

Paper No. \_\_\_\_

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GEOTAB INC. AND GEOTAB USA, INC.,  
Petitioners,

v.

FRACTUS, S.A.  
Patent Owner.

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Case No. IPR2025-01026  
Patent No. 11,031,677

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**PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE**

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| <i>Bilstad v. Wakalopulos</i> ,<br>386 F.3d 1116 (Fed. Cir. 2004) .....                                                                     | 14, 16        |
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### **REGULATIONS**

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## **EXHIBIT LIST**

| <b>Exhibit</b> | <b>Description</b>                                                                                                                                                                                                                |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1001           | U.S. Patent No. 11,031,677                                                                                                                                                                                                        |
| 1002           | Prosecution History of U.S. Patent No. 11,031,677                                                                                                                                                                                 |
| 1003           | U.S. Patent No. 11,349,200                                                                                                                                                                                                        |
| 1004           | Prosecution History of U.S. Patent No. 11,349,200                                                                                                                                                                                 |
| 1005           | U.S. Patent No. 12,095,149                                                                                                                                                                                                        |
| 1006           | Prosecution History of U.S. Patent No. 12,095,149                                                                                                                                                                                 |
| 1007           | Declaration of Daniel van der Weide, Ph.D.                                                                                                                                                                                        |
| 1008           | Curriculum Vitae of Daniel van der Weide, Ph.D.                                                                                                                                                                                   |
| 1009           | P. Ciais, R. Staraj, G. Kossiavas, and C. Luxey. "Design of an Internal Quad-Band Antenna for Mobile Phones," <i>IEEE Microwave and Wireless Components Letters</i> , vol. 14, no. 4, pp. 148-150, April 2004 ("Ciais-Quadband"). |
| 1010           | P. Ciais, R. Staraj, G. Kossiavas, and C. Luxey. "Compact Internal Multiband Antenna for Mobile Phone and WLAN Standards," <i>Electronics Letters</i> , vol. 40, no. 15, pp. 920-921, July 2004 ("Ciais-Multiband")               |
| 1011           | X. Jing, Z. Du, and K. Gong. "Compact Planar Monopole Antenna for Multi-band Mobile Phones," in <i>2005 Asia-Pacific Microwave Conference Proceedings</i> , vol. 4, pp. 2657-2660, IEEE, 2005 ("Jing").                           |
| 1012           | H. Nakano, Y. Sato, H. Mimaki and J. Yamauchi. "An Inverted FL Antenna for Dual-Frequency Operation," <i>IEEE Transactions on Antennas and Propagation</i> , vol. 53, no. 8, pp. 2417-2421, Aug. 2005 ("Nakano")                  |
| 1013           | U.S. Patent App. Pub. No. 2007/0200773 ("Dou")                                                                                                                                                                                    |
| 1014           | Declaration of James L. Mullins, Ph.D.                                                                                                                                                                                            |

| Exhibit | Description                                                                                                                                                                                                                                                                  |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1015    | Curriculum Vitae of James L. Mullins, Ph.D.                                                                                                                                                                                                                                  |
| 1016    | Plaintiff's Disclosure of Asserted Claims and Infringement Contentions Against Geotab Pursuant to Local Patent Rules 3-1 and 3-2, <i>Fractus, S.A., v. Geotab Inc.</i> , No. 2:24-cv-01008 (E.D. Tex.), served March 12, 2025                                                |
| 1017    | D.I. 75, Fractus's Opening Claim Construction Brief, <i>Fractus, S.A. v. ADT LLC</i> , No. 2:22-cv-00412 (E.D. Tex. Nov. 16, 2023)                                                                                                                                           |
| 1018    | D.I. 75-1, Exhibit 1 to D.I. 75, Fractus's Opening Claim Construction Brief, <i>Fractus, S.A. v. ADT LLC</i> , No. 2:22-cv-00412 (E.D. Tex. Nov. 16, 2023)                                                                                                                   |
| 1019    | D.I. 92, Joint Claim Construction Chart, <i>Fractus, S.A. v. ADT LLC</i> , No. 2:22-cv-00412 (E.D. Tex. Jan. 4, 2024)                                                                                                                                                        |
| 1020    | D.I. 115, Claim Construction Order, <i>Fractus, S.A. v. ADT LLC</i> , No. 2:22-cv-00412 (E.D. Tex. Feb. 25, 2024) (Payne, M.J.)                                                                                                                                              |
| 1021    | D.I. 127, Order, <i>Fractus, S.A. v. ADT LLC</i> , No. 2:22-cv-00412 (E.D. Tex. Mar. 15, 2024) (Gilstrap, D.J.)                                                                                                                                                              |
| 1022    | D.I. 82, Defendants ADT LLC and Vivint, Inc.'s Responsive Claim Construction Brief, <i>Fractus, S.A. v. ADT LLC</i> , No. 2:22-cv-00412 (E.D. Tex. Dec. 14, 2023)                                                                                                            |
| 1023    | D.I. 253, Order, <i>Fractus, S.A. v. ADT LLC</i> , No. 2:22-cv-00412 (E.D. Tex. Oct. 4, 2024) (Gilstrap, D.J.)                                                                                                                                                               |
| 1024    | D.I. 1, Complaint, <i>Fractus, S.A., v. Geotab Inc.</i> , No. 2:24-cv-01008 (E.D. Tex. Dec. 6, 2024)                                                                                                                                                                         |
| 1025    | 3GPP TS 36.101 v8.4.0 (2008-12) Technical Specification: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (Release 8), 2008 |

