

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner

v.

WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC.,
Patent Owner

Case IPR2025-00936
U.S. Patent No. 11,700,597

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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EXHIBITS

- SAMSUNG-1001 U.S. Patent No. 11,700,597 to Ko, et al. (“the ’597 patent”)
- SAMSUNG-1002 Excerpts from the Prosecution History of the ’597 Patent (“the Prosecution History”)
- SAMSUNG-1003 Declaration and Curriculum Vitae of Dr. Mark P. Mahon
- SAMSUNG-1004 Complaint, *Wilus Institute of Standards and Technology Inc., v. Samsung Electronics Co., Ltd., et al.*, 2-24-cv-00765 (EDTX) filed September 20, 2024
- SAMSUNG-1005 U.S. Pat. App. Pub. No. 2017/0223731 (“Lee”)
- SAMSUNG-1006 Robert Stacey et al., *Proposed TGax Draft Specification*, IEEE 802.11-16/0024r1 (Mar. 2, 2016), available at <https://mentor.ieee.org/802.11/dcn/16/11-16-0024-01-00ax-proposed-draft-specification.docx> (“Stacey”)
- SAMSUNG-1007 U.S. Pat. App. Pub. No. 2016/0345258 (“Zhou”)
- SAMSUNG-1008 U.S. Provisional App. No. 62/165,782 (“Zhou Provisional”)
- SAMSUNG-1009 European Pat. App. Pub. No. 2930997 (“Choudhury”)
- SAMSUNG-1010 Int’l Pub. No. WO 2015/120488 (“Liu”)
- SAMSUNG-1011 U.S. Pat. App. Pub. No. 2015/0312386 (“Lee”)
- SAMSUNG-1012 U.S. Pat. No. 9,172,447 (“Park”)
- SAMSUNG-1013 U.S. Pat. No. 7,848,330 (“Nishibayashi”)
- SAMSUNG-1014 U.S. Pat. No. 7,769,043 (“Cimini”)
- SAMSUNG-1015 European Pat. No. 3139690 (“Kim”)
- SAMSUNG-1016 Int’l Pub. No. WO 2015/198157 (“Seok”)
- SAMSUNG-1017 Int’l Pub. No. WO 2011/159831 (“Wentink”)
- SAMSUNG-1018 Int’l Pub. No. WO 2014/179713 (“Oteri”)

- SAMSUNG-1019 Kurose and Ross, Computer Networking: A Top-Down Approach, 8th Ed, 2021 (“Kurose”)
- SAMSUNG-1020 IEEE 802.11-2016
- SAMSUNG-1021 Declaration of Christopher Hansen, PH.D.
- SAMSUNG-1022 *Fintiv* Stipulation
- SAMSUNG-1023 [Reserved]
- SAMSUNG-1024 April 13, 2026 Deposition Transcript of Todor V. Cooklev, Ph.D.
- SAMSUNG-1025 Supplemental Declaration of Dr. Mark P. Mahon
- SAMSUNG-1026 *Dictionary of Computer and Internet Terms (Vol. 1)* (1st ed. 2016)
- SAMSUNG-1027 *The American Heritage Dictionary of the English Language* (5th ed. 2016)
- SAMSUNG-1028 U.S. Pat. App. Pub. No. 2018/0270038 (“Oteri”)
- SAMSUNG-1029 U.S. Pat. No. 9,942,193 (“Chu”)
- SAMSUNG-1030 U.S. Pat. No. 10,136,349 (“Yang”)
- SAMSUNG-1031 [Reserved]
through -1100
- SAMSUNG-1101 Memorandum from Coke Morgan Stewart, Acting Dir., USPTO, to All PTAB Judges (Mar. 26, 2025), <https://www.uspto.gov/sites/default/files/documents/InterimProcesses-PTABWorkloadMgmt-20250326.pdf>
- SAMSUNG-1102 *Taylor*, SAMSUNG SEMICONDUCTOR USA, <https://semiconductor.samsung.com/us/sas/company/taylor/> (last visited May 24, 2025)
- SAMSUNG-1103 *Samsung Electronics Unveils a US\$200bn Investment Plan in the U.S.*, BUS. KOREA (July 25, 2022), <https://www.businesskorea.co.kr/news/articleView.html?idxno=97177>
- SAMSUNG-1104 *Samsung Electronics to Receive up to \$6.4 Billion in Direct Funding under the CHIPS and Science Act*, SAMSUNG

SEMICONDUCTOR USA (Apr. 14, 2024),
<https://semiconductor.samsung.com/us/sas/local-news/samsung-electronics-to-receive-up-to-6-4-billion-in-direct-funding-under-the-chips-and-science-act/>

