

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AXON ENTERPRISE, INC. AND DEDRONE HOLDINGS, INC.

Petitioners

v.

AIRSPACE DEFENSE, INC.

Patent Owner

Case No. IPR2025-00525

Patent 10,713,959

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

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LIST OF EXHIBITS

Ex. No.¹	Description
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

¹ Citations to patents are made by column and line cite; citations to patent publications are made by paragraph number; citations to Exhibits 1002, 1007, 1016, and 1028 are made with reference to the Bates-stamped pagination; citations to other exhibits are made to the page number of the document itself. And claim language is italicized throughout unless otherwise noted.

1011	International Publication No. WO2016/078093 A1 to Wang <i>et al.</i> , “System and Methods for Managing Unmanned Aerial Vehicles,” (“Wang”) filed November 21, 2014 and published May 26, 2016
1012	International Publication No. WO2016/154949 A1 to Gong <i>et al.</i> , “Authentication Systems and Methods for Generating Flight Regulations,” (“Gong”) filed March 31, 2015 and published October 6, 2016
1013	U.S. Patent Application Publication No. 2016/0127890 to Qi <i>et al.</i> , “Apparatus, System and Method of Protecting a Service Identifier,” (“Qi”) filed December 24, 2014 and published May 5, 2016
1014	International Publication No. WO2015/043123 A1 to Wang <i>et al.</i> , “Data Communication Systems and Methods,” (“Wang-IP”) 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 Liu <i>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 Viggiano <i>et al.</i> , “Secure ADS-B Authentication System and Method,” (“Viggiano”) filed April 7, 2006 and published October 11, 2007
1025	U.S. Patent No. 9,875,660 to Byers <i>et al.</i> , “Multi-Modal UAV Certification,” (“Byers”) filed March 28, 2016 and issued January 23, 2018
1026	Transcript of Deposition of Dr. Nikolaos Papanikolopoulos

1027	Third Declaration of Dr. Girish Chowdhary
1028	<i>Who goes there: Friend or Foe?</i> , Office of Technology Assessment, Congress of the United States, Washington, DC, U.S. Government Printing Office, June 1993 (“FF”)
1029	Declaration of Dr. Sylvia Hall-Ellis
1030	U.S. Patent No. 10,380,775 to Hayes, “Map Declutter,” (“Hayes”), filed August 6, 2014, issued August 13, 2019
1031	Transcript of Second Deposition of Dr. Nikolaos Papanikolopoulos
1032	14 C.F.R. § 91.119

I. PO FAILED TO MEET ITS WRITTEN DESCRIPTION BURDEN

[22.e] and [22.f] Lack Written Description Support: Petitioners demonstrated no support exists for (1) a *secure identifier* transmitted to the aircraft from a *remote portable detection system* (i.e., via the uplink); (2) a *secure identifier* received by the aircraft’s *radio communication module* (i.e., via RF); and (3) the *secure identifier* as construed and as further amended. PO’s Reply fails to cure these gaps and resorts to impermissible obviousness. First, PO points to an “identification code” transmitted in the wrong direction—downward from the aircraft rather than inbound on the uplink—that consists of generic data and is not secure. Second, PO points to “light beam” embodiments that rely entirely on optical hardware (photo sensors) rather than the claimed *radio communication module*. Third, PO contends “light beam information” provides support for the *secure identifier* as construed and amended, and that optical embodiments are “equally applicable” to RF. But to get there, PO impermissibly relies on obviousness. *L.A. Biomed.* PO’s arguments fail. **No support for uplink communication of secure identifier:** PO first argues the specification allegedly “describe[s] the secure identifier received by an aircraft” and says there are “numerous disclosures of various directions of transmission.” Reply, 1. PO misses the point. SC 22 does not require such generalized reception of a secure identifier and has nothing to do with “various” transmission directions. SC 22 is specific. PO must show the aircraft’s radio communication module **receives** a *secure*

