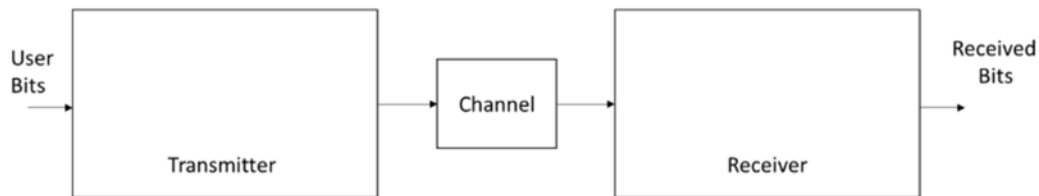
To provide context for the claimed subject matter and Samsung’s Petition, the following brief background addresses the following topics:

- wireless channels;
- detectors;
- multi-user detection algorithms; and

- prior art approaches to selecting multi-user detection algorithms.

### A. Wireless Channels

A wireless communications system typically includes a transmitter that sends information to a receiver over a wireless channel. (EX2001 at 16; EX2003 at 2-4; EX2004 at 1-5, 95, 181-183, 208-209).



As illustrated in the above overview, information in the form of bits (sequences of 0s and 1s) is input to the transmitter, which first converts those bits into a high-frequency wave signal and then transmits that signal over the wireless channel to the receiver. (EX2001 at 17; EX2003 at 2-4; EX2004 at 1-5, 95, 181-183, 208-209).

This wireless channel is the medium through which the signal is transmitted. (EX2001 at 18). For example, in a wireless cell phone communication, the channel could be affected by the relay towers used to transmit the waves and the physical spaces between those towers, including all buildings and other surfaces that may reflect, refract, or absorb parts of the travelling waves. (EX2001 at 18).

By the channel's very nature, as the electromagnetic wave signal passes through the channel, noise is introduced and information can be lost or corrupted. (EX2001 at 19; EX2003 at 2-4; EX2004 at 1-5, 95, 181-183, 208-209).

Thus, when a receiver receives the electromagnetic signal and attempts to convert it back into bits, the noise must be accounted for and can affect the accuracy of the conversion and reproduction of the original signal. (EX2001 at 20; EX2003 at 2-4; EX2004 at 1-5, 95, 181-183, 208-209).

## **B. Detectors**

Each receiver includes a "detector" that tries to recover the desired transmitted signal. A detector can fall into two categories: (1) single-user detectors or (2) multi-user detectors. (EX2001 at 21).

Regardless of the number of users or interferers, the goal of a single-user detector is to recover the signal from only a single user. Accordingly, instead of attempting to recover all signals from all users, a single-user detector uses algorithm that focuses on the signal from just one user and treats all other user signals as noise. (EX1001 at 2:43-47 and 3:1-6; EX2001 at 22).

In contrast, the goal of a multi-user detector is to recover signals from two or more users. Thus, instead of treating and discarding the other user's signals as noise, a multi-user detector uses an algorithm designed to detect each such signal. (EX1001 at 4:4-23; EX2001 at 23).

### **C. Multi-User Detection Algorithms**

The algorithm that a multi-user detector uses to recover multiple user signals is called a “multi-user detection” (MUD) algorithm. (EX2001 at 24). There are numerous kinds of MUD algorithms, each resulting in a different kind of multi-user detector. (EX2001 at 24). Exemplary algorithms include the Maximum Likelihood Sequence Estimation algorithm, Minimum Mean Square Error algorithm, Decorrelator algorithm, reduced state Viterbi, matched filter, Fano algorithm, zero-forcing block linear, and sphere decoder. (EX2001 at 24).

But MUDs are not all created equal – an algorithm that might successfully recover signals in one circumstance may fail in another. (EX2001 at 25). Moreover, a MUD may be able to successfully recover signals in a particular circumstance but would also unnecessarily expend excessive computational resources. (EX2001 at 25). Thus, even where two algorithms could both succeed in various circumstances, how efficiently each can do so might differ from circumstance—one might be more efficient in one environment, while another is more efficient in a different environment. (EX2001 at 25).

Thus, MUD algorithms and detectors are not a one-size-fits-all proposition. (EX2001 at 26). In a superior system, the right MUD out of many is chosen for the right circumstance. (EX2001 at 26). Which MUD algorithm is the right one will depend on the current conditions and the amount of complexity needed for success.

(EX2001 at 26). Improperly selecting a MUD that will not succeed under the present conditions will result in a defective system; improperly selecting one that can succeed but is not the most efficient available for the current conditions will result in an inferior system. (EX2001 at 26).

### III. The Challenged '492 Patent

The '492 patent's claimed subject matter allows for a system that switches back and forth between the MUD algorithm most appropriate for each changing circumstance.

In light of the failings in the asserted *Onggosanusi* and *Egnor* references (as discussed above and below), Petitioner mischaracterizes the inventions of the '492 patent, arguing that although “the '492 patent purports to introduce a system for selecting among a plurality of MUDs[,] the selection of a plurality of MUDs was known in the prior art.” (Pet. at 10).

But contrary to the Petition, the disclosed and claimed inventions were not the general and generic concept of selecting among a plurality MUDs. Rather, the '492 patent discloses and claims **specific improved** systems and methods for selecting among a plurality of MUD algorithms, systems and methods that the Petition does not even allege, much less prove, are disclosed in the asserted *Onggosanusi* and *Egnor* references.