- SAMSUNG-1105 *President Trump Says Samsung Is Planning a Massive Investment in the US, Calls It an Aftermath of His Tariff Policy*, WCCFTECH (May 1, 2025), <https://wccftech.com/president-trump-says-samsung-is-planning-a-massive-investment-in-the-us/>
- SAMSUNG-1106 Order Granting Stay in *Maxeon Solar PTE. LTD. v. Hanwha Solutions Corp.*, No. 2:24-CV-00262-JRG (E.D. Tex. May 5, 2025) (Gilstrap, J.)
- SAMSUNG-1107 Order Granting Stay in *Cellspin Soft, Inc. v. Bytedance Ltd.*, No. 2:23-CV-00496-JRG-RSP (E.D. Tex. Jan. 26, 2025) (Payne, J.)
- SAMSUNG-1108 Motion Success for Stay Pending IPR (Post-Institution) (E.D. Tex.), DOCKETNAVIGATOR (last visited August 27, 2025)
- SAMSUNG-1109 LegalMetric, Individual Judge Report for Judge James Rodney Gilstrap Patent Cases December 2011 to January 2025
- SAMSUNG-1110 Complaint, *Wilus Inst. of Standards and Tech. Inc., v. Samsung Elecs. Co., Ltd., et al.*, No. 2-25-cv-00070 (E.D. Tex filed January 23, 2025)
- SAMSUNG-1111 U.S. District Court for the Eastern District of Texas Calendar Events Set for 6/1/2026 for Judge Rodney Gilstrap
- SAMSUNG-1112 [Reserved]
- SAMSUNG-1113 Wi-Fi 6 Patent Brochure, SISVEL (Mar. 21, 2025), https://www.sisvel.com/xlin7ipl485u/1kNkzUZptdvqKbYiX1DSfi/f518e18ee158be974d3c83f7cd7173be/Wi-Fi_6_Pool_patent_brochure.pdf
- SAMSUNG-1114 U.S. Pat. App. Pub. No. US 2015/0264617 A1 (“Choudhury US Publication”)
- SAMSUNG-1115 Geonjung Ko et al., *Issues on BSS Color Bits Collision* (Mar.

14, 2016) IEEE 802.11-16/0396r0

SAMSUNG-1116 Osama Aboul-Magd, *TGax March 2016 Meeting Agenda* (Feb. 5, 2016) IEEE 802.11-16/0235r7

SAMSUNG-1117 Letter from Kyung-rae Cho, Manager, Wilus Inst. of Standards. & Tech., Inc., to PatCom Administrator, IEEE-SA Standards Bd. Pat. Comm. (Jan. 15, 2021)

SAMSUNG-1118 [Reserved]

SAMSUNG-1119 Abhishek Patil et al., *Proposed Resolution for CID 193 (BSS Color Disable Indication)* (Nov. 9, 2016) IEEE 802.11-16/1413r8

SAMSUNG-1120 IEEE-SA Standards Board Bylaws, IEEE-SA Bd. Govs. (Nov. 2019)

SAMSUNG-1121 IEEE-SA Standards Board Operations Manual, IEEE-SA Standards Bd. (Nov. 2019)

SAMSUNG-1122 U.S. District Court – Judicial Caseload Profile (E.D. Tex), ADMIN. OFF. U.S. CTS. (June 2025)

SAMSUNG-1123 Excerpts from the Prosecution History of U.S. Pat. No. 11,129,163

Petitioner submits this Reply to Patent Owner's Response.

**I. GROUND 1A: THE PETITION MAKES CLEAR THAT LEE
RENDERS OBVIOUS A COLORING DISABLE BIT THAT
PREVENTS ALL BSS COLOR USE**

**A. Lee's "Coloring Disable Bit" Prevents CCA Level Change, Which
Is Based on BSS Color**

The Petition clearly explains that Lee renders obvious "not using a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed..." Petition, 11-12, 16. Specifically, the Petition discusses one BSS color-based operation as part of Ground 1A—Lee's CCA level change functionality. *See* Petition, 5-17; *see also* SAMSUNG-1024, 23:19-24:6, 32:11-33:23. The Petition also explains that, in Lee, "if the coloring disable bit indicates that the frame corresponds to a trigger frame related to multiuser transmission, the STA may not perform the change of the CCA level irrespective of information indicated by the coloring bit." SAMSUNG-1005, [0068]; SAMSUNG-1024, 23:19-24:6, 69:22-71:6 (Dr. Cooklev agreeing that Lee's CCA level change operation not being performed upon receiving a "coloring disable bit" is similar to embodiments in the '597 patent "where the spatial reuse operation is not performed when the BSS color has a predetermined value of zero"). Because (1) CCA level change is the only BSS color-based operation discussed as part of Ground 1A, and (2) the "coloring disable bit" prevents CCA level change, then Lee "renders obvious that the coloring bit is not used when the

coloring disable bit indicates that a CCA level change is not allowed.” Ex. 2017, 11:7-20; *see also* SAMSUNG-1025, ¶17 (citing SAMSUNG-1026 and SAMSUNG-1027, and explaining that a POSITA would have understood that the “disabling” from Lee’s “coloring disable bit” may be a “full disablement,” such that BSS color is “nonfunctional or inoperative”).

B. Patent Owner Failed to Identify Any Other BSS Color-Based Operations in the Lee Reference

Wilus failed to identify any operations in Lee—other than CCA level change—that use the coloring bit. POR, 11. Instead, Wilus argues that neither “Petitioner nor its expert provided evidence that Lee discloses not using BSS color for ‘any other color-based operations’ beyond CCA level change or spatial reuse.” POR, 12 (quoting Mahon Dep. Tr., 15:5-22). This is wrong. Samsung’s obviousness analysis identifies Lee’s CCA level change as an “operation based on the BSS color” within the meaning of the ’597 patent’s claims and shows that, upon receiving a “coloring disable bit,” BSS color is not used. Petition, 11-12. The ’597 patent’s independent claims do not require a specific set of BSS color-based operations, and Samsung need not explain how receipt of Lee’s “coloring disable bit” impacts a hypothetical set of BSS color-based operations to show that the claims are rendered obvious. SAMSUNG-1025, ¶14-15.