| <b>Exhibit</b> | <b>Description</b>                                                                                                                                                                                                                           |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1026           | Ericsson white paper, “LTE—an introduction,” no. 284 23-3124 Uen Rev B (June 2009)                                                                                                                                                           |
| 1027           | Declaration of Gordon MacPherson                                                                                                                                                                                                             |
| 1028           | ’677 patent Claim Limitation Comparison Chart                                                                                                                                                                                                |
| 1029           | U.S. Patent Publication No. 2006/0214857 (“Ollikainen”)                                                                                                                                                                                      |
| 1030           | ETSI TS 145 005 V4.3.0 (2001-14) Technical Specification: Digital cellular telecommunications system (Phase 2+); Radio transmission and reception (3GPP TS 45.005 version 4.3.0 Release 4)                                                   |
| 1031           | ZigBee Specification (Jun. 27, 2005)                                                                                                                                                                                                         |
| 1032           | ETSI TS 125 308 V6.2.0 (2004-09) Technical Specification: Universal Mobile Telecommunications System (UMTS); UTRA High Speed Downlink Packet Access (HSDPA); Overall description; Stage 2 (3GPP TS 25.308 version 6.2.0 Release 6)           |
| 1033           | ETSI TS 125 101 V6.5.0 (2004-09) Technical Specification: Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (FDD) (3GPP TS 25.101 version 6.5.0 Release 6)                             |
| 1034           | ETSI TS 125 102 V6.0.0 (2003-12) Technical Specification: Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (TDD) (3GPP TS 25.102 version 6.0.0 Release 6)                             |
| 1035           | ETSI TS 121 101 V6.0.0 (2004-12) Technical Specification: Universal Mobile Telecommunications System (UMTS); Technical Specifications and Technical Reports for a UTRAN-based 3GPP system (3GPP TS 21.101 version 6.0.0 Release 6)           |
| 1036           | 3GPP TR 23.882 V1.2.3 (2006-06) Technical Report: 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; 3GPP System Architecture Evolution: Report on Technical Options and Conclusions (Release 7) |

| Exhibit | Description                                                                                                                                                                                                                                                                                                                                                                     |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1037    | 3GPP TR 23.882 V1.6.1 (2006-11) Technical Report: 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; 3GPP System Architecture Evolution: Report on Technical Options and Conclusions (Release 7)                                                                                                                                    |
| 1038    | 3GPP TR 23.882 V1.8.0 (2007-02) Technical Report: 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; 3GPP System Architecture Evolution: Report on Technical Options and Conclusions (Release 7)                                                                                                                                    |
| 1039    | Pages from E. Dahlman et al., <i>3G Evolution: HSPA and LTE for Mobile Broadband</i> (Academic Press 2d ed. 2008)                                                                                                                                                                                                                                                               |
| 1040    | U.S. Patent Publication No. 2008/0018543 (Baliarda-543)                                                                                                                                                                                                                                                                                                                         |
| 1041    | U.S. Department of State, <i>United States Delegation Report: World Radiotelecommunications Conference 2007</i> (2007), available at <a href="https://2001-2009.state.gov/documents/organization/108955.pdf">https://2001-2009.state.gov/documents/organization/108955.pdf</a> (visited May 19, 2025)                                                                           |
| 1042    | IEEE Std. 802.11a-1999, Supplement to the IEEE Standard for Information Technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements— Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: High-speed Physical Layer in the 5 GHz Band (Dec. 30, 1999)               |
| 1043    | IEEE Std. 802.11b-1999, Supplement to the IEEE Standard for Information Technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements— Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Higher-Speed Physical Layer Extension in the 2.4 GHz Band (Jan. 20, 2000) |
| 1044    | Specification of the Bluetooth System version 2.0, volume 2 (issued Nov. 4, 2004)                                                                                                                                                                                                                                                                                               |

| Exhibit   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1045      | Second Report and Order, <i>In re Service Rules for the 698-746, 747-762 and 777-792 MHz Bands</i> (WT Docket No. 06-150); <i>Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems</i> (CC Docket No. 94-102); <i>Section 68.4(a) of the Commission’s Rules Governing Hearing Aid-Compatible Telephones</i> (WT Docket No. 01-309); <i>Biennial Regulatory Review—Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services</i> (WT Docket No. 03-264); <i>Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission’s Rules</i> (WT Docket No. 06-169); <i>Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band</i> (PS Docket No. 06-229); <i>Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010</i> (WT Docket No. 96-86); <i>Declaratory Ruling on Reporting Requirement under Commission’s Part 1 Anti-Collusion Rule</i> (WT Docket No. 07-166), FCC 07-132 (Jul. 31, 2007), available at <a href="https://docs.fcc.gov/public/attachments/FCC-07-132A1.pdf">https://docs.fcc.gov/public/attachments/FCC-07-132A1.pdf</a> (visited May 21, 2025) |
| 1046      | ITU, Report ITU-R M.2134-0: Requirements related to technical performance for IMT-Advanced radio interface(s) (2008), <i>available at</i> <a href="https://www.itu.int/pub/R-REP-M.2134-2008/en">https://www.itu.int/pub/R-REP-M.2134-2008/en</a> (visited May 22, 2025)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1047      | Chart 45 to EX1016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 1048      | Chart 44 to EX1016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 1049-1061 | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1062      | October 2021 Letter from Fractus to Geotab                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 1063      | Email communications of Geotab and Fractus between November 2021 and January 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 1064      | November 2021 Letter from Geotab to Fractus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Exhibit | Description                                                                                                           |
|---------|-----------------------------------------------------------------------------------------------------------------------|
| 1066    | D.I. 17, Consolidation Order, <i>Fractus, S.A. v. Verizon</i> , No. 2:24-cv-01009 (E.D. Tex. Feb. 18, 2025)           |
| 1067    | Federal Court Statistics June 30, 2025                                                                                |
| 1068    | D.I. 34, Docket Control Order, <i>Fractus, S.A. v. Verizon</i> , No. 2:24-cv-01009 (E.D. Tex. Mar. 26, 2025)          |
| 1069    | Eastern District of Texas Model Patent Order                                                                          |
| 1070    | D.I. 14-1, Proof of Service of Complaint, <i>Fractus, S.A. v. Geotab</i> , No. 2:24-cv-01008 (E.D. Tex. Jan. 3, 2025) |
| 1071    | D.I. 18, Consolidation Order, <i>Cornell Univ. v. AT&amp;T</i> , No. 2:25-cv-00054 (E.D. Tex. Feb. 18, 2025)          |
| 1072    | D.I. 25, Docket Control Order, <i>Cornell Univ. v. AT&amp;T</i> , No. 2:25-cv-00054 (E.D. Tex. Mar. 26, 2025)         |
| 1073    | D.I. 11, Consolidation Order, <i>H2 Intellect v. The Home Depot</i> , No. 2:25-cv-00123 (E.D. Tex. Apr. 6, 2025)      |
| 1074    | D.I. 46, Docket Control Order, <i>H2 Intellect v. The Home Depot</i> , No. 2:25-cv-00123 (E.D. Tex. May 30, 2025)     |
| 1075    | D.I. 9, Consolidation Order, <i>HyperQuery v. Nemetschek Group</i> , No. 2:25-cv-00043 (E.D. Tex. Apr. 6, 2025)       |
| 1076    | D.I. 17, Docket Control Order, <i>HyperQuery v. Nemetschek Group</i> , No. 2:25-cv-00043 (E.D. Tex. Jun. 2, 2025)     |
| 1077    | D.I. 7, Consolidation Order, <i>Infogation v. TomTom</i> , No. 2:24-cv-01022 (E.D. Tex. Feb. 18, 2025)                |
| 1078    | D.I. 23, Docket Control Order, <i>Infogation v. TomTom</i> , No. 2:24-cv-01022 (E.D. Tex. Mar. 27, 2025)              |
| 1079    | Reserved                                                                                                              |
| 1080    | Reserved                                                                                                              |