Among these specific improvements are:

- (1) a “multi-user detector decision unit” comprising either a MUD decision unit 220 or a decision logic unit 520 running one of several specific disclosed selection algorithms for selecting among a plurality of MUDs; and
- (2) dividing a received signal into small windows of data and, for each window, selecting the MUD most appropriate to process that particular window.

**A. “Multi-User Detector Decision Unit”**

The ’492 patent does not generically disclose selecting from a plurality of MUDs the one best suited for the current processing conditions, but instead chooses a specific system and method for making that selection. Part of this system is the disclosed “multi-user detector decision unit,” which the patent describes as selecting from a plurality of MUDs and “represent[ing] one of the inventive aspects of the present invention.” (EX1001 at 13:33-34).

The ’492 patent describes this “multi-user detector decision unit” as MUD decision unit 220 (or, alternatively, decision logic unit 520) executing one of several specific disclosed selection algorithms for selecting among a plurality of MUDs. (EX2001 at 30). Unlike the prior art algorithms used to select a MUD, these disclosed algorithms are based on different information or an expansive

amount of granular data points instead of a few limited generalized data points.

(EX2001 at 30).

As a result, where the prior art would often result in the selection of a MUD more complex than necessary for the present conditions, the '492 patent's "multi-user detector decision unit" is able to identify that a lower complexity detector is still the most appropriate detector in those same conditions. (EX2001 at 31). In other words, where the simple prior art approach defaults to a high complexity detector when the considered generalized criteria (rightly or wrongly) indicates a channel having a significant amount of noise and interference, the novel decision unit disclosed in the '492 patent uses different information or an expansive amount of granular data points to identify when, in those same exact conditions, a lower complexity MUD is still the most appropriate MUD. (EX2001 at 31).

The '492 patent discloses several different algorithms for achieving these improved results, where each algorithm can be based on data points concerning granular aspects of the channel. Some exemplary algorithms disclosed in the '492 patent are highlighted below:

**BER/User Algorithm:** In one disclosed MUD selection algorithm, the expected Bit Error Rate (BER) of each channel user is calculated for every available MUD. Which MUD to use is then selected based on these expansive calculations and data points:

If any of the users have an expected BER that is acceptable, or above a threshold, for any of the lower complexity MUD techniques, then use the lowest complexity MUD possible that meets that criteria. As users are [thus processed and removed,] the expected BER of the remaining users changes. If none of the users ... have an expected BER below the threshold for any of the lower complexity MUD techniques then the highest complexity MUD technique should be used.

(EX1001 at 13:63-14:6, 20:43-49).

**SINR/Symbol Algorithm:** A wireless signal comprises a series of many “symbols,” where each symbol represents one or several bits. In another algorithm, the signal to interference plus noise ratio (SINR) is calculated for every symbol received via the channel and those ratios are used to select the appropriate MUD. “If the SINR for any symbols is above a threshold set for a specific lower complexity MUD technique, then use that technique. If none of the SINR values are above any of the lower complexity MUD thresholds then use the highest complexity MUD.” (EX1001 at 14:19-24).

**Filtered SINR/Symbol Algorithm:** Similarly, another selection algorithm calculates the expected SINR value for each symbol after filtering with one of the lower complexity MUDs. If any of the post filtering SINR values are above a threshold for a specific lower complexity MUD, that MUD can be used. If none of the post filtering SINR values are above any of the available lower complexity

MUD thresholds, then the highest complexity MUD is used. (EX1001 at 14:26-32).

**Detected Amount/Symbol Algorithm:** Another symbol-based algorithm focuses on the number of detected symbols. In this algorithm, a threshold of symbols is set for each possible MUD, and the lowest complexity MUD whose threshold exceeds the detected number of symbols is selected and used. (EX1001 at 13:39-55).

**Correlation Matrix Ratio/User Algorithm:** In the wireless context, a user “correlation matrix” is a table depicting the amount of correlation (similarity) between each possible pair of user signals. A fifth MUD decision algorithm looks at the correlation matrix between the users, and ratios calculated therefrom, to determine which MUD or MUDs to use:

[L]ook at the correlation matrix between the users and compar[e] each diagonal term to the sum of the off diagonal terms. If the ratio for a certain number of users is greater than a certain threshold then a lower complexity MUD can be used. If the ratio is below that threshold then a higher complexity can be used.

(EX1001 at 13:55-62).

**Correlation Matrix Eigenvalues Algorithm:** To analyze the complex detailed information included in the above-described user correlation matrix, another algorithm performs an eigendecomposition on that matrix to represent its information using eigenvalues and eigenvectors. The algorithm then considers all

of the eigenvalues (and their associated eigenvectors) to select the appropriate

MUD:

If the first N eigenvalues are very close to one another and the eigenvectors associated with those eigenvalues all have the same N entries terms then use a lower complexity MUD. If there are any other regions of the eigenvalues that are basically equal and the eigenvalues have the same dominant terms or if there is any one eigenvector that has a dominant term and its eigenvector is above the noise floor then use a lower complexity MUD. If the eigenvalues and eigenvectors of the correlation matrix do not have these characteristics then use the highest complexity MUD.

(EX1001 at 14:7-18).

The specification also provides some other criteria, for example, computational complexity, number of bits, and number of users. (EX1001 at 14:34-36).

Each of these algorithms has a common thread—instead of looking at just a few select representative or averaged pieces of data concerning the channel, it considers characteristics of a complete set of granular data such as, for example, information concerning all of the subject users or symbols. (EX2001 at 40). By digging deep in this manner, the disclosed and claimed “multi-user detector decision unit” succeeds where prior art approaches fail, selecting the appropriate MUD that achieves an optimal balance between complexity and performance. (EX1001 at 14:48-55; EX2001 at 40).

