

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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AXON ENTERPRISE, INC. AND DEDRONE HOLDINGS, INC.

Petitioners

v.

AIRSPACE DEFENSE, INC.

Patent Owner

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Case No. IPR2025-00525

Patent 10,713,959

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**PETITIONERS' OPPOSITION TO PATENT OWNER'S NON-  
CONTINGENT MOTION TO AMEND**

**TABLE OF CONTENTS**

|            |                                                                    |          |
|------------|--------------------------------------------------------------------|----------|
| <b>I.</b>  | <b>PO HAS NOT MET ITS BURDEN .....</b>                             | <b>1</b> |
| A.         | The Substitute Claim (“SC”) Impermissibly Enlarges Claim Scope.... | 1        |
| B.         | The SC Lacks Written Description Support.....                      | 1        |
| <b>II.</b> | <b>THE SC IS UNPATENTABLE .....</b>                                | <b>7</b> |
| A.         | SC 22 is Indefinite .....                                          | 7        |
| B.         | SC 22 is Obvious.....                                              | 8        |
| 1.         | Ground 5: Beard and Viggiano .....                                 | 9        |
| 2.         | Grounds 6 and 7 .....                                              | 14       |
| 3.         | Ground 8: Gong, Wang-II, and Viggiano .....                        | 16       |
| 4.         | Ground 9: Beard and Byers .....                                    | 18       |
| 5.         | Grounds 10 and 11 .....                                            | 22       |
| 6.         | Ground 12: Gong, Wang-II, and Byers .....                          | 24       |

**LIST OF EXHIBITS**

| <b>Ex. No.<sup>1</sup></b> | <b>Description</b>                                                                                                                                                                                                  |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1001                       | U.S. Patent No. 10,713,959 to Foina <i>et al.</i> , “Low Altitude Aircraft Identification System” (the “’959 Patent”)                                                                                               |
| 1002                       | File History for U.S. Patent No. 10,713,959                                                                                                                                                                         |
| 1003                       | Declaration of Dr. Girish Chowdhary                                                                                                                                                                                 |
| 1004                       | Complaint for Patent Infringement, <i>Airspace Systems, Inc. v. Dedrone Holdings, Inc.</i> , Case No. 1-24-cv-01625 (E.D. VA), September 16, 2024                                                                   |
| 1005                       | U.S. Patent No. 10,192,451 to Foina <i>et al.</i> , “Low Altitude Aircraft Identification System,” (the “’451 Patent”) filed December 12, 2017                                                                      |
| 1006                       | International Publication No. WO2016/201359 A1 filed on June 10, 2016 as International Application No. PCT/US2016/037071 (the “’071 Application”)                                                                   |
| 1007                       | U.S. Provisional Application No. 62/175,153 to Foina <i>et al.</i> , “A low altitude aircraft identification system” (the “’153 Provisional”), filed June 12, 2015                                                  |
| 1008                       | U.S. Patent No. 10,733,894 to Beard <i>et al.</i> , “Direct-Broadcast Remote Identification (RID) Device for Unmanned Aircraft Systems (UAS),” (“ <i>Beard</i> ”) filed February 26, 2018 and issued August 4, 2020 |
| 1009                       | U.S. Provisional Application No. 62/480,031 to Beard, “Remote Identification” (“ <i>Beard Provisional</i> ”), filed March 31, 2017                                                                                  |
| 1010                       | U.S. Patent Application Publication No. 2016/0253907 to Taveira, “Systems and Method for Restricting Drone Airspace Access,” (“ <i>Taveira</i> ”) filed January 29, 2015 and published September 1, 2016            |
| 1011                       | International Publication No. WO2016/078093 A1 to Wang <i>et al.</i> , “System and Methods for Managing Unmanned Aerial Vehicles,” (“ <i>Wang</i> ”) filed November 21, 2014 and published May 26, 2016             |

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<sup>1</sup> Citations to patents are made by column and line cite; citations to patent publications are made by paragraph number; citations to Exhibit 1002 are made with reference to the Bates-stamped pagination; citations to other exhibits are made to the page number of the document itself.

|      |                                                                                                                                                                                                                      |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1012 | International Publication No. WO2016/154949 A1 to <i>Gong et al.</i> , “Authentication Systems and Methods for Generating Flight Regulations,” (“ <i>Gong</i> ”) filed March 31, 2015 and published October 6, 2016  |
| 1013 | U.S. Patent Application Publication No. 2016/0127890 to <i>Qi et al.</i> , “Apparatus, System and Method of Protecting a Service Identifier,” (“ <i>Qi</i> ”) filed December 24, 2014 and published May 5, 2016      |
| 1014 | International Publication No. WO2015/043123 A1 to <i>Wang et al.</i> , “Data Communication Systems and Methods,” (“ <i>Wang-II</i> ”) filed January 14, 2014 and published April 2, 2015                             |
| 1015 | Claim Listing of Challenged Claim                                                                                                                                                                                    |
| 1016 | File History for U.S. Patent No. 10,192,451                                                                                                                                                                          |
| 1017 | First Amended Complaint for Patent Infringement, <i>Airspace Systems, Inc. v. Dedrone Holdings, Inc.</i> , Case No. 1-24-cv-01625 (E.D. VA), October 30, 2024                                                        |
| 1018 | Airspace Systems, Inc.’s Opposition to Defendants’ Rule 12(b)(6) Motion to Dismiss, <i>Airspace Systems, Inc. v. Dedrone Holdings, Inc.</i> , Case No. 1-24-cv-01625 (E.D. VA), January 13, 2025                     |
| 1019 | U.S. Patent Application Publication No. 2014/0337633 <i>et al.</i> , “System and Method for Indicating a Service Set Identifier,” filed May 7, 2014 and published November 13, 2014                                  |
| 1020 | U.S. Patent Application Publication No. 2006/0236376 to <i>Liu et al.</i> , “Wireless Security Using Media Access Control Address Filtering with User Interface,” filed April 1, 2005 and published October 19, 2006 |
| 1021 | Kayton, Myron and Fried, Walter, <i>Avionics Navigation Systems</i> , John Wiley and Sons, 1997.                                                                                                                     |
| 1022 | Stipulation email on May 29, 2025                                                                                                                                                                                    |
| 1023 | Second Declaration of Dr. Girish Chowdhary                                                                                                                                                                           |
| 1024 | U.S. Patent Application Publication 2007/0239986 to <i>Viggiano et al.</i> , “Secure ADS-B Authentication System and Method,” (“ <i>Viggiano</i> ”) filed April 7, 2006 and published October 11, 2007               |
| 1025 | U.S. Patent No. 9,875,660 to <i>Byers et al.</i> , “Multi-Modal UAV Certification,” (“ <i>Byers</i> ”) filed March 28, 2016 and issued January 23, 2018                                                              |
| 1026 | Transcript of Deposition of Dr. Nikolaos Papanikolopoulos                                                                                                                                                            |