| Exhibit | Description                                                                                                                             |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 1081    | D.I. 16, Docket Control Order, <i>IOT Innovations v. Snap One</i> , No. 2:25-cv-00022 (E.D. Tex. Mar. 26, 2025)                         |
| 1082    | D.I. 12, Consolidation Order, <i>QR Switch v. Walmart</i> , No. 2:25-cv-00064 (E.D. Tex. Feb. 18, 2025)                                 |
| 1083    | D.I. 22, Docket Control Order, <i>QR Switch v. Walmart</i> , No. 2:25-cv-00064 (E.D. Tex. Mar. 26, 2025)                                |
| 1084    | D.I. 21, Docket Control Order, <i>Valtrus Innovations v. Equinix</i> , No. 2:25-cv-00016 (E.D. Tex. Mar. 27, 2025)                      |
| 1085    | Chart of Consolidated and Individual Cases With Jury Selection Set For September 14, 2026 Before Judge Gilstrap                         |
| 1086    | Chart Listing Trials Held Before Judge Gilstrap Since September 29, 2024                                                                |
| 1087    | D.I. 39, Consolidation Order, <i>Netlist v. Samsung</i> , No. 2:22-cv-00293 (E.D. Tex. Oct. 21, 2022)                                   |
| 1088    | D.I. 832, Minute entry showing start of jury selection, <i>Netlist v. Samsung</i> , No. 2:22-cv-00293-JRG-RSP (E.D. Tex. Nov. 12, 2024) |
| 1089    | D.I. 126, Minute entry showing start of jury selection, <i>Netlist v. Samsung</i> , No. 2:22-cv-00294-JRG-RSP (E.D. Tex. May 20, 2024)  |
| 1090    | Chart of Cases Cited in Fractus Discretionary Denial Brief (Paper 9) at 7-11 with Median-Time-to-Trial Dates Added                      |
| 1091    | Fractus Litigation Outcomes (Docket Navigator) as of September 29, 2025                                                                 |
| 1092    | Judge Gilstrap Profile Showing Number of Cases by Year as of September 29, 2025                                                         |
| 1093    | U.S. Patent No. 8,738,103                                                                                                               |
| 1094    | Pages from file history for U.S. Patent Application Ser. No. 11/614,429                                                                 |

| Exhibit | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1095    | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1096    | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1097    | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1098    | Declaration of David Ringle <b>[SUPPLEMENTAL EVIDENCE - NOT FILED]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 1099    | IEEE Std. 802.11b-1999, Supplement to the IEEE Standard for Information Technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements— Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Higher-Speed Physical Layer Extension in the 2.4 GHz Band (Jan. 20, 2000), <i>available at</i> <a href="https://ieeexplore.ieee.org/document/817038">https://ieeexplore.ieee.org/document/817038</a> <b>[SUPPLEMENTAL EVIDENCE - NOT FILED]</b> |
| 1100    | Declaration of Dara Del Rosario <b>[SUPPLEMENTAL EVIDENCE - NOT FILED]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1101    | D.I. 104, Claim Construction Order, <i>Fractus, S.A. v. Verizon Connect Inc. et al.</i> , No. 2:24-cv-01009 (E.D. Tex. Mar. 18, 2026)                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1102    | D.I. 114, Order, <i>Fractus, S.A. v. Verizon Connect Inc. et al.</i> , No. 2:24-cv-01009 (E.D. Tex. Apr. 6, 2026)                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1103    | Declaration of Daniel van der Weide, Ph.D. In Support of Petitioners’ Reply to POR                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 1104    | <i>Intentionally left blank</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1105    | Steven E. Ellingson, <i>Electromagnetics II</i> (2025) (available at <a href="https://commons.libretexts.org/book/eng-19441">https://commons.libretexts.org/book/eng-19441</a> (last accessed April 25, 2026)), filed by Fractus as EX2009 in IPR2025-00929                                                                                                                                                                                                                                                                                           |
| 1106    | D.I. 75, Fractus’s Opening Claim Construction Brief, <i>Fractus, S.A. v. Verizon Connect Inc. et al.</i> , No. 2:24-cv-01009 (E.D. Tex. Jan. 27, 2026)                                                                                                                                                                                                                                                                                                                                                                                                |