**B. Dividing A Received Signal Into Windows Of Data And Selecting The MUD Most Appropriate To Process That Particular Window**

Another improvement identified and claimed in the '492 patent is dividing a received signal into small windows containing a limited amount of transmitted symbols/bits and, for each window, selecting the MUD most appropriate to process that particular window.

The '492 patent describes that in this improvement, the received signal is broken into numerous subparts, called “windows”: “The received signals are split into a plurality of window . . . , wherein the windows are subsets of the total received signals.” (EX1001 at 18:52-54). “[T]he processing window is at least as wide as any single block of data;” typically in a small channel, each window will be around three symbols in length, while each can be longer for larger channels. (EX1001 at 17:24-57).

The patent further describes that when each window is processed, a new MUD selection occurs so that instead of using the same MUD for the entire signal, each subpart of the signal (window) is processed by an MUD selected as optimal for that particular window:

- “the MUD processing is performed for all of the symbols of a given window , . . before decoding the results and then moving to the next window;”
- “based upon the decision logic, the MUD is chosen . . . for the particular window of data;”

- “an independent decision is made about which MUD technique to use for every window.”

(EX1001 at 17:63 - 18:7).

#### **IV. The Petition Should be Denied Because Each Asserted Ground Fails to Establish the Required Reasonable Likelihood of Success**

Samsung’s Petition asserts the following Grounds:

| Ground | References                | Basis | Challenged Claims |
|--------|---------------------------|-------|-------------------|
| 1      | <i>Onggosanusi, Egnor</i> | § 103 | 1-16              |
| 2      | <i>Egnor, Onggosanusi</i> | § 103 | 17-18             |

The Petition should be denied because as established in the following sections, Grounds 1 and 2 each fails to establish the required reasonable likelihood of success.

**Ground 1** challenges claims 1-16, each of which recites the inventive “multi-user detector decision unit” discussed above. Ground 1 relies solely on *Onggosanusi* as allegedly disclosing this required limitation, but the Petition identifies no such “multi-user detector decision unit” in *Onggosanusi*. In prior litigation, the District Court for the Eastern District of Texas construed “multi-user detector decision unit”<sup>1</sup> as the patent’s disclosed MUD decision unit 220 (or decision logic 520) configured to perform one or more of the several decision

---

<sup>1</sup> The Court construed “multi-user detector decision unit using decision criteria to determine a selected multi-user detector” of claim 1.

algorithms described in the '492 patent. The Petition does not dispute or identify any fault in this construction, but does not even try to meet it. The Petition does not assert, much less prove, that *Onggosanusi* discloses a (1) MUD decision unit 220 or decision logic unit 520; or (2) any of the described decision algorithms. The Petition cannot because *Onggosanusi* does not disclose any of these undisputed requirements of the “multi-user detector decision unit.” For each and any of these reasons, Ground 1 fails.

**Ground 2** challenges claims 17 and 18, each of which recites the second inventive improvement discussed above, *i.e.*, dividing a received signal into small windows data and, for each window, selecting the MUD most appropriate to process that particular window. Neither *Egnor* nor *Onggosanusi* teaches this improvement and the Petition does not assert otherwise. Instead, the Petition tries to remedy this fatal gap in the asserted references by arguing it would have been obvious to modify *Egnor*'s “window” processing to include the required selection of a MUD for each window. But the Petition fails to prove that the modification was obvious, ignoring that *Egnor* itself teaches away from selecting a new MUD for processing each window.

**A. Ground 1**

**1. The Challenged Claims All Require the Inventive “multi-user detector decision unit”**

Ground 1 challenges claims 1-16 as obvious in light of *Onggosanusi* combined with *Egnor*. Independent claim 1 (and its dependent claims 2-9) and independent claim 10 (and its dependent claims 11-16) each embody and recite the foregoing innovative “multi-user detection decision unit” for selecting approaches a MUD.

For example, this limitation is present and highlighted in the following exemplary claim 1:

1. A hybrid Multi-User Detector System for processing received signals, comprising:  
a parameter estimator coupled to said received signals providing receive data information;  
**a multi-user detection decision unit** coupled to said parameter estimator and said received signals;  
at least two multi-user detectors coupled to said parameter estimator and said multi-user detector decision unit, **said multi-user detector decision unit using decision criteria to determine a selected multi-user detector**, wherein said selected multi-user detector outputs a plurality of information streams, one stream corresponding to each of said received signals; and  
a bank of decoders coupled to said plurality of information streams, wherein said decoders output a plurality of improved information streams.

(EX1001 at claim 1; *see also* claim 10 at 24:15-18).

## 2. The Construction Of “Multi-User Detector Decision Unit”

Patent Owner Collison previously asserted the '492 patent in the District Court for the Eastern District of Texas. In that litigation, the District Court construed claim 1's “multi-user detector decision unit” as a means-plus-function term, where the claimed function is “using decision criteria to determine a selected multi-user detector,”<sup>2</sup> and the corresponding structure is “MUD decision unit 220 (or decision logic 520) configured to perform one or more algorithms described at 8:12-18, 13:35-14:40, 15:3-21, 19:43-48, 19:56-62, and 20:41-49; and equivalents thereof.” (EX2005 73-74). The algorithms identified by the District Court as comprising the claimed structure are the several selection algorithms identified in the '492 patent and some of which are discussed above, including:

- BER/User Algorithm;
- SINR/Symbol Algorithm;
- Filtered SINR/Symbol Algorithm;
- Detected Amount/Symbol Algorithm;
- Correlation Matrix Ratio/User Algorithm;

---

<sup>2</sup> Claim 10 phrases the function differently—“selects a multi-user detector based upon at least one threshold”—but that difference does not affect the analysis or corresponding structures here, and Petitioner Samsung does not argue otherwise.