identifier from a remote portable detection system (i.e., on the uplink). PO cites three specification (EX2015) passages, but none provide the requisite support. PO first argues the specification shows support by “transmitting an ‘identification code’ **from an aircraft to a ground station** via RF or visible light.” Reply, 1 (citing EX2015 at 2:11-17, 3:14-15) (emphasis added). This fails for two reasons. PO’s own quote admits this code is transmitted **from the aircraft to the ground station** (i.e., on the downlink), but that is transmission in the opposite direction of SC [22.f]’s recitation, which is on the uplink. Further, a generic identification code is not a *secure identifier* under the Board’s construction of that term. The Board already evaluated disclosure of a “code” in its Preliminary Guidance and found “no disclosure that either code is a ‘secure identifier’” as construed. Preliminary Guidance (“PG”) (Paper 23), 7. PO next argues sufficient support from disclosures of “**directing a specific wavelength** and modulated light beam emitter **to one of the aircrafts**” and sending a “light beam excitation flow 82” from a ground device to the aircraft. Reply, 1 (citing EX2015 at 3:31-4:4, 9:6-12). This fails for two reasons. A modulated light beam, regardless of specific wavelength, is not a *secure identifier* as construed. ID (Paper 13), 6-14. Nothing describes that light beam as being a credential, let alone being secure. Second, SC 22 requires the *radio communication module* to receive the *secure identifier*, but the relied-upon disclosures state that the light beam is received “through the light sensor” or “captured by the light sensor

19.” EX2015, 3:31-4:4, 9:6-12. This does not support the *secure identifier* received by the aircraft’s *radio communication module* as claimed. PO also suggests support in the prior claim language reciting that the *radio communication module* is configured to “utilize” a secure identifier. Reply, 2-3. However, that ignores that PO further narrowed the claim to recite that the module must **receive** the secure identifier **from** a remote portable detection system. PO must show support for that amended language and has not done so. **No support for aircraft’s radio communication module receiving the secure identifier:** None of PO’s arguments or citations provide adequate support for a *secure identifier* that is transmitted to an aircraft’s *radio communication module* (i.e., using RF). Reply, 2. PO argues that a POSITA would understand the specification’s description of “exchang[ing] information through light or RF” as conveying “embodiments which solely use RF.” *Id.* (citing EX2015 at 9:18-21). This is insufficient for two reasons. PO (and its expert) provides no explanation as to why the generic information exchange using “light or RF” supports RF-only embodiments that effectuate the specific details of optical embodiments. Reply, 2 (citing EX2018, ¶65). No specification portions support this. *Id.* Second, PO ignores context. Reply, 2. EX2015 at 9:6-11 explains a light sensor 19 of an aircraft’s identification box 1 is activated by a light beam transmitted from light beam emitter 23 of a ground device, and that “[t]his beam, when captured by the light sensor 19 will change the data transmitted” by the aircraft

via RF. *See also* EX2015, 2:11-15, 6:26-7:14, 9:6-11, Figs. 2-4. Exchanging information “through light or RF” thus relates to this example, where the uplink “activat[ion]” is “by a light beam,” not by RF—setting aside this does not even relate to a *secure identifier*. PO next argues the specification “show[s] possession of transmission of the secure identifier via RF.” Reply, 3. That addresses the wrong question. PO must show support for the aircraft’s *radio communication module receiving* the *secure identifier* from the *remote portable detection system*; so, while that communication must be via RF, it must also be in the correct direction and by the correct components. In any event, PO’s cites are insufficient. PO first cites to the aircraft’s “transponder” transmitting an “identification code.” *Id.* at 2 (citing EX2015 at 2:11-17, 3:14-15). But those disclosures, as addressed above, relate to (1) transmission from the aircraft, not reception by the aircraft’s radio communication module as claimed; and (2) an identification code that does not disclose a secure identifier as construed. Section I ([22.e], [22.f]), *supra*. PO then asserts the specification discloses “‘two-way communication’ where the ‘RF receiver and transmitter 16 and 27 in both devices’ engage in ‘a duplex communication’ and ‘exchange information,’ **including an excitation transmitted to the aircraft ‘through...RF’**,” but that is false and insufficient. Reply, 2-3 (emphasis added) (citing EX2015 at 9:18-21). That cited portion says nothing about “excitation” being transmitted to an aircraft “through...RF” and only refers to