C. Samsung's Discussion of NAV And Power Save Operations In Ground 1B Is Irrelevant to Ground 1A

Samsung's reliance on "other operations based on BSS color," including "NAV setting [and] power save mode" as part of Ground 1B has no bearing on its analysis for Ground 1A. POR, 11. The claims analyzed as part of Ground 1A—claims 1, 7, 9, and 15—do not require NAV or power save functionality. SAMSUNG-1001, cls. 1, 7, 9, 15. Indeed, NAV and power save functionality are requirements of dependent claims 2, 3, 6, 10, 11, and 14, and these narrowing limitations do not restrict the independent claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1324-25 (Fed. Cir. 2005). Moreover, the Petition's discussion of NAV and power save operations relates to disclosures in the Stacey reference, which is not analyzed as part of Ground 1A. POR, 11 (citing Petition, 20). In short, Samsung's Ground 1A analysis is not undermined by its discussion of additional BSS color-based operations as part of a *different* ground involving *different* claims and a *different* prior art reference.

D. Even If Wilus Had Raised Other BSS Color-Based Operations In Lee, Petitioner's Obviousness Theory Need Not Incorporate All Of Lee's Disclosures

Had Wilus raised Lee's passing discussion of NAV functionality in its patent owner response (it did not), Samsung's Ground 1A analysis still stands. Indeed, one embodiment of a reference can invalidate a patent even if other embodiments in the same reference do not. *See, e.g., Krippelz v. Ford Motor Co.*, 667 F.3d 1261,

1268 (Fed. Cir. 2012) (reversing JMOL of validity because “just one embodiment” of reference failed to disclose claim limitation while “other embodiments” did disclose said limitation). Lee’s only reference to NAV functionality arises as part of Lee’s “Embodiment 3,” which is not relied upon by Samsung to show independent claim limitations [1.4] and [9.3] are met. *Compare* SAMSUNG-1005, [0067]-[0075] (describing “Embodiment 1” and including no references to NAV) *with id.*, [0081]-[0090] (discussing “Embodiment 3” and referencing NAV functionality); Petition, 11-12, 16; SAMSUNG-1025, ¶14-17. Indeed, Wilus agrees that Lee’s “Embodiment 3” is a “separate embodiment not at issue in the Petition’s theory....” POR, 15 n.2.

II. GROUND 1B: THE LEE-STACEY COMBINATION RENDERS OBVIOUS DEPENDENT CLAIMS 2, 3, 6, 10, 12, AND 14

A. Lee’s “Coloring Disable Bit” Can Be Seamlessly Integrated with Stacey’s NAV And Power Save Teachings

The teaching of the Lee and Stacey references combine to meet the ’597 patent’s claims. Wilus’s arguments to the contrary fail because (1) the “coloring disable bit” in the Lee-Stacey combination signals that operations based on BSS color (*i.e.*, NAV and/or power save operations) are not allowed, as opposed to signaling a trigger frame, and (2) as a result, the “errors” raised in Wilus’s Patent Owner Response are illusory.

1. In the Lee-Stacey combination, the “coloring disable bit” signals that NAV, power save, and/or spatial reuse operations are not allowed

The Petition makes clear that, in the Lee-Stacey combination, the “coloring disable bit” is used to “signal to STAs in the BSS that operations based on BSS color are disabled and/or disallowed.” Petition, 20. Indeed, “when the [Lee-Stacey Device] receives a frame whereby the coloring disable bit indicates that operations based on BSS color are not allowed, the [Lee-Stacey Device] does not perform inter-/intra-BSS NAV setting, power save operations (*e.g.*, entering a doze state until the end of a received intra-BSS PPDU), or spatial reuse operations using BSS color.” Petition, 22. The Petition never states that the “coloring disable bit” signals a trigger frame as part of the operation of the Lee-Stacey combination, as Wilus suggests. POR, 14-16. Instead, the important aspect of Lee for purposes of the Lee-Stacey combination is that the “coloring disable bit” indicates that an operation based on the BSS color (*i.e.*, CCA level change) is not allowed. SAMSUNG-1024, 74:16-20 (“Q. So you’d agree with me that the coloring disable bit in Lee could be an indication that CCA level change is not performed, correct? A. Yes.”).

2. Wilus’s alleged “errors” arising from the Lee-Stacey combination are illusory

The two “errors” Wilus alleges arise from the Lee-Stacey combination stem from Wilus’s mistaken belief that the Lee-Stacey combination’s “coloring disable bit” signals *both* (1) receipt of a trigger frame, and (2) BSS color collisions. In

essence, the “errors” Wilus describes involve a device’s supposed inability to determine whether a received “coloring disable bit” signals a trigger frame or a BSS color collision. POR, 17. However, as described above, Samsung’s Ground 1B involves modifying Lee such that the “coloring disable bit” indicates that BSS color is “disable[d].” Specifically, in the proposed combination, the “coloring disable bit” indicates that operations based on the BSS color (*i.e.*, NAV setting, power save operations, and spatial reuse operations) are not allowed. Samsung’s analysis for ground 1B does not mention using the “coloring disable bit” to indicate that a received frame is a trigger frame. Moreover, even if the “coloring disable bit” did indicate (1) that the received frame is a trigger frame or (2) that a BSS color collision has occurred, a POSITA would have understood that other means could be used to confirm whether a frame with a “coloring disable bit” is, in fact, a trigger frame. As an example, Stacey explains a trigger frame is a “control frame of subtype Trigger.” SAMSUNG-1006, 28.