| Exhibit | Description                                                                                                                                                                                                                                                                                                    |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1107    | Internet Archive copy of “Capitol Broadcasting Who We Are” web page captured on April 8, 2002                                                                                                                                                                                                                  |
| 1108    | Internet Archive copy of “Capitol Broadcasting Home” web page captured on March 31, 2002                                                                                                                                                                                                                       |
| 1109    | SEC Form 10-Q (Quarterly Report) for Lin TV Corp. (June 30, 2002)                                                                                                                                                                                                                                              |
| 1110    | S. Derek Turner & Mark Cooper, <i>Out of The Picture 2007: Minority &amp; Female TV Station Ownership in the United States</i> (Free Press 2007)                                                                                                                                                               |
| 1111    | Smith, “Dialogue demos ‘total wireless’ sub-notebook” (The Register, Jun. 2, 2004)                                                                                                                                                                                                                             |
| 1112    | IBM Hardware Announcement: New IBM ThinkPad T42 notebooks feature new fingerprint and Intel PRO/Wireless technologies (Jan. 11, 2005) <i>text version available at</i> <a href="http://www.ibm.com/docs/en/announcements/archive/ENUS105-006">http://www.ibm.com/docs/en/announcements/archive/ENUS105-006</a> |
| 1113    | Internet Archive copy of the “Data Sheet” web page for the Symbol MC70 Enterprise Digital Assistant, captured on March 17, 2006                                                                                                                                                                                |
| 1114    | <i>Intentionally left blank</i>                                                                                                                                                                                                                                                                                |
| 1115    | Declaration of Dara Del Rosario                                                                                                                                                                                                                                                                                |
| 1116    | Amendment of Parts 2 and 73 of the Commission’s AM Broadcast Rules concerning the use of the AM carrier, FCC 84-301 (Aug. 14, 1984)                                                                                                                                                                            |
| 1117    | 614-902 MHz (National Telecommunications and Information Administration Mar. 1, 2014) <i>available at</i> <a href="http://www.ntia.gov/files/ntia/publications/compendium/0614.00-0902.00_01MAR14.pdf">http://www.ntia.gov/files/ntia/publications/compendium/0614.00-0902.00_01MAR14.pdf</a>                  |
| 1118    | Rodney Vaughan et al., “Channels, Propagation and Antennas for Mobile Communications,” 50 <i>IET Electromagnetic Waves Series</i> 577-580 (2003)                                                                                                                                                               |

## I. GROUND 3

As the Board found, Fractus alleged claims 1-5 and 12-20—which recite a wireless device having an antenna configured to support frequencies associated with a 4G communications standard—cover a device with an antenna supporting the Long-Term Evolution (LTE) standard, including LTE Band 12 operating within the 698-806 MHz spectrum. Paper 20 (“DI”), 63-68; *see also* Petition (Paper 28), 28-31, 92-93; EX1024, ¶43(b). Fractus doubled down on that assertion in the district court (EX1106, 8-9, 11), its Director Review request (Paper 23 at 13), and its POR (Paper 29) at 3 and 19-22. Ground 3 demonstrates claims 1-5 and 12-20 are unpatentable under that construction. DI, 53-70 (crediting Ground 3).

### A. The Dispute Is Over Written Description.

The parties dispute whether the ’429 Application provides written description for claims 1-5 and 12-20 under the agreed-upon construction of the 4G terms. The lack of written description makes Baliarda-543 prior art to those claims. Petition, 89-98.

The disagreement is not “one of claim construction.” POR, 39. The Board recognized this. DI, 64-66. Petitioners adopted *Fractus’s* claim construction and noted “there is no dispute over the meaning of the ‘4G’ terms that requires the Board’s resolution in order to decide Ground 3.” Petition, 28-31 (citing *Nidec*).

Fractus admitted no claim construction differences are “directly pertinent to any of the arguments Patent Owner is making.” POR, 19.

Petitioners never argued that “the 698-806 MHz frequency band is ‘expressly excluded’ from the construction of ‘4G communication standard.’” POR, 39 (citing “Petition at 97”). Petitioners argue that the ’429 Application “expressly excluded an *antenna* receiving signals at 698-806 MHz”<sup>1</sup> from its disclosure of an *antenna supporting 4G* because in December 2006 that frequency range was allocated to TV—not yet “part of a 4G genus”—and the ’429 Application describes *different* antennas providing TV reception (including at 698-806 MHz). Petition, 96-97.

The Board should again reject Fractus’s assertion that, because the Petition explained that the ’429 Application lacks written description of an antenna supporting LTE Band 12’s operation in the 698-806 MHz spectrum, the Petition’s claim construction somehow differs from Fractus’s construction. DI, 67. No authority precludes Petitioners from adopting Fractus’s claim construction and demonstrating the claims unpatentable thereunder. Paper 30 (rejecting Fractus’s Director Review request).

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<sup>1</sup> Emphasis is added unless otherwise indicated.