- Correlation Matrix Eigenvalues Algorithm;
- Computational Complexity Algorithm;
- Number of Bits Algorithm; and
- Number of Users Algorithm.

(EX2005 73-74; EX1001 at 8:12-18, 13:35-14:40, 15:3-21, 19:43-48, 19:56-62, and 20:41-49).

The District Court publicly issued its order construing “multi-user detector decision unit” on August 31, 2022, nearly two years before Petitioner Samsung filed its August 1, 2024 Petition. Despite knowing of the Court’s order and construction, the Petition does not dispute the construction, nor does the Petition identify any flaws in the Court’s analysis in arriving at that construction.

There are no such flaws and, consistent with the District Court’s undisputed claim construction, the Board should adopt the same claim construction.

**a. The Claimed “Multi-User Detector Decision Unit” Is Means-Plus-Function Limitation**

As the District Court acknowledged and applied (EX2005 at 45-46, 67-74), the Federal Circuit’s *Williamson* decision sets forth the test for determining whether the claimed “multi-user detector decision unit” is a means-plus-function limitation: even absent the word “means,” a claim term will be construed as a means-plus function limitation where “the claim fails to ‘recite sufficiently definite

structure’ or else recites ‘function without reciting sufficient structure for performing that function.’” *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (relevant portion decided *en banc*) (internal citation omitted).

The District Court determined that the claimed “multi-user detector decision unit” is a means-plus-function limitation despite not literally using the word “means” because the claims do not recite sufficiently definite—or any—structure for this limitation. The Court held that “the word ‘unit’ as used in the term here at issue is a nonce word that can be ‘tantamount to using the word means.’” (EX2005 at 69) (citing *Williamson*, 792 F.3d at 1350). As the *Williamson* court explained about the similarly generic “module”: it “does not provide any indication of structure because it sets forth the same block recitation for providing the same specified function as if the term ‘means’ had been used.” *Williamson*, 792 F.3d at 1351.

Because the Court determined that the unit in “multi-user detector decision unit” is a nonce word imparting no definite structure, the Court identified that the “issue, then, is whether the phrase ‘multi-user detector decision’ imparts structural meaning to the word ‘unit.’” (EX2005 at 69). But this phrase just further describes what the “unit” does—it makes a decision about a multi-user detector—not what the structure actually is. Accordingly, the Court found that “the presence

of these particular terms does not provide any structural significance to the term ‘[unit]’ in this case.” (EX2005 at 69) (citing *Williamson*, 792 F.3d at 1351).

Petitioner does not dispute or argue otherwise, neither alleging or providing any evidence that a POSITA would understand that the phrase “multi-user detector decision unit” refers to any definite structure for performing the claimed function. Accordingly, PTAB should follow the Court’s lead: “This ‘unit’ term is thus not directed to any particular class of structures but rather to anything that performs the claimed function. The Court therefore finds that the presumption against means-plus-function has been rebutted ... .” (EX2005 at 72).

**b. The Corresponding Structure Requires One Of The Disclosed Selection Algorithms**

Correctly construed, a mean-plus-function limitation covers the corresponding structures disclosed in the specification for performing the claimed functions, and equivalents thereof. *Williamson*, 792 F.3d at 1351. A structure disclosed in the specification is a corresponding structure if the specification links or associates the structure to the function recited in the claim. *Id.* at 1352.

As discussed and established above, the ’492 Patent describes the structures for performing the multi-user detector decision unit’s claimed functions (selecting a MUD based on a decision criteria or threshold) is a MUD decision unit 220 (or, alternatively, decision logic unit 520) configured to perform one or more of the

several decision algorithms, e.g., the BER/User, SINR/Symbol, Filtered SINR/Symbol, Detected Amount/Symbol, Correlation Matrix Ratio/User, Correlation Matrix Eigenvalues, Computational Complexity, Number of Bits, Number of Users, and other algorithms disclosed at 8:12-18, 13:35-14:40, 15:3-21, 19:43-48, 19:56-62, and 20:41-49.

This is consistent with the Court’s construction, which held that the “corresponding structure is ‘MUD decision unit 220 (or decision logic 520) configured to perform one or more algorithms described at 8:12-18, 13:35-14:40, 15:3-21, 19:43-48, 19:56-62, and 20:41-49; and equivalents thereof.’”

The Petition does not dispute that these are the correct corresponding structures, challenge the Court’s analysis on this issue, or propose any additional or alternative corresponding structures for the claimed “multi-user detector decision unit.”

**3. The Petition Does Not Allege or Establish That *Onggosanusi* Discloses the Claimed “multi-user detector decision unit” Under the Correct—and Undisputed—Construction**

Ground 1 relies solely on *Onggosanusi* as allegedly disclosing the required “multi-user detector decision unit” limitation, but the Petition identifies no such “multi-user detector decision unit” in *Onggosanusi*. Despite knowing of and not disputing the Court’s “multi-user detector decision unit” construction, Petitioner

does not address or apply this construction—it never even asserts, much less proves, that *Onggosanusi* discloses a MUD decision unit 220 (or, alternatively, decision logic unit 520) configured to perform one or more of the decision algorithms, e.g., the BER/User, SINR/Symbol, Filtered SINR/Symbol, Detected Amount/Symbol, Correlation Matrix Ratio/User, Correlation Matrix Eigenvalues, Computational Complexity, Number of Bits, Number of Users, and other algorithms disclosed at 8:12-18, 13:35-14:40, 15:3-21, 19:43-48, 19:56-62, and 20:41-49. For this failure alone, Ground 1 does not and cannot support institution.