B. A POSITA Would Have Found It Obvious Not To Use BSS Color for All Operations

As the Petition explains, a POSITA would have found it obvious not to use the BSS color indicated by the PPDU for all BSS color-based operations upon receipt of the “coloring disable bit.” *First*, because Stacey discloses that an AP selects the BSS color from a finite number of BSS color values, a POSITA would have understood that an AP may incidentally select the same BSS color as another

AP, leading to a BSS color collision. Petition, 19 (citing SAMSUNG-1003, ¶106).

Second, a POSITA would have found obvious that, when a BSS color collision occurs, operations normally based on BSS color—including NAV setting, power save operations, and spatial reuse operations—should not be performed using BSS color. Petition, 19-20. **Third**, and as a result of the first two, a POSITA would have been motivated to combine the BSS color-based operations in Stacey with Lee’s “coloring disable bit” such that, upon an AP’s recognition of a BSS color collision, the AP can signal to STAs in the BSS that operations based on BSS color are disabled and/or disallowed. Petition, 20.

Wilus’s argument that the “Petition fails to show that a POSITA would have found it obvious to disable all BSS operations in response to color collisions in view of Lee and Stacey” (POR, 19-22) fails because (1) a POSITA would appreciate the possibility of BSS color collisions, (2) Petitioner is not required to show that not using the BSS color indicated by the PPDU for all BSS color-based operations is the most desirable solution, and (3) Petitioner need not explain how the Lee-Stacey combination can perform NAV operations or spatial reuse operations without BSS color because the claims do not require these operations.

1. The Petition succinctly explains that a POSITA would have appreciated the possibility of BSS color collisions and would have found it obvious not to use BSS color in response

Wilus’s argument that “Dr. Mahon does not allege that a POSITA would understand [BSS color collisions] to be a sufficiently common occurrence that a POSITA would be motivated to design a system that disables color operations” fails. POR, 19-20. Specifically, Wilus argues that, because Stacey does not explicitly state how many bits are dedicated to BSS color, a POSITA would not be motivated to find a solution to the BSS color collision problem. *Id.* But the fact that Stacey does not set forth a specific number of bits or values for the BSS color is—at best—a neutral fact. Stacey states that BSS color values are “1 to TBD,” and a POSITA would have understood from this disclosure that the ultimate number of BSS colors could be quite small (*e.g.*, 2 or 4) such that BSS color collisions are a common occurrence. SAMSUNG-1025, ¶¶18-19; SAMSUNG-1006, 51; Petition, 19-20. Additionally, prior art and other publications from the relevant time frame show that BSS color collisions were known in the art, and that those of skill in the art were searching for solutions to the BSS color collision problem. SAMSUNG-1025, ¶20 (citing SAMSUNG-1007; SAMSUNG-1028; SAMSUNG-1029; SAMSUNG-1030).

2. Petitioner need not show that not using BSS color is the most desirable solution

Wilus's argument that "Dr. Mahon does not explain why a POSITA would have sought to disable all operations based on color in response to color collisions as opposed to implementing [other] techniques" is contrary to law. POR, 20. The "law does not require that a particular combination must be the preferred, or the most desirable, combination described in the prior art in order to provide motivation for the current invention." *In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004). Thus, Samsung was not required to show that the Lee-Stacey combination's functionality is preferable to other possible solutions, including "implementing techniques to avoid collisions in the first place" or "resolv[ing] those collisions quickly through prompt color reassignment...." POR, 20. The proper inquiry is "whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination...." *Fulton*, 391 F.3d at 1200 (quotations omitted). Samsung cleared this burden through the Petition's obviousness analysis, which is supported by expert testimony and explains why a POSITA would have been motivated to combine the Lee and Stacey references to address concerns related to BSS color collisions. Petition, 18-22; SAMSUNG-1025, ¶21.

3. Petitioner need not explain how the Lee-Stacey combination can perform NAV operations or spatial reuse operations without BSS color

Wilus's argument that "the Petition does not explain how a POSITA would have ceased all color-based operations while maintaining network functionality" also fails under the facts and law. POR, 20. "[T]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference...." *In re Keller*, 642 F.2d 413, 425 (1981). Moreover, "the inquiry is not whether a relevant artisan would combine a first reference's feature with a second reference's feature to meet requirements of the first reference that are not requirements of the claims at issue." *Axonics, Inc. v. Medtronic, Inc.*, 73 F.4th 950, 957 (2023).

Here, Wilus argues that the Lee-Stacey combination fails because NAV setting and spatial reuse are requirements of the Stacey reference, and the Petition allegedly fails to explain "how" these operations can be performed without using BSS color. POR, 20-21. But performing NAV and spatial reuse operations without using BSS color "are not requirements of the claims at issue." *Axonics*, 73 F.4th at 957. The claims analyzed under Ground 1B make no mention of spatial reuse operations, and with regard to NAV, the claims require "**not setting** an Intra-BSS Network Allocation Vector (NAV) by using the BSS color indicated by a signaling field of the PPDU...." SAMSUNG-1001, cl. 10 (emphasis added), *see also id.*, cl.