**B. The Inventors Did Not Possess Antennas Meeting the Full Scope of Any Claim Ground 3 Challenges.**

**1. The Specification Acknowledges “4G” Refers to As-Yet-Undefined Standards That Might Operate at Undisclosed Frequencies.**

When Fractus filed the ’677 Patent’s specification (in the ’429 Application) on December 21, 2006, many standards later recognized as 4G standards (including LTE) had not yet been adopted; their specifications—including the frequency ranges at which they would operate—were not defined until years later. E.g., Petition, 91-95. The ’677 Patent acknowledges that its reference to 4G standards encompasses “*other* high-speed wireless standards” nowhere described in the specification, which “might require operation in *additional* frequency bands” including “*other* bands” the specification does not describe. EX1001, 25:1-9; POR, 20-21 (admitting the specification only discloses “a *non-exhaustive list of examples* of the claimed ‘frequency bands being associated with a 4G communication standard.’”). Based on this intrinsic evidence, as a matter of claim construction “4G communications standard” encompasses “other” standards not described in the specification, including those operating at “other” frequency bands not described in the specification. EX1001, 25:1-9.

The District Court recently construed “4G communications standard(s)” to mean “4G communications standards that had been adopted or proposed as of the effective filing date of the ’677 Patent and the ’200 Patent, including but not

limited to Long Term Evolution (‘LTE’).” EX1101, 14-18; EX1102 (Judge Gilstrap adopting Judge Payne’s construction). The Court did so despite finding that “LTE standards were not finalized until after the effective filing date.” EX1101, 17. The Court did not reference particular LTE bands in its construction but noted the parties’ agreement “that ‘4G communication standard(s)’ include frequency bands associated with/used by LTE, such as LTE Bands 12, 13, and 14.” *Id.*, 16.

Fractus chose to claim a wireless device with an antenna configured to support *any* 4G communication standard, including those like LTE that were not finalized in December of 2006. The consequence is that the specification does not support the full scope of those claims. The ’429 Application nowhere discloses an antenna configured to support “*other* [4G] high-speed wireless standards” like LTE that operate in “*other* [frequency] bands” (EX1001, 25:1-9) (e.g., 698-806 MHZ) nowhere disclosed in the ’429 Application.

**2. The ’429 Application Discloses No Antenna Meeting the Claimed Complexity Factors and Supporting Frequencies Associated with LTE Band 12.**

Every claim Ground 3 challenges recites a wireless device with *an antenna*, having particular complexity factors, that supports frequencies associated with a 4G communications standard. The ’429 Application does not disclose such an

*antenna* that supports LTE Band 12 communications in the 698-806 MHz spectrum. *See infra* §I.B.5.b.i. Fractus does not even allege that it does.

**3. No Expert Testimony Supports Fractus’s Written Description Argument.**

Petitioners’ expert explained that a POSA would not have understood the ’429 Application to demonstrate that the inventor possessed an antenna meeting the claimed complexity factors and configured to support LTE communications at 698-806 MHz. EX1007 (“Weide”), ¶¶295-297.

Fractus offers no expert testimony refuting this. EX2010, ¶54 (“refrain[ing] from offering an opinion on” Ground 3); EX2029 (ignoring Ground 3).

**4. Some Frequency Ranges Being Considered for Reallocation in 2006 Does Not Show Possession of Any Challenged Claim.**

The ’429 Application does not support the *full* scope of any claim Ground 3 challenges because it does not disclose an *antenna* that meets the claimed complexity factors and supports future-defined 4G standards—like LTE—that are nowhere described in the specification and operate in frequency ranges—like 698-806 MHz—the specification never mentions. *Supra* §I.B.1.

Fractus never disputes that LTE was undefined in 2006, or that the ’429 Application does not disclose an *antenna* that meets the claimed complexity factors and supports 698-806 MHz communications. That is fatal to Fractus’s Ground 3 arguments.

Fractus obfuscates by citing indications from the FCC, in 1998 and 2002 respectively, that the 746-806 MHz (“Upper 700 MHz band”) and 698-746 MHz (“Lower 700 MHz band”) spectrum were going to be reallocated at some future time. POR, 3-4. Based on this, Fractus says a POSA “understood that ‘4G communication standards,’ ... would operate in the Upper and Lower 700 MHz Frequency Bands.” POR, 4. Extrinsic evidence cannot establish written description. Petition, 90-91 (citing authority). But even if it could, Fractus badly mischaracterizes the evidence.

**a. Disclosure of Different 4G Standards Operating at Different Frequencies Is Not Disclosure of LTE Operating Within the 698-806 MHz Spectrum.**

Fractus cites the specification’s disclosure that a wireless device “incorporating 3.5G or 4G features... such as... HSDPA, WiBro, WiFi, WiMAX, UWB or other high-speed wireless standards... might require operation in additional frequency bands corresponding to said 4G standards” such as “2-11 GHz.” POR, 32-34 (citing EX1001, 25:1-12). Fractus says this discloses that “examples of the claimed ‘frequency bands being associated with a 4G communication standard’ may include 1900-2170 MHz, 810-960 MHz, 1710-1990 MHz, or 2-11 GHz... as well as ‘additional frequency bands corresponding to said 4G standards.’” POR, 33-34. As the Board observed, none of these frequency ranges includes LTE Band 12’s spectrum. DI, 67.

Fractus nonetheless alleges “the knowledge of the POSITA shows that these disclosed examples would indicate to the POSITA that the inventors were in possession of the 698-806 MHz spectrum.” POR, 34. Even if it were sufficient to show “possession of the 698-806 MHz spectrum” rather than an *antenna* configured to support it—it is not (*supra* §I.B.2)—no *evidence* supports Fractus’s attorney argument about the POSA’s alleged knowledge. *Supra* §I.B.3 (Fractus’s expert does not support this argument). Petitioners’ expert directly refutes it. EX1103 (“Weide-Reply”), ¶¶7-10.

**b. Extrinsic Evidence Cannot Provide Written Description Support.**

Fractus’s assertion that “the inventors were in possession of the 698-806 MHz spectrum” is based on extrinsic evidence. POR, 34-35. That fails because written description support must be *within the specification’s four corners*.