generically exchanging “information.” Generic transmission of information is not sufficient to show the claimed reception of the *secure identifier* (as construed and claimed) by the aircraft’s *radio communication module*. See *Supra*. **No support for secure identifier**: PO has not and cannot show possession of the *secure identifier* as construed and claimed. PO’s arguments impermissibly rely on two layers of obviousness. Under *L.A. Biomed*, it is not enough that an earlier application’s disclosure “renders the later-claimed invention obvious;” the disclosure must *describe* the claimed invention with all its limitations. PO’s first layer of impermissible obviousness is its attempt to equate generic “light beam information” with the Board’s construed *secure identifier*. Reply, 3-5. PO asserts its light-beam disclosures constitute a *secure identifier*, because they are “specifically designed” to cause only the target aircraft to respond and thereby “verify” the aircraft’s identity. *Id.*, 4-5. This reasoning relies on quintessential obviousness, and that is impermissible when attempting to show written description support, as PO’s assertions appear nowhere in the specification. Additionally, the disclosed light beam information has nothing to do with a *secure identifier* in this patent. Indeed, the Institution Decision already found light beam information is not a secure identifier, and PO cannot subsequently find support by **narrowing** the claim. ID (Paper 13), 6-14. The light-beam information also does not “securely verify an identity.” And the light-beam information is fundamentally distinct from the claimed

invention because it is **optical**, whereas the claim requires a “*radio* communication module” to receive the secure identifier. EX1031, 17:1-20:6. PO’s second layer of impermissible obviousness is its conclusion that a POSITA would recognize optical disclosures are “equally applicable to the RF-only embodiments.” Reply, 5.² As explained, the specification describes no “RF-only embodiments” or that optical embodiments would have been implemented by RF (*see supra*), and PO and its expert only refer to specification portions relating to the generic exchange of “information” via RF. Reply, 2, 5; EX2018, ¶¶83-84; EX2015, 9:18-21; EX2016, ¶36. And setting aside that PO acknowledges it is relying on optical embodiments in making this leap, the leap is an independent layer of impermissible obviousness. Possession requires evidence in the intrinsic record, not expert conjecture about a possible “obvious” design choice or “equally applicable” modification. Reply, 5.

II. SC 22 IS INDEFINITE

“low altitude aircraft”: PO says “[a] POSITA would have readily apprehended the meaning of ‘low altitude aircraft’” but never says the meaning or its objective

² PO also refers to “directing a specific wavelength and modulated light beam emitter” to allege “Petitioner does not dispute” this discloses a signal sent to a UAV to cause disambiguation” via change in behavior. Reply, 3. Petitioner disputes this is even relevant; it has nothing to do with a *secure identifier* and is not sent via RF.

boundaries. Reply, 5. PO’s expert says “the specification clearly describes a low altitude aircraft **as one flying in low altitude airspace, e.g., up to 500 ft of the low altitude airspace**” (EX2018, ¶92 (emphasis added, citing EX1001, 1:50-52)). Reply, 5. But the specification never says what the “low altitude airspace” is and only discusses “related art small UASs” flying in a **portion** “**of the low altitude airspace**”—that portion being “**up to 500 ft**”—without revealing what the remaining portion is. *Id.*; EX1001, 1:50-52; Oppo., 5-6. The specification’s deficiencies render the SC indefinite. *Hall. v U.S.W.S.*, IPR2022-00074, Paper 56 at 23-34 (PTAB 2023) (“high pressure” indefinite due to lack of “objective boundaries” in the specification, which thus failed to inform POSITAs about invention scope with reasonable certainty). PO’s expert further demonstrated indefiniteness, testifying the low-altitude airspace could go up to “14,000 feet” or to “18,000 feet” (EX1031, 22:2-24:16) and could change based on location (New York, Minneapolis, Sacramento) (*id.*, 27:2-31:6), and also stated that a *low altitude aircraft* “depends [] on the type of the plane” (*id.*, 24:22-25:22). *Id.*, 21:11-31:17. A POSITA thus would have had no guidance on what constitutes the low altitude airspace rather than a portion of it, let alone what constitutes a *low altitude aircraft*. *Id.* PO’s citation to 14 C.F.R. § 91.119(c) further demonstrates indefiniteness. Reply, 5. § 91.119 defines the “[m]inimum safe altitudes” for aircraft and subsection (c) says that in “other than congested areas,” an aircraft cannot be operated at an altitude below “500