## **I. PO HAS NOT MET ITS BURDEN**

### **A. The Substitute Claim (“SC”) Impermissibly Enlarges Claim Scope**

PO amended the SC’s [22.c] to recite “*wherein the radio communication module is configured to receive a [[received]] radio signal.*” MTA at 4. This impermissibly broadens the SC as it contemplates receiving **any** “radio signal” (“receive **a** radio signal”). *Id.* Regardless of if PO narrowed other SC aspects, the amendment is improper as this aspect was broadened. *Sisvel Int’l S.A. v. Sierra Wireless, Inc.*, 81 F.4th 1231, 1240-41 (Fed. Cir. 2023). PO mentions the amendment is “a typographical correction.” MTA at 2. No support exists for this. EX1023, ¶28.

### **B. The SC Lacks Written Description Support**

PO’s string-cites do not demonstrate support for the SC, and PO’s accompanying commentary is unavailing. PO has not met its burden. *B.E. Tech., L.L.C. v. Google, Inc.*, 2016 WL 6803057, at \*7 (Fed. Cir. Nov. 17, 2016) **[22.i]**: Via [22.i], PO attempts to claim a “radio communication module” that transmits both “identification information” and a “secure identifier.” MTA at 4-9 ([22.b] (“radio communication module...configured to transmit identification information...”), [22.e] (“the radio communication module is configured to utilize a secure identifier”), [22.i] (“utilizing the secure identifier comprises transmitting the secure identifier...”). This concept, as well as using a “secure identifier” itself (i.e., in “cross-verifying” of [22.i]), is not supported by the ’959 Patent. PO cites to its [22.e] analysis as support, stating “security identifier comprises a code that is ‘similar’ to

the code that is ‘transmitted’ identification information, and the RF module transmits the similar code, i.e., the security identifier.” MTA at 8. Notwithstanding how PO refers to an term not in the SC—“*security* identifier”—rendering PO’s analysis inaccurate and wrong, PO’s confusing allegations are incorrect. As discussed in Section I.B ([22.e]), *infra*, the [22.e] citations fail to disclose a “secure identifier” as claimed. PO’s assertion that the [22.e] citations describe an “RF module transmits the similar code, i.e., the security identifier” is wrong because they describe nothing of the sort. EX2015 at 2:27-3:5 and 3:14-16 (and corresponding EX1001 at 2:30-59) describe an aircraft light array that blinks a color pattern, and a transponder that transmits a code via RF that is “similar” to that blinked pattern—not “similar” to some other code transmitted via a radio frequency (RF). No radio communication module transmitting a “secure identifier,” or the “cross-verifying” of such a “secure identifier” and “transmitted identification information,” is described. PO also refers to the citations of [22.pre]. MTA at 3, 8. These portions again relate to transmitting an “identification code” via a “visible light color sequence or by a radio frequency signal.” *See, e.g.*, EX2015 at 2:11-17; EX1001 at 2:7-15; EX2016 at ¶29. None concern a “secure identifier,” a radio communication module transmitting a “secure identifier,” or cross-verification involving a “secure identifier.” EX1023, ¶¶29-31.

The additional portions cited by PO do not fare better. MTA at 8-10. They refer to (1) a “ground identification device 21” that “can detect aircrafts through the

RF signal transmitted from the identification box RF module 16” or (2) “command execution” and the communication of “execution results” including an “ACK” or “error status code” to “ground identification unit 21.” *See, e.g.*, EX1001 at 6:31-35, 7:54-8:6, Figs. 7, 8. PO has not shown or explained how they support a “secure identifier,” a radio communication module transmitting a “secure identifier,” or cross-verification using a “secure identifier.” EX1023, ¶32. PO also cites to “EX1001 at 38-44.” MTA at 9. Assuming this refers to the equivalent portion of EX2015 at 4:15-19, which is EX1001 at 3:38-44, this is not supportive. This section states a “remote (e.g., ground) device” is “equipped with a camera, lens, and image processing algorithms to capture the color sequence,” and “[i]n addition, the device has an RF receiver capable of receiving the identification box RF signal to connect both information sources and to verify authenticity,” but says nothing about a “secure identifier,” a radio communication module transmitting a “secure identifier,” or cross-verification using a “secure identifier.” EX1001 at 3:38-44; EX1023, ¶33.