Petition, 90 (citing *Ariad* and *Broad*).

**c. The 698-806 MHz Spectrum Was Not Earmarked in December 2006 Exclusively for Wireless Communications, Let Alone for LTE.**

Fractus’s allegation that the FCC had earmarked 698-806 MHz for *some type* of mobile communication (POR, 3-4 and 21-29) is insufficient to show that this frequency range was earmarked for a *4G standard* (let alone LTE). Fractus never disputes that in December 2006 it was an “open issue what frequency ranges might be assigned to LTE.” Petition, 91-94; *supra* §I.B.1. Moreover, while the

FCC had announced plans to reallocate the Upper and Lower 700 MHz Bands it had not decided *how* they would be reallocated. The POR itself shows that in 2002 the FCC noted possible ways in which the Lower 700 MHz Band “*could*” be reallocated. POR, 27. Contemplated uses included “*new broadcast operations*” as well as wireless communications. POR, 27; EX2018, ¶70. EX2018’s table (reproduced below with Fractus’s highlighting and Petitioners’ red annotation) is not “the FCC order illustrating the allocation of the Lower 700 MHz Band.” POR, 28. No frequencies were “allocated” in EX2018. It considered *various* uses for a *future* 698-746 MHz allocation including “Broadcasting NG128,” “Broadcast Radio (TV),” and “Auxiliary Broadcasting.” Weide-Reply, ¶11.

| 49 MHz (UHF)                                         |                                                                                    | Page 37                                                                                                             |
|------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| United States Table                                  |                                                                                    | FCC Rule Part(s)                                                                                                    |
| Federal Government                                   | Non-Federal Government                                                             |                                                                                                                     |
| 470-608                                              | 470-512<br>BROADCASTING NG128<br>NG149<br>FIXED NG127<br>LAND MOBILE NG66<br>NG114 | Public Mobile (22)<br>Broadcast Radio (TV)<br>(73)<br>Auxiliary Broadcasting<br>(74)<br>Private Land Mobile<br>(90) |
|                                                      | 512-608<br>BROADCASTING NG128<br>NG149                                             | Broadcast Radio (TV)<br>(73)<br>Auxiliary Broadcasting<br>(74)                                                      |
| 608-614<br>RADIO ASTRONOMY US74<br>LAND MOBILE US350 |                                                                                    | Personal (95)                                                                                                       |
| US246                                                |                                                                                    |                                                                                                                     |
| 614-690                                              | 614-698<br>BROADCASTING NG128<br>NG149                                             | Broadcast Radio (TV)<br>(73)<br>Auxiliary Broadcasting<br>(74)                                                      |
|                                                      | 698-746<br>BROADCASTING NG128<br>FIXED<br>MOBILE                                   | Wireless<br>Communications (27)<br>Broadcast Radio (TV)<br>(73)<br>Auxiliary Broadcasting<br>(74)                   |
|                                                      | NG159                                                                              |                                                                                                                     |

Fractus’s Upper 700 MHz Band evidence fares no better. Fractus’s chart (POR, 25-26) shows that the FCC’s contemplated uses included TV, i.e., “Broadcast Radio (TV).” Weide-Reply, ¶12. Fractus’s *own evidence* refutes Fractus’s assertion that POSAs knew the *entire* Upper 700 MHz Band “was going to be used for expanded cellular services as of 1998” (POR, 25-26).

Fractus says EX2019 shows “*portions* of the Lower 700 MHz Band were auctioned off in the Fall of 2002... to wireless communications companies.” POR, 29. Fractus never alleges the *entire* Lower 700 MHz Band was auctioned off, or

that *all* auctioned “portions” went to “wireless communications companies.” *Id.*

Many frequencies were auctioned to *broadcasting companies* (“Capitol Broadcasting” and “Banks Broadcasting”). EX2019, 2, 4-5, 7, 9 and 13-14; EX1107 (Capitol Broadcasting broadcasts High Definition TV); EX1108; EX1109 at 19 (Banks Broadcasting “owns and operates” TV stations); EX1110 at 40-41 (Banks Broadcasting owned “Broadcast TV Stations”). Weide-Reply, ¶13.

Moreover, the auctioned-off “portions” (710-716 and 740-746 MHz) are subsets of the spectrums later used by LTE Band 12 (698-716 and 728-746 MHz). EX2020, 2 (“710-716, 740-746 MHz”); EX2022 (same); Weide-Reply, ¶13. Fractus never shows that the full 36 MHz later used by LTE Band 12 was auctioned for wireless communication, or that POSAs expected the purchasers would later allow such “portions” to be used for LTE. Weide-Reply, ¶13. No evidence supports that.

Thus, Fractus’s own evidence refutes its assertion that in 2006 POSAs knew the entire Lower 700 MHz Band (698-746 MHz) would be used for some wireless communications standard—let alone a “4G” communication standard, or LTE. POR, 4.

In December 2006 the frequency ranges LTE would use were an “open issue.” Petition, 91-94 (citing evidence). Fractus cannot demonstrate possession of the *full* scope of the claimed wireless device comprising an antenna supporting 4G communications—including LTE Band 12 in the 698-806 MHz spectrum—by

showing that *some but not all* frequencies in that spectrum had been auctioned for some other type of wireless communication.

Finally, even if in December 2006 POSAs expected that a 4G standard might define frequency band(s) within the Lower 700 MHz Band (698-746 MHz), and even if it might then have been obvious how to design an antenna that *meets the claimed complexity factors and supports communications in the Lower 700 MHz band* (which Fractus never even attempts to establish), “a description that merely renders the invention obvious does not satisfy the [written description] requirement.” DI, 56 (quoting *Ariad*).