2. Thus, the fact that NAV setting and spatial reuse operations are allegedly requirements of the Stacey reference is irrelevant—Samsung is not required to “bodily incorporate” all aspects and requirements of the Stacey reference into its obviousness analysis. *Keller*, 642 F.2d at 425 (1981).

Regardless, Stacey discloses that NAV and spatial reuse operations *can* be performed without using BSS color. Regarding spatial reuse, Wilus is categorically incorrect that “Stacey teaches that spatial reuse requires different CCA levels and BSS coloring.” POR, 21. Unsurprisingly, Wilus does not cite any specific disclosures in Stacey to support this proposition. *Id.* Indeed, Stacey makes clear that for purposes of its “Color code based CCA rules,” “[a]n STA determines whether a detected frame is an inter-BSS or an intra-BSS frame by using BSS color *or MAC address in the MAC header.*” SAMSUNG-1006, 48 (emphasis added). Stacey also makes clear that NAV setting depends on whether the received frame is “identifie[d] as Intra-BSS” or “identified as Inter-BSS,” which can be determined using a MAC address as opposed to BSS color. *Id.*, 39, 48.

III. GROUND 2A: CHOUDHURY RENDERS OBVIOUS THE '597 PATENT'S INDEPENDENT CLAIMS BASED ON THE LOW POWER/HIGH INTERFERENCE INDICATOR EMBODIMENT AND THE COLOR VALUE OF "0000" EMBODIMENT

A. Choudhury's "Low Power/High Interference" Indicator Meets The Claims' "Signaling Information" Requirements

Choudhury's "Low Power/High Interference" indicator is the claimed "signaling information."

First, the Petition clearly explains that the "Low Power/High Interference" indicator "indicates that an operation based on the BSS color is not allowed." SAMSUNG-1001, cl. 1. Petitioner's theory is that a POSITA would have found obvious from Choudhury's disclosure that "the Low Power/High Interference Indicator functions as signaling information that, when set to '1', indicates that devices receiving a transmission from an OBSS STA with the indicator set to 1 are 'required to defer channel access,' regardless of the BSS color information." Petition, 53; SAMSUNG-1025, ¶¶22-24. Indeed, the following table from Choudhury shows that the Choudhury device *always limits channel access* when the "Low Power/High Interference Indicator" is set to 1.

COLOR Field	Low Power/High Interference Indicator	Receiving STA
Not used	<u>1</u>	<u>Limit Access</u>
Not used	0	Allow Access
STA in same BSS (that is, same COLOR field as receiving STA)	0 or <u>1</u>	<u>Limit Access</u>
STA in different BSS (different COLOR field from receiving STA)	0	Allow Access
STA in different BSS (different COLOR field from receiving STA)	<u>1</u>	<u>Limit Access</u>

SAMSUNG-1009, [0029] (annotated).

Thus, Choudhury's "Low Power/High Interference" indicator is signaling information indicating that an operation based on the BSS color (*i.e.*, COLOR-based channel access) is not allowed. SAMSUNG-1025, ¶¶22-24. Wilus's POR arguments to the contrary are unavailing and rest on a misunderstanding of Petitioner's theory. POR, 23-26.

Moreover, to the extent Wilus argues that checking the "Low Power/High Interference" indicator before the COLOR field is not disclosed by Choudhury, a POSITA would have found it obvious to check Choudhury's "Low Power/High Interference" indicator first and, if the indicator is set to 1, not check the COLOR field. SAMSUNG-1025, ¶24. For example, Choudhury describes using the three bits of the COLOR field to signal Basic Service Set identification, whereas the "Low Power/High Interference" indicator is represented by a single bit. SAMSUNG-1009, [0029]. A POSITA would have understood that it would be more efficient to read the value of the single-bit "Low Power/High Interference"

indicator first and only read the three-bit COLOR value after determining that the “Low Power/High Interference” indicator has a value of zero. SAMSUNG-1025, ¶24; SAMSUNG-1024, 101:6-14 (“Dealing with one bit, is it simpler than multiple bits? Yes, it is simpler.”). A POSITA also would have found this arrangement obvious to try, as there are only two alternatives: (1) check the “Low Power/High Interference” indicator first and the COLOR field second, or (2) check the COLOR field first and the “Low Power/High Interference” indicator second. SAMSUNG-1025, ¶24 (citing SAMSUNG-1009, [0029]). The order of checking the “Low Power/High Interference” indicator and the COLOR field does not change the functionality of Choudhury’s device, and a POSITA would have found the order to be a minor implementation detail that would have been obvious to adjust. *Id.*; SAMSUNG-1024, 95:14–100:10 (“I think that you could implement it like this.”). Moreover, a POSITA implementing the Choudhury device according to this arrangement would have enjoyed a reasonable expectation of success in doing so because changing the order in which the Choudhury device checks the “Low Power/High Interference” indicator and the COLOR field would require minor software changes that would be well within the knowledge of a POSITA as of the relevant time. *Id.*

Second, Wilus’s argument that “a POSITA would understand that there are *other* operations that use BSS color in an 802.11 system such as Choudhury’s”

fails for similar reasons as those discussed above with respect to the Lee grounds.