PO provides commentary at the end of its [22.i] analysis purporting to summarize its cited sections. MTA at 9-10. This commentary is unclear, wrong, and disconnected from the sections because it refers to undisclosed concepts. PO states that “the ’406 App. and the ’153 Prov. each discloses that the ground device crosschecks / cross-verifies the ‘code,’ i.e., the transmitted identification information and a code similar to the code, i.e., the secure identifier, to verify authenticity of the

transmitted identification information.” *Id.* at 9. However, for the same reasons discussed above, the citations do not show the verification of any “code” and “code similar to the code” that is a “secure identifier,” as PO confusingly purports. PO also alleges “[w]hen the light array transmits the command execution results, the light array does not transmit the code, i.e., the identification information” and “[i]n that event, the RF module of the identification box transmits to the ground device, using RF, the ‘same code,’ i.e., the identification information and a ‘similar code,’ i.e., the secure identifier.” MTA at 9-10. Again, this is disconnected from the ’959 Patent’s disclosure and finds no support. PO has not shown any portion of the ’959 Patent that discloses an RF module transmits identification information and a secure identifier, including within the context of “command execution results.” And PO’s allegation that such a transmitted identification information and secure identifier are verified (MTA at 10) is wrong and unsupported for the same reasons. PO failed to demonstrate that [22.i] has sufficient written description support. EX1023, ¶¶34-36.

**[22.e]:** [22.e] recites “the radio communication module is configured to utilize a secure identifier.” MTA at 5. PO has not demonstrated written description support. SC 22 recites a “device” that comprises “the radio communication module” of [22.e]. MTA at 3-6 ([22.pre], [22.b], [22.e]). The claim requires that “the device is coupled to the low-altitude aircraft.” *Id.* at 7 ([22.g]). Thus, the “radio communication module” is coupled to the low-altitude aircraft, and thus on-board the aircraft. PO

agrees. MTA at 4-5 ([22.b], [22.c], [22.d]). But PO's alleged support for [22.e] does not reference disclosure concerning a "radio communication module" that is on-board an aircraft and utilizes a "secure identifier." MTA at 5-6; EX1023, ¶¶37-39.

PO cites to EX2015 at 4:14-20 and 4:25-26, as well as EX2016 at ¶¶11-12 and EX1001 at 3:37-44 and 3:53-55. MTA at 5. These sections, however, refer only to a "ground" based device rather than a component on-board an aircraft. EX1001 at 3:37-44 and 3:53-55, and EX2015 at 4:14-20 and 4:25-26, are located under a heading titled "Ground Identification Device" and describe a "remote (e.g., ground)" device that "assist[s] the aircraft identification." EX2016 at ¶¶11-12 centers on how "a ground device to assist the aircraft identification has been invented." These sections thus cannot provide support for a "radio communication module" on-board an aircraft that "is configured to utilize a secure identifier." EX2015 at 3:4-5 and 3:14-16, EX2016 at ¶¶7 and 8, and EX1001 at 2:41-42 and 2:56-59 also fail to support [22.e]. They describe use of a "transponder" that transmits a code via an RF frequency, where the code corresponds to a sequence of blinked lights generated by an aircraft light array. *See, e.g.* EX2015 at 2:27-3:5, 3:14-16; EX1001 at 2:30-59. PO has not shown these sections describe using a "secure identifier" (or otherwise explain what a "secure identifier" is), let alone a "radio communication module" on board an aircraft configured to "utilize a secure identifier." EX1023, ¶40.

Finally, PO provides commentary at the end of the [22.e] analysis that

purports to summarize PO's cited sections, but it is wrong. PO states that "the '406 App. and the '153 Prov. both teach that the ground station crosschecks / cross-verifies two identifiers – the "code," i.e., the transmitted identification information, which can be transmitted through RF, and another "similar" code, i.e., the security identifier." MTA at 6. PO here refers to a "security identifier," that is not recited in SC 22, and PO's commentary is thus irrelevant. And contrary to the commentary, PO has not shown that the cited sections describe use of a "secure identifier" as claimed (or a "security identifier"), let alone cross checking or cross verifying that uses a "secure identifier," rendering PO's comments baseless. EX1023, ¶¶41.

Petitioners further note that, for the same reasons discussed in the Petition, [22.e] is not adequately supported by the '153 Prov. (EX2016), and SC 22 is not entitled to claim priority to PCT/US2016/037071 ("the '071 Application"). Petition (Paper 1, "Pet."), 7-16. The Board preliminarily recognized this in the Institution Decision (Paper 13, "ID"), stating that "the '153 Provisional and '071 Application lack adequate written description support for the 'secure identifier' limitation of claim 21," which is also recited in SC 22. ID at 11-14. The MTA does not properly address the Board's analysis of the Institute Decision or the priority issues raised by the Pet. Instead, the MTA generically states that "[i]n proposed substitute claim 22, 'utilize secure identifier' is defined in a manner that is consistent with the Board's interpretation and that is fully supported by both the '406 App. and the '153

provisional” and refers to Section IV of the MTA. MTA at 11. But PO misses the mark and none of that changes the Board’s correct determination of the ID. ID at 11-14. SC 22 recites the same “secure identifier” as original claim 21 and newly added limitation [22.i] simply attempts to explain how the “secure identifier” is “utilize[d]”—not what the term “secure identifier” itself means. MTA at 8-9 ([22.i]). As such, SC 22 still suffers from the very same written description issues recognized by the Board with respect to original claim 21. And PO’s reference to MTA Section IV is without merit because, as discussed, the MTA’s cited portions for [22.e] (contained in Section IV) do not provide adequate support. PO has failed to demonstrate that [22.e] has sufficient written description support. EX1023, ¶¶42-43.