#### **5. Fractus Misapplies the Law.**

Fractus says there need not be written description of an antenna configured to send/receive LTE Band 12 signals in the 698-806 MHz spectrum because this “is not recited in the claims.” POR, 29. But Fractus never disputes that such an antenna is *within the scope* of the claims challenged in Ground 3, or that the law requires written description for the *full scope* of each claim. Petition, 90-91 (citing authority).

To demonstrate possession of the *full* scope of any claim Ground 3 challenges under the agreed-upon construction of “4G communication standard,” Fractus must demonstrate possession of an antenna (with claimed complexity

factors) configured to send/receive LTE Band 12 signals in the 698-806 MHz spectrum.

**a. Fractus Cannot Demonstrate Possession of the Claimed Antenna by Purportedly Demonstrating Possession of 4G Standards and Frequency Bands.**

As the Board found, “the ’429 application did not ‘reasonably convey[] to those skilled in the art that the inventor had possession’ of ‘an *antenna* configured to send or receive signals in the 698-806 MHz spectrum,’ including LTE Band 12.” DI, 65. Fractus does not even allege that it does. That is fatal to Fractus’s assertion that the specification supports the full scope of any claim Ground 3 challenges.

Fractus says possession of a species of 4G standards and associated frequency bands shows possession “of the genus ‘4G communication standard.’” POR, 33-34. That misses the mark because the claimed invention is a wireless *device* comprising an *antenna*. Even if POSAs believed that in 2006 an as-yet-unidentified 4G standard would someday use the 698-806 MHz spectrum, that is not disclosure of an *antenna that meets the claimed complexity factors and is configured to operate in that spectrum*. No such antenna is disclosed in the ’429 Application (*infra* §I.B.5.b.i). Fractus never alleges otherwise.

**b. Fractus Does Not Demonstrate Possession of the Claimed Genus of Antennas.**

Fractus’s assertion that “the inventors were in possession of the 698-806 MHz spectrum” (POR, 34) is factually wrong (*supra* §I.B.4.c) and legally

insufficient because it does not even allege that the '429 Application demonstrates that the inventors possessed an *antenna* that meets the complexity factors and supports this frequency range. Weide-Reply, ¶14.

The claims recite a genus of wireless devices with a genus of antennas that meet the claimed complexity factors and collectively support communication via every 4G communication standard. Weide-Reply, ¶15. Written description support for that genus of antennas requires disclosure of “a representative number of species falling within the scope of the genus or structural features common to the members of the genus.” Petition, 96 (citing *Ariad*); DI, 55; POR, 30 (conceding). The '429 Application discloses neither.

**i. The '429 Application Does Not Disclose a Representative Number of Species of the Claimed Genus of Antennas.**

Fractus identifies alleged species of “wireless *standards*” and “associated *frequencies*.” POR, 32-33 (citing EX1001, 25:1-12 listing “HSDPA, WiBro, WiFi, WiMax, UWB, or other high-speed wireless standards”). That fails to demonstrate possession of the claimed genus of *antennas*. *Supra* §I.B.5.a.

The '429 Application discloses a *single* antenna. EX1040, [00264]-[00265], Figs. 12, 17. This antenna “operates in accordance with two mobile communication standards: GSM and UMTS” whose frequency ranges (“810 MHz-960 MHz,” “1710 MHz-1990 MHz,” and “1900 MHz-2170 MHz”) do *not* include

the 698-806 MHz spectrum used by LTE Bands 12-14. *Id.*; *see also* EX1040, [0325]-[0326], Fig. 19 (showing the antenna's frequency response). The disclosed antenna does not demonstrate possession of a ***different*** antenna that meets the claimed complexity factors and supports communication using a different 4G standard (LTE) over a different frequency range (698-806 MHz). Weide-Reply, ¶15.

*Bilstad's* statement that disclosure of a single species can provide written description for a genus ***if the field is predictable and POSAs would have expected all the members of the genus to perform similarly*** (POR, 30-31) does not apply because neither factual predicate is met.

Antenna design was unpredictable. Weide-Reply, ¶16. The '677 Patent discusses numerous "difficulties" and "problems" antenna designers face involving interdependent "constraints" where changing one parameter can "counterproductive[ly]" impact others and "[i]t is usually not obvious how to control the counter-productive effects or how to compensate for them without creating still more problems." EX1001, 4:18-5:17. For a multi-band antenna (as in the claims Ground 3 challenges), changing the antenna to "produce a new antenna frequency of resonance" changes the antenna's other resonant frequencies so prior optimizations are lost. *Id.*, 4:4-18. Producing a multi-band antenna to resonate at different frequencies than the specification's single antenna would have required a

different antenna, and the required changes were not predictable. Weide-Reply, ¶¶16-17.

Fractus’s assertion that Petitioners relied on “predictability of the antenna arts” is false. POR, 30-31 (citing Petition, 35-36). On the cited pages, the Petition explained that the ***Dou+Ciais combination*** was predictable. That combination uses Ciais’s antenna in Dou—it does not redesign Ciais’s antenna to support different frequencies. Petitioners never alleged that changing an antenna to resonate at different frequencies was predictable. To the contrary, Petitioners explained the specification nowhere “teaches a POSA how to make” an antenna that meets the claimed complexity factors and supports LTE Band 12. Petition, 96.

Moreover, all the members of the genus of claimed antennas do not perform similarly. Weide-Reply, ¶18. The genus encompasses antennas supporting different standards (e.g., LTE and the GSM and UMTS standards disclosed in the specification) operating at different frequencies. Weide-Reply, ¶18.

Petitioners’ expert is unequivocal that antenna design was unpredictable, the claimed genus of antennas do not all perform similarly, and the ’429 Application does not demonstrate possession of an antenna that meets the claimed complexity factors and supports LTE Band 12 communications. Weide-Reply, ¶¶16-18. That testimony is undisputed. *Supra* §I.B.3 (Fractus offers no expert testimony

addressing Ground 3). The *evidence* refutes Fractus’s assertion that the specification’s single antenna supports the claimed genus under *Bilstad*.