POR, 27; *see also* Section I.B-I.D. Wilus's Patent Owner Response identifies NAV operations, power save operations, and CCA level change as other operations based on BSS color that are not addressed by the Petition's Choudhury analysis.

POR, 28. But Wilus fails to cite any evidence from Choudhury indicating that its system conducts NAV operations, power save operations, or CCA level change based on BSS color. POR, 26-28. As with the Lee grounds, Samsung need not explain how receipt of Choudhury's "Low Power/High Interference" indicator impacts a hypothetical set of BSS color-based operations to show that the claims are rendered obvious. Here, Samsung focused on one BSS color-based operation from Choudhury—channel access—and showed that COLOR is not used for that operation when a "Low Power/High Interference" indicator with a value of 1 is received. Petition, 50-54. Samsung thus showed that the Choudhury device is configured not to use the BSS color indicated by the PPDU (*i.e.*, not to use the "COLOR" field for channel access) when signaling information (*i.e.*, the "Low Power/High Interference" indicator) indicates that an operation based on the BSS color (*i.e.*, channel access) is not allowed.

B. Choudhury's Reserved COLOR Value Of "0000" Also Meets the Claimed "Signaling Information" Requirement and Aligns with The '597 Patent's Disclosures

Choudhury's disclosure of using a BSS color of zero to indicate that BSS color should not be used aligns precisely with embodiments described in the '597 patent. The '597 patent describes an embodiment where "the wireless communication terminal ... transmit[s] the BSS color value indicated by the signaling field of the PPDU by setting it to a predetermined value," which "may be a reserved value which is not used in the BSS color when the BSS color is selected by the AP." SAMSUNG-1001, 21:32-39. The '597 patent further explains that the "predetermined value" for BSS color in this embodiment may be zero. *Id.* The '597 patent explicitly claims an embodiment where a BSS color with a "predetermined value" of zero is used to signal that operations based on BSS color are not allowed. *Id.*, cls. 8, 16.

Choudhury similarly describes that "reserved values may be used for the entire 4-bit [COLOR] field" such that "every STA that could successfully decode these values could be required to defer channel access" (*i.e.*, not use the BSS color indicated by the PPDU). SAMSUNG-1009, [0029]. As with the '597 patent, Choudhury explains that the "reserved" COLOR value may be "0000." *Id.* The Petition explains that "when the COLOR field is set to the reserved value of '0000,' it indicates that operations based on BSS COLOR are not allowed and the

receiving STA does not use BSS COLOR.” Petition, 54. With this disclosure, Choudhury’s use of a predetermined/reserved BSS color value of zero mirrors the embodiment described and claimed in the ’597 patent and renders the patent’s independent claims obvious.

The ’163 Patent (col. 21:16-30)

Specifically, the wireless communication terminal may transmit the PPDU by including signaling information indicating that the operation based on the BSS color is not allowed in the signaling field of the PPDU. At this time, the wireless communication terminal receiving the PPDU including the signaling information indicating that the operation based on the BSS color is not allowed may not perform the operation based on the BSS color. In a specific embodiment, the wireless communication terminal may transmit the BSS color value indicated by the signaling field of the PPDU by setting it to a predetermined value. At this time, the predetermined value may be a reserved value which is not used in the BSS color when the BSS color is selected by the AP. For example, the predetermined value may be zero.

Choudhury ([0043])

[0043] In a third exemplary variant, the COLOR field concept can be generalized to achieve the functionality of both the low power indicator and the COLOR field as defined by 802.11ah. For example, the first three bits of the COLOR bit can be used to set the basic service set identification (BSS ID) and the fourth bit can be used as a low power/high interference indicator. To take a more general view, the fourth bit may be seen simply as an indicator defining channel access. It can be set or cleared based on whatever appropriate criteria are desired, and may constitute a command to defer or allow access to a channel, not a specific indicator of device characteristics. It will be recognized, however, that the bit can be set for a low power device or a device causing or experiencing high interference so that it actually does serve as an indicator of device capability and network capacity can be defined to indicate network conditions or device characteristics. In addition or as an alternative, reserved values may be used for the entire 4-bit field. For example, 1111 may be used for low power devices or 0000 may be used for high interference devices. Every STA that could successfully decode these values could be required to defer channel access. The following table shows the functionality of the combined COLOR bit and low power indicator.

Wilus raises two arguments against Choudhury’s reserved COLOR value of “0000” embodiment: (1) the Choudhury device uses BSS color when it reads and identifies whether a COLOR field is set to the reserved value of “0000”; and (2) a reserved COLOR value of “0000” is not “an identifier of a BSS” as allegedly required by the claims. POR, 29-32. Both arguments fail.

1. When The “Signaling Information” Is A “Predetermined Value” Of The BSS Color, Reading And Identifying Whether The BSS Color Is The “Predetermined Value” Is Not “Using” The BSS Color

Wilus first contends that Choudhury’s reading and identifying the BSS color value of zero is itself a “use” of BSS color. POR, 30-31. Not so. When the claimed “signaling information indicating that an operation based on the BSS color” is a predetermined BSS color value—which the ’597 patent makes clear is within the scope of its claims—determining whether the BSS color field is the “predetermined value” is not a “use” of BSS Color. SAMSUNG-1025, ¶¶25-26.