## **II. THE SC IS UNPATENTABLE**

### **A. SC 22 is Indefinite**

SC 22 is indefinite for multiple reasons due to [22.c]. MTA at 4. First, the claim previously recites in [22.b] “a transmitted radio signal.” MTA at 4. It is thus unclear whether [22.c]’ “to receive a radio signal” refers to receiving the same transmitted radio signal of [22.b] or some other radio signal. The scope of SC 22 is thus ambiguous and unclear, rendering the claim indefinite. EX1023, ¶¶44-45. Second, the term “the received information” of [22.c] lacks antecedent basis. The claim previously recites to “transmit identification information associated with the low-altitude aircraft through a transmitted radio signal” in [22.b]. MTA at 4. Thus, “the

received information” in [22.c] could refer to the “identification information” that as transmitted in [22.b] due to the common usage of “information” in both terms. However, SC 22 also recites “to receive a radio signal” in [22.c]. *Id.* Thus, “the received information” could also refer to the received “radio signal” due to the common usage of “receive” and “received” in both terms. [22.c]’s “the received information” lacks antecedent basis and a POSITA would not have ascertained the scope of PO’s alleged invention, rendering the claim indefinite. EX1023, ¶46.

**B. SC 22 is Obvious**

SC limitations added via MTA and relevant orig. claim limitations are addressed; unaddressed orig. limitations are addressed in the Pet. Elements that are indefinite and/or lack written description support are addressed based on Petitioners’ understanding of PO’s position and as best understood by a POSITA.

| Ground | SC | 35 U.S.C. § | Prior Art                         |
|--------|----|-------------|-----------------------------------|
| 5      | 22 | 103         | Beard and Viggiano                |
| 6      | 22 | 103         | Taveira, Wang, Gong, and Viggiano |
| 7      | 22 | 103         | Taveira, Qi, Gong, and Viggiano   |
| 8      | 22 | 103         | Gong, Wang-II, and Viggiano       |
| 9      | 22 | 103         | Beard and Byers                   |
| 10     | 22 | 103         | Taveira, Wang, Gong, and Byers    |
| 11     | 22 | 103         | Taveira, Qi, Gong, and Byers      |

|    |    |     |                          |
|----|----|-----|--------------------------|
| 12 | 22 | 103 | Gong, Wang-II, and Byers |
|----|----|-----|--------------------------|

Grounds 5-8 rely on the Pet.’s original grounds and add Viggiano. Grounds 9-12 rely on the Pet.’s original grounds and add Byers. PO asserts a priority date of June 12, 2015. MTA at 2-10. Petitioners disagree. For the same reasons discussed in the Pet., the SC is not adequately supported by the ’153 Prov. (EX2016), and SC 22 is not entitled to claim priority to the ’071 Application. Pet. at 7-16. At best, the ’959 Patent’s priority date is October 1, 2017, the filing date of U.S. Provisional Application No. 62/566,450 (which Petitioner assumes but does not concede). *Id.* Viggiano (published October 11, 2007; filed April 7, 2006) is prior art under 35 U.S.C. §102(a)(1) and (a)(2). Byers (filed March 28, 2016) is prior art under 35 U.S.C. §102(a)(2) as the ’959 Patent is entitled to priority no earlier than October 1, 2017. *Id.* As Viggiano and Byers each addresses aircraft identification techniques, they are each highly relevant to the ’959 Patent. EX1023, ¶¶47-51; EX1001, 1:28-31, 2:27-29; EX1024, Abstract, ¶¶0002, 0012-0018, 0024-0027, Figs. 1, 3; EX1025, Abstract, 8:21-35, 8:65-9:24, 9:48-10:5, 10:30-11:26, Figs. 3, 4.

# **1. Ground 5: Beard and Viggiano**

## a) Motivation to Combine

A POSITA would have been motivated to combine Beard and Viggiano with a reasonable expectation of success. EX1023, ¶57. As combined, the Beard-Viggiano system would have provided the predictable result in which Beard’s

unmanned aerial system (UAS) RF transceiver utilizes Viggiano's teachings of transmitting a "message authentication code" (MAC) 38 formed by encrypted identification information 22 and a secret key of the UAS and transmitting identification information 32 of the UAS, and that Beard's receiver verifies the identity of the UAS by determining a MAC 58 from information 32 and comparing the two MACs 38 and 58 to determine a match and "authenticate" aircraft identity. EX1008, Abstract, 3:30-36, 4:61-5:7, 5:41-57, 8:39-42, 9:8-12, 10:12-20; EX1009, 3-8, 11; EX1024, ¶¶0002, 0011-0028, Figs. 1-3, Claims 1, 5, 8, 21, 39; EX1023, ¶57. A POSITA would have been so motivated because the use of false or fraudulent identity information by a UAV was known problem. EX1024, ¶¶0003-0007; EX1023, ¶57. Viggiano addresses this problem and furthers Beard's own verification teachings, providing a specific technique for aircraft identity verification that prevents "unauthorized third parties" from "enter[ing] a given air traffic control region by broadcasting false identification data." EX1024, ¶0004; EX1023, ¶57. Beard already discloses the general verification of UAS identity using transmitted identification information, and Viggiano provides implementation details for performing such verification, which would have been straightforward and routine to implement. EX1008, 3:30-36, 5:41-57, 8:39-42, 9:8-12, 10:12-20; EX1009, 5-8, 11; EX1024, ¶¶0002, 0011-0028, Figs. 1-3, Claims 1, 5, 8, 21, 39; EX1023, ¶57. Beard and Viggiano determine accurate aircraft identity and utilize ADS-B for aircraft data

transmissions, further demonstrating their compatibility and complementary nature. EX1008, 2:22-49, 2:66-3:36, 4:61-5:7, 6:20-29, 7:11-26; EX1009, 2-5, 7-11, 12-14; EX1024, ¶¶0002, 0011-0028, Figs. 1-3, Claims 1, 5, 8, 21, 39; EX1023, ¶57. Thus, there would have been a reasonable expectation of success. *Id.*

b) [22.b]

Beard's remote identification (RID) device attached to an unmanned aircraft system (UAS) includes an RF transceiver (*radio communication module*). Pet., 29-31. Beard-Viggiano teaches the RF transceiver transmits identification information 32, which can be encrypted and identifies the UAS aircraft (*configured to transmit identification information associated with the low-altitude aircraft*). *Id.*; Section II.B.1.a; EX1023, ¶58. [22.b]'s remaining aspects are taught in the Pet. at 29-31.