And Samsung is prohibited from now attempting to augment its Petition to address these failures—it was required to put such assertions in its Petition as filed, particularly where it already knew of, could have addressed, and should have addressed the Court’s claim construction.

Moreover, *Onggosanusi* does not disclose the claimed “multi-user detector decision unit” under the correct—and only—construction now before the Board. (EX2001 at 52). *Onggosanusi* does not disclose selecting a MUD using any of the algorithms disclosed in the ’492 patent and required by the correct claim construction, and the Petition does not and cannot assert otherwise.

Rather, as confirmed by the Petition itself, *Onggosanusi* selects a MUD based on simple and generalized determination of whether a channel is “well-behaved” or “ill-conditioned.” (See, e.g., Pet. at 35; EX2001 at 53). As the

Petition states, in *Onggosanusi*, “ill-conditioned channels trigger use of high performance detection, whereas well-behaved channels lead to low complexity detection.” (Pet. at 11, quoting *Onggosanusi*).

The Petition further alleges that the determination of whether a channel is “well-behaved” or “ill-conditioned” is based “channel estimation H.” (Pet. at 34-35). But the Petition fails to explain how “channel estimation H” fits into the disclosed ’492 algorithms or their equivalents, and the Petition cannot argue otherwise. Rather, according to the Petition, the “channel estimation H is a channel matrix of attenuations and phase shifts.” (Pet. at 34; EX2001 at 54). This “channel estimation H” is thus admittedly different from that used in the disclosed and claimed decision algorithms of the ’492 patent. (EX2001 at 54).

Additionally, not only is the data used by these algorithms different from that used in *Onggosanusi*, but the specific algorithm steps disclosed in the ’492 algorithms are also absent from *Onggosanusi*. (EX2001 at 55). For example, the disclosed Correlation Matrix Eigenvalues Algorithm comprises the following steps not disclosed in *Onggosanusi*:

If the first N eigenvalues are very close to one another and the eigenvectors associated with those eigenvalues all have the same N entries terms then use a lower complexity MUD. If there are any other regions of the eigenvalues that are basically equal and the eigenvalues have the same dominant terms or if there is any one eigenvector that has a dominant term and its eigenvector is above the noise floor then use a lower complexity MUD. If the eigenvalues and

eigenvectors of the correlation matrix do not have these characteristics then use the highest complexity MUD.

(EX1001 at 14:7-18; EX2001 at 55).

In summary, the Petition does not even assert that the correctly construed “multi-user detector decision unit” is disclosed by *Onggosanusi*. (EX2001 at 56). Nor could the Petition successfully do so because the ’492 patent’s disclosed selection algorithms used both different data and different algorithm steps from the simple process disclosed in *Onggosanusi*. (EX2001 at 56). For any and all of these reasons, Ground 1 does not establish the required reasonable likelihood of success.

## **B. Ground 2**

### **1. Challenged Claims 17 and 18 Require Dividing a Received Signal Into Small Windows Of Data and, for Each Window, Selecting the MUD Most Appropriate to Process that Particular Window**

Ground 2 challenges independent claim 17 and its dependent claim 18. As shown in exemplary claim, each of these claims requires dividing a received signal into small windows of data and, for each window, selecting the MUD most appropriate to process that particular window:

17. A method for processing signals from multiple users with raw digitized data, comprising:

performing a parameter estimation of said raw digitized data;

**grabbing a window of bits from said raw digitized data;**

subtracting any known bits from said window of bits;

**selecting a multi-user detector;**

estimating unknown bits from said window of bits using said multi-user detector;

incrementing to a next window of bits;

**repeating said steps of** subtracting, **selecting**, estimating, and incrementing until there are no more windows and outputting a set of symbol estimates.

(EX1001 at claim 17).

**2. Petitioner Concedes That None Of The References Disclose Dividing A Received Signal Into Small Windows Of Data And, For Each Window, Selecting The MUD Most Appropriate To Process That Particular Window**

Petitioner does not dispute that claims 17 and 18 each require dividing a received signal into small windows of data and, for each window, selecting the MUD most appropriate to process that particular window. Nor does Petitioner dispute that none of its asserted references disclose this requirement.

Petitioner cannot. Ground 2's secondary reference, *Onggosanusi*, does not even mention windows, much less choosing a new optimal MUD each a new window is processed. (EX2001 at 58).

And Ground 2's primary reference, *Egnor*, actually explicitly teaches against this requirement. (EX2001 at 58). Instead, *Egnor* teaches that to save computation power, a single MUD should be selected and then repeatedly used to process the series of windows. (EX1006 at ¶ [0017]; EX2001 at 58).

### 3. The Petition Does Not Identify Adequate Evidence to Support Its Obviousness Assertions

The Petition tries to remedy this fatal gap in the asserted references by arguing it would have been obvious to modify *Egnor*'s "window" processing to include the required selection of a MUD for each window. But the Petition fails to prove that the modification was obvious, ignoring that *Egnor* itself teaches away from selecting a new MUD for processing each window.