This conclusion flows directly from the ’597 patent’s claims and specification. The patent’s independent claims recite “not ... us[ing] a Basic Service Set (BSS) color indicated by the PPDU when signaling information indicates that an operation based on the BSS color is not allowed...” SAMSUNG-1001, cl. 1. A POSITA would have understood from this claim structure that the claimed device must determine whether the “signaling information” indicates “that an operation based on the BSS color is not allowed” in order to “not ... use a Basic Service Set (BSS) color indicated by the PPDU” in response. SAMSUNG-1025, ¶26.

The patent’s specification and claims further make clear that the claimed “signaling information indicating that an operation based on the BSS color is not allowed” can be a BSS color field with a “predetermined value” of zero.

SAMSUNG-1025, ¶26; SAMSUNG-1001, cls. 1, 7, 8, 9, 15, 16. Specifically, the '597 patent describes an embodiment where “*when the BSS color value* indicated by the signaling field of the PPDU received by the wireless communication terminal *is a pre-determined value*, the wireless communication terminal *may not perform the SR operation described above based on the BSS color value.*”

SAMSUNG-1001, 21:25-48 (emphasis added). Claims 7 and 8 (as well as claims 15 and 16) cover this embodiment—“the processor is configured not to perform a spatial reuse operation when the BSS color indicated by a signaling field of the PPDU is a predetermined value” (claims 7 and 15), “wherein the predetermined value is 0” (claims 8 and 16). SAMSUNG-1001, cls. 7, 8, 15, 16. Because dependent claims further narrow the claims from which they depend, claims 7 and 8 (and claims 15 and 16) confirm that the '597 patent's example of using a BSS color value of zero is encompassed within the scope of independent claims 1 and 9. *See, e.g., Eli Lilly & Co. v. Teva Parenteral Meds., Inc.*, 845 F.3d 1357, 1371 (Fed. Cir. 2017) (“The doctrine of claim differentiation ... presumes that dependent claims are ‘of narrower scope than the independent claims from which they depend.’” (quoting *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1242 (Fed. Cir. 2003))).

Thus, when a device uses a predetermined BSS color value of zero as “signaling information indicating that an operation based on the BSS color is not

allowed,” reading and identifying the BSS color value of zero is not a “use” of BSS color that places the device outside the scope of the ’597 patent’s claims. Instead, reading and identifying a BSS color of zero in such a case, as is disclosed in Choudhury, is merely part of determining whether the “signaling information” indicates “that an operation based on the BSS color is not allowed....” SAMSUNG-1001, cl. 1.

Moreover, accepting Wilus’s argument that reading and identifying a BSS color of zero is a “use” of said BSS color requires reading one of the ’597 patent’s primary embodiments out of the claims. Doing so would also improperly render dependent claims 7, 8, 15, and 16 inconsistent with the claims from which they depend. The Federal Circuit has repeatedly found error in arguments that read out a primary embodiment described in the specification or require an interpretation that renders claims in the same patent inconsistent with one other. *See, e.g., Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996) (stating that an interpretation where “a preferred ... embodiment in the specification would not fall within the scope of the patent claim” is “rarely, if ever, correct and would require highly persuasive evidentiary support”); *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1362 (Fed. Cir. 2008) (“[T]his court strives to reach a claim construction that does not render claim language in dependent claims

meaningless.”). Thus, Wilus’s first argument against Choudhury’s disclosure of using a BSS color value of zero as the claimed “signaling information” fails.

2. Choudhury’s COLOR Field Is an Identifier of a BSS, Even If the COLOR Field May Have A “Reserved Value” of “0000”

Wilus’s second argument—that Choudhury’s use of a BSS color value of zero fails because the color value of zero is not an identifier of a BSS—fares no better than its first. As with Wilus’s first argument, the ’597 patent’s disclosure of using a predetermined BSS color value of zero is instructive and aligns perfectly with Choudhury.

In *both* the ’597 patent and the Choudhury reference, the reserved BSS color value of zero is not an identifier of a BSS. During deposition, Dr. Cooklev incorrectly suggested that a BSS color value of zero may be a valid identifier for a BSS in the ’597 patent, whereas in Choudhury it is not. *See* SAMSUNG-1024, 62:2-6 (“Q. Okay. So the difference between Choudhury and the ’163 patent is that in the ’163 patent, zero could be a valid BSS identifier, correct? A. Could be.”); *see also id.*, 57:14-21; 58:9-59:8; 60:13-62:6. Dr. Cooklev is incorrect. The ’597 patent is clear that the predetermined BSS color value of zero is a “reserved value” that is “*not used in the BSS color* when the BSS color is selected by the AP.” SAMSUNG-1001, 21:35-38 (emphasis added). Once again, the embodiment described in the ’597 patent aligns perfectly with Choudhury’s disclosures—in both, the predetermined BSS color value of zero is not used to identify a BSS.