c) [22.c]

Beard's RF transceiver (*radio communication module*) can “‘listen’ for other proximate UAS within range, receiving identifier signals transmitted by another RID device (100a) aboard the proximate UAS and relaying the received signals throughout the RID coverage area of the RID device 100.” EX1008, 7:34-42; EX1009, 14; Pet., 31-34. The RID devices can communicate on different radio frequencies. Pet., 28-31. Accordingly, Beard teaches “*wherein the radio communication module is configured to receive a radio signal.*” EX1023, ¶¶59-60. The Beard-Viggiano combination teaches to “*store the received information in a*

storage.” *Id.* If “*the received information*” is interpreted to refer to the “*identification information associated with the low-altitude aircraft*” recited in [22.b], Beard-Viggiano combination discloses that Beard’s RID device can “store[] to memory” the “current position of the UAS 102 and identification data” of the UAS associated with the RID device, which would have thus included Viggiano’s identification information in the combination. *Id.*; EX1008, 5:44-46, 7:45-47; EX1009, 11, 15; Section II.B.1.a; EX1003, ¶125; Pet. at 31-34. If “*the received information*” is interpreted to refer to information associated with the “radio signal” recited in [22.c], Beard discloses that “memory 106 of the RID device 100 may serve as an ad hoc black box data recorder, storing data regarding the UAS 102 ***as well as other nearby UAS, based on received identifier signals.***” *Id.*; EX1008, 7:45-48 (emphasis added), 7:48-51; EX1009, 15; EX1003, ¶126; Pet., 31-34; EX1023, ¶60.

d) [22.e] and [22.i]

Beard’s RF transceiver forms a “*radio communication module.*” Section II.B.1.b. Beard’s receiver forms a “*remote portable detection system.*” Pet., 35-39. The Beard-Viggiano combination teaches that Beard’s RF transceiver transmits a message authentication code (MAC) 38 to Beard’s receiver (*the radio communication module is configured to utilize a secure identifier...wherein, utilizing the secure identifier comprises transmitting the secure identifier to the remote portable detection system*). EX1008, 3:30-36, 5:41-57, 7:11-17, 8:39-42, 9:8-

12, 9:67-10:20; EX1009, 3-8, 11, 15; Section II.B.1.a; Pet., 34-35; EX1023, ¶61. MAC 38 is a *secure identifier*. *Id.* MAC 38 is formed by identification information 22 that identifies the transmitting aircraft, as well as secret key 36 which is “unique” to the aircraft, which makes MAC 38 an *identifier* of the transmitting aircraft. *Id.*; EX1024, ¶¶0012-0015, 0019-0027, Figs. 1-3; EX1023, ¶61. Moreover, information 22 may be encrypted when it is used to form MAC 38, and MAC 38 is generated by using a “secure hash algorithm” and a “moving bit pattern” that truncates the result of the algorithm. *Id.*, ¶¶0017, 0019, 0026-0027. MAC 38 is also generated from use of a “secret key” which further aids in security by assuring that the transmitted MAC is “from the aircraft that the message claims it to be from.” *Id.*, ¶0022. These aspects make MAC 38 *secure*. EX1023, ¶61. The combination teaches the MAC 38 (*secure identifier*) is received by the receiver, which then compares the MAC 38 to another MAC 58 that is formed from the separately transmitted identification signal 32, to “authenticate” transmitter identity. *Id.*; Pet., 34-35; Section II.B.1.a; EX1024, ¶¶0002, 0011-0028, Figs. 1-3, Claims 1, 5, 8, 21, 39; EX1023, ¶62. By comparing MAC 58 and 38 to authenticate identity, a POSITA would have understood that the identification information 32 and identification information 22 that respectively form each MAC would have been cross verified with each other, and that this process would have authenticated the identity of the transmitter UAV and thus authenticated the transmitted identification information 32 representing this identity (“*for cross-*

*verifying the secure identifier and the transmitted identification information, to verify authenticity of the transmitted identification information”).<sup>2</sup> Id.* Moreover, because MAC 38 (*secure identifier*) is used in this authentication process to authenticate identity of the transmitter UAV, and because MAC 38 is generated from encrypted information 22, using a “secure hash algorithm” and a “moving bit pattern,” and using a “secret key,” it satisfies the Board’s *secure identifier* construction of “a credential that can be used to securely verify the identity of a device, such as an airborne object or ground-based transmitter.” EX1024, ¶¶0017, 0019, 0022, 0026-0027; Paper 13 at 10; EX1023, ¶62.

## 2. Grounds 6 and 7

**Motivation to Combine (MTC):** A POSITA would have been motivated to combine Taveira, Wang, and Gong/Taveira, Qi, and Gong as discussed in the Petition, and would have further been motivated to combine each combination with Viggiano with a reasonable expectation of success for the same reasons discussed for Viggiano in Section II.B.1.a. Pet. at 40-45, 60-62; EX1023, ¶63. The combinations would have provided the predictable result in which Taveira’s drone radio module 130 transmits a MAC 38 formed by encrypted identification