#### a. *Egnor* Teaches Away From Selecting a New MUD at the Beginning of each Window

Contrary to the baseless modification proposed by Ground 2, *Egnor* teaches away from selecting a new multi-user detector at the beginning of each window. (EX2001 at 60). Instead, *Egnor* teaches the opposite, stating that to achieve real-time performance, a linear complexity MUD should be selected and iterated repeatedly instead of selecting a new optimal MUD to process each new window. (EX1006 at ¶ [0017]; EX2001 at 60).

*Egnor* states that "[i]t is well known that the reduction in performance of linear MUDs can be offset by the gains due to the **iterations in a turbo MUD between a linear MUD and a decoder can achieve optimal MUD like performance with fewer computations, even though the processing is repeated five times.**" (EX1006 at ¶ [0017] (emphasis added)). *Egnor* teaches that the claimed novelty of *Egnor*'s invention is to repeatedly iterate with a low complexity

algorithm. (EX2001 at 61). This approach is more advantageous than using the optimal MUD because *Egnor*'s approach has low complexity and achieves real-time performance, whereas the optimal MUD cannot achieve real-time performance in practice. (EX2001 at 61).

In *Egnor*'s approach the bit streams (the output) from the MUD are passed to a bank of error correction decoders. (EX1006 at ¶ [0059]). The decoders produce soft outputs which indicate both a discrete estimate of a bit and the probability that estimate is correct. (EX1006 at ¶¶ [0011] and [0059]). These soft outputs are then passed back to the MUD “to produce **an improved stream** of soft bit (or symbol) decisions that [are] fed into the decoder for **another iteration of improvement.**” (EX1006 at ¶ [0060]). *Egnor* teaches that this process is repeated until an asymptote is reached or the desired level of performance is achieved, at which point the estimates of the data sequences for all active users are output. (EX1006 at ¶ [0060]).

**b. Selecting a New MUD at Each Iteration Would Slow Performance of Egnor's Claimed Invention**

Selecting a new MUD at each iteration of the turboMUD disclosed in *Egnor* would make *Egnor* less efficient. (EX2001 at 63). Contrary to the proposed modification, *Egnor* is striving for a less computationally complex algorithm that can still achieve real-time performance. (See EX1006 at ¶¶ [0017], [0020], and

[0088]; EX2001 at 63). For example, *Egnor* states that “[i]t is well known that the reduction in performance of linear MUDs can be offset by the gains due to the **iterations in a turbo MUD between a linear MUD and a decoder can achieve optimal MUD like performance with fewer computations, even though the processing is repeated five times.**” (EX1006 at ¶ [0017] (emphasis added)).

*Egnor* teaches that the tradeoff of repeating the process five times with a linear MUD is offset by the fact that optimal MUD like performance is achieved. (EX2001 at 63).

But stopping this process at each iteration of *Egnor*, to select a new MUD, adds additional complexity, and lowers the performance of *Egnor*, which teaches away from *Egnor*’s tradeoff to achieve real-time processing. (EX2001 at 64).

**4. A POSITA Would Not Combine *Egnor* with *Onggosanusi* Because the Proposed Combination Teaches Away From *Egnor***

The Petition claims that a POSITA would combine *Onggosanusi*’s MUD selection, which only selects a high complexity detector “if needed for a noisy channel,” with *Egnor* because “[t]his would allow the system to gradually use less complex detectors as the signals are processed by subsequent MUD processors that gradually decorrelate the signals.” (Pet. at 52). But this suggestion ignores *Egnor*’s explicit teachings of using the same low complexity MUD repeatedly, achieving real-time, optimal ML like performance. (EX2001 at 65). A POSITA would not

combine *Egnor* with *Onggosanusi* because selecting a high complexity detector for a noisy channel, goes against *Egnor*'s teachings. (EX2001 at 65).

*Egnor*'s principle of operation is that high complexity detectors (like the optimal ML detector) need not even be considered because iterating between the same low complexity MUD and decoder achieves real-time, optimal ML like performance. (EX2001 at 66). Under the Petition's proposed combination, and according to the Petition, "high complexity detectors need only be selected if needed for a noisy channel." (Pet. at 52). If a noisy channel were detected, then under the Petition's proposed combination, a high complexity algorithm would be selected and iterated over repeatedly. (EX2001 at 66). A POSITA would understand that iterating with a high complexity algorithm would result in lower performance than iterating with a low complexity algorithm. (EX2001 at 66).

Because the Petitions' proposed combination of *Egnor* and *Onggosanusi* goes against *Egnor*'s teaching, a POSITA would not combine the two references. Thus, for the foregoing reasons, the Board should deny the Petition.