Wilus's argument against Choudhury's use of a predetermined COLOR

value of zero lays bare an apparent inconsistency in the '597 patent's claims. The '597 patent's claims require both (1) that "the BSS color is an identifier of a BSS," and (2) that the claimed "signaling information indicating that an operation based on the BSS color is not allowed" encompasses a BSS color field with a "predetermined value" of zero. SAMSUNG-1001, cls. 1, 7, 8, 9, 15, 16. The Board recognized this apparent inconsistency in the Institution Decision. Paper 13, 13-14. Specifically, the Board found that "Choudhury's reserved value disclosures appear to teach [the] subject matter of claims 7 and 8 [*i.e.*, that the claimed "signaling information" be a BSS color with a "predetermined value" of zero], even if claims 7 and 8 are inconsistent with claim 1's requirement that 'the BSS color is an identifier of a BSS.'" *Id.*, 14 (quoting SAMSUNG-1001, 21:32-39 (disclosing that the BSS color value may be set to a predetermined value such as zero)).

This apparent inconsistency in the '597 patent's claims can be resolved by recognizing the distinction between BSS color and BSS color *value*. The '597 patent repeatedly uses the phrase "BSS color" as well as the phrase "BSS color value." *E.g.*, SAMSUNG-1001, 12:9 ("BSS color"); 12:17 ("BSS color value"). During deposition, Dr. Cooklev testified that "BSS Color" and "BSS color value" can, at times, be used interchangeably. SAMSUNG-1024, 15:13-22:19. But Dr. Cooklev also testified that "BSS color" would have been understood by a POSITA

to refer to “a concept or ... a field in a PPDU, which identifies the basic service set,” whereas the phrase “BSS Color value” would have been understood by a POSITA to refer to “a set of bits.” SAMSUNG-1024, 13:9-14:15, 15:7-12.

12		Q.	Would it be a fair interpretation to	
13			refer to the BSS color as the field or concept of	
14			BSS color and the BSS color value as the specific	
15			bits included in that field?	
16		MR. MILKEY:	Objection to form.	
17		THE WITNESS:	It is a -- in	
18			general, that's -- it seems to me correct	
19			what you are saying.	

Id., 16:12-19.

When the claims of the '597 patent are interpreted with the level of precision described by Dr. Cooklev, there is no inconsistency. Claims 1/9's requirement that “the BSS color is an identifier of a BSS” refers to the BSS color “concept” or “field”—it does not refer to a specific value or set of bits contained in the BSS color field of a received PPDU. SAMSUNG-1001, cls. 1, 9. In contrast, claims 7/8/15/16's reference to the BSS color “value” refers to the specific set of bits contained within the BSS color field of a given PPDU. SAMSUNG-1001, cls. 7, 8, 15, 16. Although a predetermined BSS color *value* of zero is not an identifier of a BSS, the predetermined value exists as part of a broader BSS color “concept” or

“field in a PPDU, which identifies the basic service set.” SAMSUNG-1024, 13:9–14:15, 15:7-12.

Moreover, recognizing the distinction between BSS color and BSS color *value* in the patent’s claims allows the claims to be construed in a manner that preserves their validity and avoids indefiniteness and written description issues. *See, e.g., Modine Mfg. Co. v. U.S. Int’l Trade Comm’n*, 75 F.3d 1545, 1557 (Fed. Cir. 1996) (“[W]hen claims are amenable to more than one construction, they should when reasonably possible be interpreted to preserve their validity”), *overruled on other grounds, Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558 (Fed. Cir. 2000). Here, if claim 1 were interpreted in a manner that requires a BSS color value that identifies a BSS, claims 7 and 8 would be irreconcilably inconsistent with claim 1, such that they would be invalid as indefinite and/or lacking written description support. When an interpretation that avoids inconsistency between claims in the same patent exists, that interpretation is correct. *See Modine Mfg. Co.*, 75 F.3d at 1557. Thus, claim 1’s “BSS color” limitation should be interpreted to refer to the general concept or field of BSS color, which is “an identifier of a BSS,” even when the BSS color value for a given PPDU may be a “predetermined value” signifying that BSS color should not be used. SAMSUNG-1001, cls. 1, 7, 8, 9, 15, 16. With this interpretation, Choudhury’s example of using a BSS color value of “0000” to signal that color-

based channel access should be limited falls squarely within the scope of the '597 patent's claims.

Because Choudhury's use of a reserved BSS color value of zero aligns perfectly with embodiments described and claimed in the '597 patent, Choudhury renders obvious the Challenged Claims.

**IV. BECAUSE GROUND 2A MEETS THE '597 PATENT'S
INDEPENDENT CLAIMS, GROUNDS 2B AND 2C RENDER
OBVIOUS CLAIMS 2-6 and 10-14**

Wilus relies on its arguments against Choudhury alone in its assessment of the combinations of Choudhury with Stacey and Zhou as part of Grounds 2B and 2C. POR, 32-34. Because Wilus's arguments against Choudhury fail for the reasons discussed above, and because Wilus does not separately argue against the combinations, Grounds 2B and 2C render obvious claims 2-6 and 10-14 of the '597 patent.

V. CONCLUSION

For these reasons, the Challenged Claims are unpatentable.

Respectfully submitted,

Dated: May 22, 2026

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioners' Reply to Patent Owner's Response totals 5,391, which is less than the 5,600 allowed under 37 CFR § 42.24.

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(1) and 42.6(e)(4)(iii), the undersigned certifies that on May 22, 2026, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response and accompanying exhibits were provided by email to the Patent Owner by serving the email correspondence addresses of record as follows:

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