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<sup>2</sup> “*for cross-verifying...to verify*” recited by [22.e] is intended use language that lacks patentable weight. *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

information 22 and a secret key, and transmits identification information 32, and a receiving device verifies the identity of the drone by determining a MAC 58 from information 32 and comparing the two MACs 38 and 58 to determine a match and “authenticate” aircraft identity. *Id.*; Pet. at 40-45, 60-62; EX1003, ¶¶138-146, 172-176; EX1024, ¶¶0002, 0011-0028, Figs. 1-3, Claims 1, 5, 8, 21, 39. **[22.b]:** Taveira’s radio module 130 forms a *radio communication module*. Pet. at 49-50, 62. In the combinations, radio module 130 transmits identification information 32 identifying Taveira’s drone (*configured to transmit identification information associated with the low-altitude aircraft*). *Id.*; Section II.B.2 (MTC); EX1023, ¶64. [22.b]’s remaining aspects: taught by the combinations as in the Pet. Pet., 49-50, 62. **[22.c]:** Radio module 130 receives RF signals from other devices (*wherein the radio communication module is configured to receive a radio signal*). Pet., 50-53, 62; EX1023, ¶65. The combinations each teach to “*store the received information in a storage.*” *Id.* If “*the received information*” refers to the “*identification information associated with the low-altitude aircraft*” of [22.b], the combinations disclose storing identification data associated with the drone, which would have included access level information. *Id.*; Pet., 50-53, 62; Section II.B.2 (MTC). If “*the received information*” refers to information associated with the “*radio signal*” of [22.c], the combinations disclose such information is stored in memory unit 121 of drone 100. *Id.*; Pet., 50-53, 62; EX1023, ¶65. **[22.e], [22.i]:** Radio module 130 is a “*radio*

*communication module.”* Section II.B.2.b ([22.b]). Taveira and Gong teach a device that forms a “*remote portable detection system.*” Pet. at 55-58. The combinations each teach radio module 130 transmits MAC 38 to the device (*the radio communication module is configured to utilize a secure identifier...wherein, utilizing the secure identifier comprises transmitting the secure identifier to the remote portable detection system*). Pet. at 53-55; Section II.B.2 (MTC); EX1023, ¶66. MAC 38 is a *secure identifier*. See Section II.B.1.d. The combinations each teach the device forms a MAC 58 from identification information 32, and the MAC 58 and MAC 38 (*secure identifier*) are compared to each other by a comparator to “authenticate” the transmitter UAV’s identity. EX1024, ¶¶0002, 0011-0028, Figs. 1-3, Claims 1, 5, 8, 21, 39; Section II.B.2 (MTC); EX1023, ¶66. This comparison teaches *for cross-verifying the secure identifier and the transmitted identification information, to verify authenticity of the transmitted identification information* for the same reasons discussed in Section II.B.1.d.

### **3. Ground 8: Gong, Wang-II, and Viggiano**

**Motivation to Combine (MTC):** A POSITA would have been motivated to combine Gong and Wang-II as discussed in the Petition, and would have further been motivated to combine with Viggiano with a reasonable expectation of success for the same reasons discussed for Viggiano in Section II.B.1.a. Pet. at 64-66; EX1023, ¶68. The Gong-Wang-II-Viggiano combination would have provided the

predictable result in which Gong's communication module/unit of a drone transmits a MAC 38 formed by encrypted identification information 22 and a secret key of the drone, and transmits identification information 32 of the drone, and a geo-fencing device verifies the identity of the drone by determining a MAC 58 from information 32 and comparing the two MACs 38 and 58 to determine a match and "authenticate" aircraft identity. *Id.*; Pet. at 64-66; EX1003, ¶¶188-191; EX1024, ¶¶0002, 0011-0028, Figs. 1-3, Claims 1, 5, 8, 21, 39. **[22.b]:** Gong's communication module/unit is a *radio communication module*. Pet., 70-72. As combined, the communication module/unit transmits identification information 32 identifying Gong's drone (*configured to transmit identification information associated with the low-altitude aircraft*). *Id.*; Section II.B.3 (MTC); EX1023, ¶69. Gong-Wang-II teaches [22.b]'s remaining aspects as in the Pet. Pet., 70-72. **[22.e] and [22.i]:** Gong's communication module/unit is a *radio communication module*. Pet. at 70-72. Gong's geofencing device is a "*remote portable detection system*." Pet., 75-76. The combination teaches Gong's communication module/unit transmits MAC 38 to the geofencing device (*the radio communication module is configured to utilize a secure identifier...wherein, utilizing the secure identifier comprises transmitting the secure identifier to the remote portable detection system*). Pet., 74-75; Section II.B.3 (MTC); EX1023, ¶70. MAC 38 is a *secure identifier*. See Section II.B.1.d. The combination teaches the geofencing device forms a MAC 58 from identification

information 32, and the MAC 58 and MAC 38 (*secure identifier*) are compared to each other by a comparator to “authenticate” identity of the transmitter UAV. EX1024, ¶¶0002, 0011-0028, Figs. 1-3, Claims 1, 5, 8, 21, 39; Section II.B.3 (MTC); EX1023, ¶70. This comparison teaches *for cross-verifying the secure identifier and the transmitted identification information, to verify authenticity of the transmitted identification information*. See Section II.B.1.d.

#### 4. Ground 9: Beard and Byers

**Motivation to Combine (MTC):** A POSITA would have been motivated to combine Beard and Byers with a reasonable expectation of success. EX1023, ¶71.

**Combination of Byers embodiments:** Byers discloses unmanned aerial vehicle (UAV) authentication using “multiple modes of identification.” EX1025, 10:40-61, Fig. 4. The modes of identification include encrypted radio identity data and additional radio identity data transmitted by a UAV, and optical identity data transmitted via blinking lights of the UAV. *Id.*, 5:9-51, 5:58-6:46, 7:61-8:2, 8:65-9:47, 9:66-10:5, 10:30-39, Fig. 3. Figure 3 discloses an embodiment where a UAV transmits encrypted radio identity data, additional radio identity data, and optical identity data that is received and used by a receiving device to “certify” the UAV. *Id.*, 4:38-44, 5:9-51, 5:58-6:46, 6:61-7:8, 10:30-39, Fig. 3. Figure 4 discloses another embodiment where a UAV transmits the encrypted radio identity data and the optical identity data, and the data is received and compared by the receiving device; a match