feet above the surface, except over open water or sparsely populated areas.” 14 C.F.R. § 91.119(c). But § 91.119(b) says that in “congested areas” an aircraft cannot be operated at an altitude below “1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.” 14 C.F.R. § 91.119(b). Which is it? Is PO arguing a *low altitude aircraft* is an aircraft that flies above or below 500 feet? Or is it one that flies below 1000 feet? Does the meaning of *low altitude aircraft* change depending on whether it is operated in “congested areas” or “other than congested areas?” PO’s expert adds more confusion, testifying a *low-altitude aircraft* has a “minimum altitude” of “500 feet” but then saying minimum altitudes differ depending on a “highest obstacle” which itself may be “completely different” based on location. EX1031, 26:5-31:17. This ambiguity and different potential meanings in different circumstances supports indefiniteness. *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1255 (Fed. Cir. 2008). **“the received information”**: PO relies on “implication” to address the lack of antecedent basis for “the received information.” Reply, 5-6. PO’s reliance is misplaced as *Cross Med. Prods.* is distinguishable. *Id.* There, “antecedent basis for ‘said longitudinal axis’ was by implication the longitudinal axis of the rod” previously recited by the claim at issue. *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1299, 1319 (Fed. Cir. 2005). But in SC 22, there is no previously recited element that provides antecedent basis by implication. Oppo., 6-7. PO alleges “[a] POSITA

would readily understand that because radio *signals* contain information, the received radio signal contains the received information.” Reply, 5-6. But PO’s own evidence says noisy transmitted radio signals might need correction to account for “**information which is missing in the received signal.**” EX2025, 19-20. Radio signals thus do **not** necessarily contain information, and a “receive[d] [] radio signal” cannot provide antecedent basis by implication for *the received information*. *Id.* Also, SC 22 encompasses receiving any radio signal, including signals that could not be received in the original claim, such as noisy signals. Oppo., 7.

III. THE AMENDMENT IMPERMISSIBLY BROADENS SC 22

Removing *received necessarily* broadens SC 22, as it no longer limits the signal received by the *radio communication module* to radio signals already received by the device, its radio frequency communication antenna, or another component. Oppo., 7. The specification describes multiple components can receive radio signals, including antenna and components of drone operation logic 1400 in Fig. 14. EX2015, 18:18-19:12, Fig. 14; EX1031, 12:19-15:14 (“Q: Does DSP 1426 send and receive signals between -- to and from main controller 1404? A: Among other things.”).

IV. SC 22 IS UNPATENTABLE OVER GROUNDS 5B-12B

First, PO argues Viggiano’s challenge 12 does not change a behavior as recited in [22.f] because “responding to a challenge is the default and expected behavior, not a changed behavior.” Reply, 7-8. This is false. The Oppo. explained transmission of