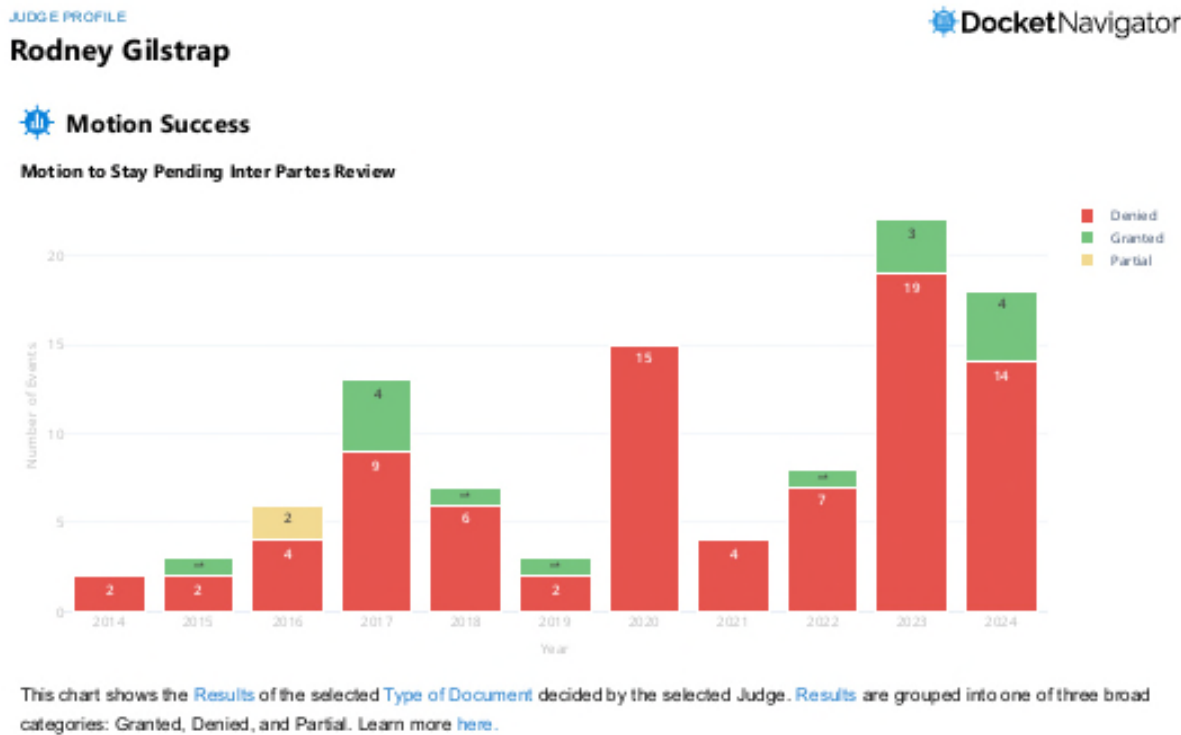
**V. On Balance the *Fintiv* Factors Favor Discretionary Denial of Institution Under § 314(A)**

The *Fintiv* factors heavily weigh in favor of discretionary denial. In an attempt to characterize every factor as either neutral or favoring institution, the Petition is rife with conclusory statements and misapplications of controlling

PTAB precedent. Under the appropriate legal standards—and considering the totality of the record evidence—on balance, the *Fintiv* factors support discretionary denial of institution.

**A. Factor 1: Whether a stay exists or is likely to be granted if a proceeding is instituted**

Petitioner admits that it has not sought a stay in the district court, and Patent Owner represents that it will not seek nor agree to a stay. Further, here other evidence exists that makes stay very unlikely. Over the past ten years, the presiding district court judge has denied over 83% of motions to stay pending *inter partes* review.



EX2006. Because the Petition does not even go as far to suggest that Petitioner will seek a stay, and because Judge Gilstrap has denied the overwhelming majority of motions to stay pending *inter partes* review, this factor weighs in favor of discretionary denial.

**B. Factor 2: Proximity of the Court’s Trial Date to the Board’s Projected Statutory Deadline**

Here, any final written decision would issue *over five months* after the trial date. If the court’s trial date is earlier than the expected statutory deadline for the IPR’s final written decision, “the Board generally has weighed this fact in favor of exercising authority to deny institution.” *Fintiv*, IPR2020-00019, Paper 11 at 9. The trial date is set for September 8, 2025, while the statutory final written decision, if the IPR were instituted, would be February 14, 2026. While Petitioner suggests that “much can change in five months,” that speculation is entirely without basis. (*See Pet.* at 58).

To the contrary, the evidence of record strongly supports the conclusion that trial will occur months before any final written decision would issue. According to the most recent statistics, the time to trial for the Eastern District of Texas is 21.6 months—squarely in line with the approximately 21 month schedule set by the district court. EX2007 (June 30, 2024 Federal District Court Case Management Statistics); EX2008 (Docket in *Collision Communications, Inc. v. Samsung*

*Electronics Co., Ltd.*, No. 23-cv-00587 (E.D. Tex.) showing complaint filing date of Dec. 12, 2023); *see also Comcast Cable Communications, LLC v. Touchstream Technologies, Inc.*, IPR2024-00324, Paper 13 at 11 (PTAB July 24, 2024) (“Patent Owner’s representation of median time-to-trial of twenty-one months is consistent with the most recent available data from the judiciary. . . . We find that the related district court litigation’s trial date and the district court’s median time-to-trial favor denial.”) (discretionary denial granted upon rehearing); PTAB Director’s 2022 *Fintiv* Memorandum, 8-9 (“Parties may present evidence regarding the most recent statistics on median time-to-trial for civil actions in the district court in which the parallel litigation resides for the PTAB’s consideration.”).

Because any final written decision would issue substantially later than the district court trial, this factor weighs in favor of discretionary denial. *See Verizon Bus. Network Servs. LLC v. Huawei Techs. Co. Ltd.*, IPR2020-01292, Paper 13 at 12 (PTAB Jan. 25, 2021) (trial date seven to eight months before expected final written decision deadline weighs in favor of discretionary denial).