from the comparison authenticates the UAV. *Id.*, 4:38-44, 5:9-51, 5:58-6:46, 6:61-7:8, 10:53-61, Fig. 4. A POSITA would have been motivated to combine the Figure 3 and Figure 4 embodiments such that the encrypted radio identity data and, *instead* of the optical identity data, the additional radio identity data, are compared to each other to determine a match to authenticate the UAV, with a reasonable expectation of success. *Id.*, 5:9-51, 5:58-6:46, 7:61-8:2, 8:65-9:24, 9:66-10:5, 10:30-39, 10:53-61, Figs. 3, 4; EX1023, ¶72. This combination would have been a “predictable variation” of Byers’ teachings (i.e., using additional radio ID data instead of optical ID data), and it would not have required a “leap of inventiveness” to combine the two embodiments that are “disclosed adjacent to each other” in Byers. *Id.*; *Bos. Sci. Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 991 (Fed. Cir. 2009). Providing another technique for UAV authentication, the combination would have furthered Byers’ goal of “implement[ing] highly robust and trustworthy systems and method[s] to identify individual UAVs, e.g., using various modes of generating identification information.” EX1025, 3:25-28; EX1023, ¶72. A POSITA would have further been motivated due to the limitations of using modulated lights for identity, such as maintaining line of sight and occlusion of the light stream. EX1023, ¶72. And for the reasons discussed, the combination would have had a reasonable expectation of success. *Id.* **Combination of Beard and Byers:** A POSITA would have been motivated to combine Beard and Byers. EX1023, ¶73. The Beard-Byers combination

would have provided the predictable result in which Beard's UAS RF transceiver transmits encrypted radio identity data and additional radio identity data to Beard's receiver, which compares the data to determine a match and authenticate the UAV, with a reasonable expectation of success. EX1008, Abstract, 3:30-36, 4:61-5:7, 5:41-57, 8:39-42, 9:8-12, 10:12-20; EX1009, 3-8, 11; EX1025, 5:9-51, 5:58-6:46, 7:61-8:2, 8:65-9:24, 9:66-10:5, 10:30-39, 10:53-61, Figs. 3, 4; EX1023, ¶73. A POSITA would have been so motivated because the use of false or fraudulent identity information by a UAV, including the "spoofing" of UAV identity, was a known problem in the art. EX1024, ¶¶0003-0007; EX1025, 1:15-17, 2:57-64, 3:35-37, 4:41-44, 5:6-8; EX1023, ¶73. Byers addresses this problem and furthers Beard's own verification teachings, providing a specific technique for aircraft identity authentication that "increase[s] the difficulty of spoofing" and identity misrepresentation. EX1025, 3:35-37, 4:38-44; EX1023, ¶73. Byers provides implementation details for Beard's authentication. EX1008, 3:30-36, 5:41-57, 8:39-42, 9:8-12, 10:12-20; EX1009, 5-8, 11; EX1025, 5:9-51, 5:58-6:46, 7:61-8:2, 8:65-9:24, 9:66-10:5, 10:30-39, 10:53-61, Figs. 3, 4; EX1023, ¶73. As such, a POSITA would have had a reasonable expectation of success. EX1023, ¶73. **[22.b]:** Beard's RF transceiver discloses a *radio communication module*. Section II.B.1.b ([22.b]). In the combination, the RF transceiver transmits encrypted radio identity data of Beard's UAS (*configured to transmit identification information associated with the*

*low-altitude aircraft*). *Id.*; Pet., 29-31; Section II.B.4 (MTC); EX1023, ¶74. Beard teaches [22.b]’s other aspects for the same reasons of the Pet. Pet., 29-31. **[22.c]:** Beard teaches “*wherein the radio communication module is configured to receive a radio signal.*” Section II.B.1.c ([22.c]). The Beard-Byers combination further teaches to “*store the received information in a storage.*” EX1023, ¶75. If “*the received information*” refers to the “*identification information associated with the low-altitude aircraft*” recited in [22.b], Beard-Byers combination discloses that Beard’s RID device attached to the UAS can “store[] to memory” the “current position of the UAS 102 and identification data” of the UAS associated with the RID device, which would have thus included Byers’ radio identity data in the combination. EX1008, 5:44-46, 7:45-47; EX1009, 11, 15; Section II.B.4 (MTC); EX1003, ¶125; Pet. at 31-34. If “*the received information*” is interpreted to refer to information associated with the “radio signal” recited in [22.c], Beard discloses that “the memory 106 of the RID device 100 may serve as an ad hoc black box data recorder, storing data regarding the UAS 102 ***as well as other nearby UAS, based on received identifier signals.***” *Id.*; EX1008, 7:45-48 (emphasis added), 7:48-51; EX1009, 15; EX1003, ¶126; Pet. at 31-34; EX1023, ¶75. **[22.e], [22.i]:** Beard’s RF transceiver forms a “*radio communication module.*” Section II.B.4.c ([22.c]). Beard’s receiver forms a “*remote portable detection system.*” Pet. at 35-39. The Beard-Byers combination teaches that Beard’s RF transceiver transmits an

encrypted radio identity data and additional radio identity data to Beard's receiver (*the radio communication module is configured to utilize a secure identifier...wherein, utilizing the secure identifier comprises transmitting the secure identifier to the remote portable detection system*). EX1008, 3:30-36, 5:41-57, 7:11-17, 8:39-42, 9:8-12, 9:67-10:20; EX1009, 3-8, 11, 15; Section II.B.4 (MTC); Pet., 34-35; EX1023, ¶76. The receiver compares the encrypted radio identity data and the additional radio identity data (*for cross-verifying the secure identifier and the transmitted identification information*) to determine a match and authenticate the UAV (*to verify authenticity of the transmitted identification information*). *Id.* The encrypted radio identity data (*secure identifier*) is used in this authentication process described above to authenticate the UAV, and because the radio identity data is encrypted, it teaches the Board's construction of *secure identifier*. *Id.*; ID at 10.