a challenge causes a first aircraft to change behavior by being triggered to prepare and transmit a challenge response. *Oppo.*, 15-16, 19-20, 23-25. Even if this is “default and expected behavior” in a challenge response framework (*Reply*, 8), it is still a *change* in behavior because at least immediately before receiving any challenge the aircraft is not transmitting a response, and the aircraft changes behavior to prepare and transmit a response when challenged. *Id.* PO’s expert agreed: “Q: If the device being authenticated does not receive a challenge, then would it send a response? A: No.” EX1031, 11:15-12:4. Next, PO argues challenge 12 “does not ‘enable[] disambiguation’ as it is the “absence of adequate responses after ‘two or more’ transmissions of challenge 12” that allows a conclusion the response failed. *Reply*, 8-9. PO also suggests the combinations do not involve transmission of a response—i.e., “continuing to not broadcast anything”—and that changed behavior of “other UAVs” causes disambiguation. *Id.* PO is incorrect. The grounds all involve transmission of a challenge response: challenge 12 (*secure identifier*) includes excitation that causes a first aircraft to prepare and transmit a challenge response (*comprising a specified excitation*), and the response allows the first aircraft to be distinguished from among multiple detected aircraft and highlighted for display (*enabling disambiguation of the first low-altitude aircraft from other detected low-altitude aircraft*)—specifically, when the response causes consecutively failed authentications. *Id.*; *Oppo.*, 13-15, 18-25; EX1024, 0015

(“authentication response[s]” used to authenticate). A challenge and response can each be “consecutive” challenges and responses—i.e., a second challenge and second response. *Id.*; EX1024, ¶0015. Contrary to PO’s assertion, a second consecutive response would be the result of an “individual[ly] transmit[t]ed” authentication challenge—a second authentication challenge—and when the second response causes multiple failed authentications and issuance of an alert, that would have been caused by the individually transmitted challenge. *Id.*; Reply, 8. This challenge’s excitation causes a first aircraft to change behavior by transmitting a challenge response. *Id.*; Oppo., 15-17, 19-21, 23-25 ([22.f], [22.i]). When failed authentication results due to this response, modification of a displayed user interface occurs causing other detected and displayed aircraft to be removed so the first aircraft is more clearly displayed; this modification is thus based on the triggered response, meeting elements [22.f] and [22.i] and the claimed *disambiguation* (modification of displayed user interface as discussed) based on *changed behavior* (triggered response). *Id.* **PO further** argues the combinations only disclose “isolating the non-responding aircraft” rather than “disambiguating” an aircraft as recited in [22.i] and that “Petitioner’s theory” involves aircraft that “failed to respond.” Reply, 8. PO mischaracterizes the combinations and its own claim language. The grounds all involve challenge responses rather than “fail[ure] to respond.” *Id.*; *supra*, Section IV. And as explained by the Petition with respect to the

original limitations of [22.i], a user interface provides information to a user regarding a plurality of detected aircraft, meeting *the remote portable detection system includes a user interface configured to provide to a user, information associated with a plurality of different low altitude aircraft detected by the remote portable detection system*. Petition, 37-39, 58-60, 64, 75-78; Oppo., 16-17, 20-21, 23-24 ([22.i]). The user interface displays multiple detected aircraft simultaneously, including a first aircraft, and upon consecutive authentication failures for the first aircraft, the user interface is modified such that other detected and displayed aircraft are removed and the first aircraft is thus more clearly displayed (*disambiguate the first low-altitude aircraft from the other detected low-altitude aircraft of the plurality*). Oppo., 16-17, 20-21, 23-24 ([22.i]). PO appears to adopt an unsupported, overly narrow *disambiguate* definition requiring simultaneously displaying a first aircraft and other aircraft at all times and throughout disambiguation, and the importing of “identifiers” such as “bold text” into the SC. Reply, 8-9; EX2018, ¶104. PO has not shown (or argued) such a definition is right, and the claim is not so restrictive; the grounds teach to *disambiguate* as claimed. And notwithstanding PO’s apparent definition (EX2022) relates to “words” and “phrases” (not aircraft), the grounds meet this, showing a difference between an aircraft that failed authentication and aircrafts that have not by more clearly displaying the failed-authentication aircraft from others. Oppo., 16-17, 20-21, 23-24; EX2022; EX2018, ¶104.

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.

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

Lead Counsel for Petitioners

Date: July 13, 2026

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this 13th day of July, 2026,
**PETITIONERS' SUR-REPLY TO PATENT OWNER'S REPLY TO
OPPOSITION TO NON-CONTINGENT REVISED MOTION TO AMEND**
and **EX1031-EX1032** were served by email on the following counsel for Patent
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Respectfully submitted,

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