**C. Factor 3: Investment in the parallel proceeding by the court and parties**

At best for Petitioner, this factor slightly favors denial of institution or is neutral. Petitioner fails to evaluate the investment by both the court **and** the parties at the relevant time—at the deadline for institution. *Apple Inc. v. Fintiv, Inc.*,

IPR2020- 00019, Paper 11 at 9-10 (PTAB Mar. 20, 2020) (precedential). By the February 14, 2025 deadline for institution, the parties will have invested substantial resources in the following case events:

- Completion and service of invalidity contentions;
- Completion of claim construction discovery;
- Substantial completion of document production;
- Exchange of privilege logs;
- Filing of technical tutorials for claim construction;
- Filing of opening claim construction brief; and
- Filing of responsive claim construction brief

EX2009 (Scheduling Order). Therefore, this case, particularly at the time of institution, will hardly be in the “very early stages of litigation” and discovery will not be in its “preliminary stages.” (*See* Pet. at 58-59). The Parties will have expended significant resources on the district court litigation by the deadline for institution, which favors denial of institution. Finally, Petitioner provides no support for its contention that filing the Petition five months before the statutory deadline weighs against denying institution. *See id.* Conversely, filing the Petitions four months after receiving Patent Owner’s infringement contentions and notice of asserted claims weighs slightly in favor of denial of institution. *Comcast*, IPR2024-00324, Paper 13 at 15.

**D. Factor 4: Overlap between issues raised in the petition and in the parallel proceeding**

In a transparent attempt to generate a factor—any factor—favoring institution, Petitioner argues that the Petition “challenges *many* more claims than those being challenged in the parallel litigation.” (Pet. at 59 (emphasis added)). But the very next sentence contradicts this assertion—the petition challenges 18 claims of the ’492 patent, while Petitioner challenges 15 of those claims in the district court. In other words, the Petition challenges just 3 additional claims. Further, those 3 additional claims are all dependent claims that depend from claims challenged in both proceedings. See EX1001. And the Petition asserts no new prior art references or prior art combinations to satisfy those three dependent claims. (Pet. at 4).

Due to the substantial overlap in challenged claims and the similarity of Petitioner’s claims and theories, this factor weighs in favor of discretionary denial. *Apple v. Fintiv*, IPR2020-00019, Paper 11 at 12-13 (PTAB March 20, 2020) (“[I]f a petition involves the same prior art challenges but challenges claims in addition to those that are challenged in the district court, it may still be inefficient to proceed because the district court may resolve validity of enough overlapping claims to resolve key issues in the petition.”).

**E. Factor 5: Whether the petitioner and the defendant in the parallel proceeding are the same party**

Petitioner admits that the parties in this IPR and the district court proceeding are the same. Despite that admission, it argues that the factor is neutral. This is flatly wrong. Precedential PTAB authority holds that where the petitioner and the defendant in the parallel proceedings are the same party, the factor favors denial. *See Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A); *see also Comcast*, IPR2024-00324, Paper 13 at 15.

**F. Factor 6: Other circumstances that impact the Board's exercise of discretion, including the merits / compelling merits**

No other considerations warrant discretionary denial. As discussed above, Petitioner's case does not even meet the "reasonable likelihood" standard for the statutory institution threshold. The Petition thus falls far short of showing "compelling merits." *See* PTAB Director's 2022 *Fintiv* Memorandum, 4 ("Compelling, meritorious challenges are those in which the evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence. . . . Where the information presented at the institution stage is merely sufficient to meet the statutory institution threshold, the PTAB has the authority, where warranted, to exercise discretion to deny institution in view of the other *Fintiv* factors."). Accordingly,

because the Petition fails to show compelling merits, and the *Fintiv* factors heavily support discretionary denial, the Board should deny institution.

## **VI. Conclusion**

For the foregoing reasons, the Board should deny institution of the Petition.

Dated: November 14, 2024

Respectfully submitted,

/William A. Meunier/

William A. Meunier (Reg. No. 41,193)

Michael T. Renaud (Reg. No. 44,299)

Kevin C. Amendt (Reg. No. 69,361)

MINTZ, LEVIN, COHN, FERRIS,

GLOVSKY AND POPEO, P.C.

One Financial Center

Boston, MA 02111

Telephone: 617-542-6000

Facsimile: 617-542-2241

E-mails: WAMeunier@mintz.com;

KCAmendt@mintz.com

**CERTIFICATE OF WORD COUNT**

Pursuant to 37 C.F.R. §42.24(d), Patent Owner hereby certifies, in reliance on the word count of the word-processing system (Microsoft Office Word 2010) used to prepare this preliminary response, that the number of words in this paper is 7,315. This word count excludes the tables of contents, tables of authorities, certificate of word count, certificate of service, and table of exhibits.

Dated: November 14, 2024

/William A. Meunier/

William A. Meunier (Reg. No. 41,193)

**CERTIFICATE OF SERVICE**

I certify that copies of Patent Owner's Preliminary Response and accompanying Exhibits 2001 through 2009 are being served by electronic mail on the following counsel of record:

James M. Glass (Reg. No. 46729)  
jimglass@quinnemanuel.com

John T. Mckee (Reg. No. 65,926)  
johnmckee@quinnemanuel.com

QUINN EMANUEL URQUHART &  
SULLIVAN, LLP  
51 Madison Avenue, 22nd Floor  
New York, NY 10010  
Tel: (212) 849-7000  
Fax: (212) 849-7100

QUINN EMANUEL URQUHART &  
SULLIVAN, LLP  
51 Madison Avenue, 22nd Floor  
New York, NY 10010  
Tel: (212) 849-7000  
Fax: (212) 849-7100

Dated: November 14, 2024

/William A. Meunier/

William A. Meunier (Reg. No. 41,193)