## 5. Grounds 10 and 11

**Motivation to Combine (MTC):** A POSITA would have been motivated to combine Taveira, Wang, and Gong/Taveira, Qi, and Gong as in the Petition, and would have further been motivated to combine each of these combinations with Byers with a reasonable expectation of success. Pet., 40-45, 60-62; EX1023, ¶77. A POSITA would have been so motivated to achieve Byers' advantages discussed in Section II.B.4 (MTC). *Id.* The combinations would have provided the predictable result in which Taveira's radio module 130 of a drone transmits encrypted radio

identity data and additional radio identity data to a receiving device, which compares the data to determine a match and authenticate the UAV. *Id.*; EX1025, 5:9-51, 5:58-6:46, 7:61-8:2, 8:65-9:24, 9:66-10:5, 10:30-39, 10:53-61, Figs. 3, 4; EX1023, ¶77.

**[22.b]:** Taveira’s radio module 130 forms a *radio communication module*. Pet. at 49-50, 62. In the combinations, radio module 130 transmits the drone’s encrypted radio identity data (*configured to transmit identification information associated with the low-altitude aircraft*). *Id.*; Section II.B.5 (MTC); EX1023, ¶78. The combinations each teach [22.b]’s remaining aspects for the same reasons of the Pet. *Id.*; Pet. at 49-50, 62. **[22.c]:** Radio module 130 receives RF signals from other devices (*wherein the radio communication module is configured to receive a radio signal*). Pet., 50-53, 62; EX1023, ¶79. The combinations teach to “*store the received information in a storage.*” *Id.* If “*the received information*” refers to the “*identification information associated with the low-altitude aircraft*” of [22.b], the combinations disclose storing identification data associated with the drone, which would have included access level information. Pet., 50-53, 62; Section II.B.5 (MTC); EX1023, ¶79. If “*the received information*” refers to information associated with the “*radio signal*” of [22.c], the combinations disclose such information is stored in memory unit 121 of drone 100. *Id.*; Pet., 50-53, 62; EX1023, ¶79. **[22.e], [22.i]:** Radio module 130 forms a “*radio communication module.*” Section II.B.5 ([22.b]). Taveira and Gong teach a device that forms a “*remote portable detection*

system.” Pet. at 55-58. The combinations teach that radio module 130 transmits encrypted radio identity data to the device (*the radio communication module is configured to utilize a secure identifier...wherein, utilizing the secure identifier comprises transmitting the secure identifier to the remote portable detection system*). Pet., 53-55; Section II.B.5 (MTC); EX1025, 5:9-51, 5:58-6:46, 7:61-8:2, 8:65-9:24, 9:66-10:5, 10:30-39, 10:53-61, Figs. 3, 4; EX1023, ¶80. The combinations teach that the receiving device compares the encrypted radio identity data and the additional radio identity data (*for cross-verifying the secure identifier and the transmitted identification information*) to determine a match and authenticate the UAV (*to verify authenticity of the transmitted identification information*). *Id.*; Section II.B.5 (MTC); EX1023, ¶80. The encrypted radio identity data is a *secure identifier* as discussed in Section II.B.4 ([22.e], [22.i]).

## **6. Ground 12: Gong, Wang-II, and Byers**

**Motivation to Combine (MTC):** A POSITA would have been motivated to combine Gong and Wang-II as discussed in the Petition, and would have further been motivated to combine with Byers with a reasonable expectation of success. Pet. at 64-66; EX1023, ¶81. A POSITA would have been so motivated to achieve Byers’ advantages discussed in Section II.B.4 (MTC). *Id.* The combination would have provided the predictable result in which Gong’s communication module/unit of a drone transmits encrypted radio identity data and additional radio identity data to a

receiving device, which compares the data to determine a match and authenticate the UAV. *Id.*; EX1025, 5:9-51, 5:58-6:46, 7:61-8:2, 8:65-9:24, 9:66-10:5, 10:30-39, 10:53-61, Figs. 3, 4; EX1023, ¶81. **[22.b]**: Gong's communication module/unit is a *radio communication module*. Pet. at 70-72. In the combination, the communication module/unit transmits encrypted drone radio identity data (*configured to transmit identification information associated with the low-altitude aircraft*). *Id.*; Section II.B.6 (MTC); EX1023, ¶82. [22.b]'s remaining aspects are taught for the same reasons of the Pet. Pet., 70-72. **[22.e], [22.i]**: Gong's communication module/unit is a *radio communication module*. Pet., 70-72. Gong's geofencing device is a "*remote portable detection system*." Pet., 75-76. The combination teaches that Gong's communication module/unit transmits encrypted radio identity data to the device (*the radio communication module is configured to utilize a secure identifier...wherein, utilizing the secure identifier comprises transmitting the secure identifier to the remote portable detection system*). Pet., 74-75; Section II.B.6 (MTC); EX1023, ¶83. Moreover, the combination teaches that the receiving device compares the encrypted radio identity data and the additional radio identity data (*for cross-verifying the secure identifier and the transmitted identification information*) to determine a match and authenticate the UAV (*to verify authenticity of the transmitted identification information*). *Id.* The encrypted radio identity data is a *secure identifier* as discussed in Section II.B.4 ([22.e], [22.i]).

Respectfully submitted,

BAKER BOTTS L.L.P.

A handwritten signature in black ink, appearing to read "Chad C. Walters". The signature is fluid and cursive, with a long horizontal stroke extending from the end.

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Chad C. Walters (Reg. No. 48,022)

Lead Counsel for Petitioners

Date: March 9, 2026

**CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this 9th day of March, 2026,  
**Petitioners' Opposition To Patent Owner's Non-Contingent Motion To Amend**  
and **Exhibits 1023-1026** were served by email on the following counsel for Patent  
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Respectfully submitted,

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