**ii. The ’429 Application Does Not Describe Structural Features Common to the Genus of Claimed Antennas.**

Fractus says the ’429 Application describes “structural features of the genus in the form of multiple examples of *frequencies* at which the antennas operate, as well as their high speed operation.” POR, 32-33. Species of *frequencies* do not describe “structural features common to” the claimed genus of *antennas*. Petition, 96; *supra* §I.B.5.a. Fractus’s cited evidence (EX1001, 25:1-12)<sup>2</sup> describes *no* structural feature of any *antenna*, let alone structural features common to the claimed genus of antennas that meet the complexity factors and support every 4G communications standard. The ’429 Application has no such explanation. Weide-Reply, ¶19.

**c. Fractus Cannot Distinguish Petitioners’ Cases.**

Fractus says Petitioners’ cases found a lack of written description because the patent claims “recite subject matter that is unambiguously broader than the

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<sup>2</sup> Fractus’s POPR citations fail because the POPR is not evidence, arguments cannot be incorporated therefrom (37 C.F.R. §42.6(a)(3)), and the POPR cites no evidence describing structural features common to the claimed genus of antennas.

disclosures of the priority applications.” POR, 38. The same is true here. The claims recite an antenna configured to support any 4G standard, including LTE (which the specification does not disclose), and operating at frequencies unsupported by the specification’s single antenna. *Supra* §§I.B.1- I.B.2, I.B.5.b; Weide-Reply, ¶20.

The Board did not require description of “every specific variant within the scope of the claim.” POR, 5, 31. The Director agreed. Paper 30, 2 (rejecting Fractus’s same “legal error” argument in Paper 23, 8). Petitioners concede the claims recite a “genus.” POR, 30-32. Petitioners and the Board properly applied *Ariad*’s test for determining whether a written description supports a claimed genus. Petition, 90-97; DI, 55-56, 65-68. Under *Ariad*, the written description must disclose a representative number of species or the structural features common to the genus. The ’429 Application does neither. *Supra* §I.B.5.b.

**C. Fractus Ignores Differences Between the Claim Construction and Written Description Standards.**

After mischaracterizing Petitioners’ claim construction position as excluding 698-806 MHz from “4G communications standard” (*supra* §I.A), Fractus says “regardless of who is correct about the scope of ‘4G communication standard,’ the alleged written description problem falls away.” POR, 39-40. Fractus alleges it would be inconsistent to “interpret[] the claims as covering the 698-806 MHz spectrum based on the evidence presented but, on the other hand, find[] that

evidence insufficient to show possession of the claims as so interpreted.” POR, 40. Fractus made this same argument to the Director. Paper 23 at 13. The Director rejected it (Paper 30). The Board should too.

As a matter of claim construction, “4G communications standard” encompasses “other” standards like LTE that use “other” frequency bands like 698-806 MHz. EX1001, 25:1-9; *supra* §I.B.

Fractus’s assertion that the same “evidence” must “show possession of the claims as so interpreted” (POR, 40) is wrong. As detailed *supra* §§I.B.2, I.B.5.b, the ’429 Application lacks disclosure of an **antenna** that meets the claimed complexity factors and supports LTE Band 12 communications. There is no “inconsistency” in finding that the claims cover such a device but the specification fails to demonstrate that the inventors possessed such a device.

To the extent Fractus suggests the Board reject the parties’ agreed-upon construction of “4G communication standard” and adopt a different construction that does not encompass LTE Band 12—so there would be “no need for the ’429 Application to provide written description for” an antenna supporting its frequency band (POR, 39-40)—the Board should decline. A party may not take different claim construction positions before the Board and district court without good explanation. *Revvo Techs. v. Cerebrum Sensor Techs.*, IPR2025-00632, Paper 20 at 3-5 (Dir. Nov. 3, 2025) (precedential) ). The Board applies the district court’s

claim construction standard “to minimize inconsistency in claim construction between forums,” discourage parties from advancing “inconsistent arguments about claim scope,” and “provide greater predictability and certainty.” *Id.*, 4-5 (citing *Sun Pharm. v. Nivagen Pharm.*, IPR2025-00893, Paper 18 at 3 (Dir. Sept. 19, 2025)). Those concerns are implicated by either “party” taking inconsistent claim construction positions. *Revvo*, 4-5; *see also Infineon Techs. v. Mosaid Techs.*, IPR2025-01456, Paper 27, 4 (Dir. March 17, 2026) (“We are not in the business of aiding parties to stress test claim constructions to see which will prevail.”). The Board should not allow Fractus to change its claim construction position after the court adopted it. EX1102; EX1101; *supra* §I.A.

**D. Baliarda-543 Anticipates Claims 1-5 and 12-20.**

Fractus does not dispute that if it is prior art, Baliarda-543 anticipates claims 1-5 and 12-20. Petition, 97-100.

**II. GROUNDS 1-2**

Fractus’s sole argument against Grounds 1-2 contends POSAs would not have combined Dou and Ciais in the manner alleged. POR, 40-51. Fractus does not refute any of the Petition’s reasons to combine or that POSAs would have succeeded in making the combinations. Petition, 32-36, 69-71. Fractus only alleges POSAs would not have made the Petition’s Dou+Ciais combinations because the combinations allegedly cannot provide antenna diversity. POR, 44-45. That

argument fails for the reasons below and Fractus waived any other argument. Paper 21 at 11.

**A. It Is Proper Reply to Refute Fractus’s Erroneous Assertion That the Combinations Do Not and Cannot Provide Antenna Diversity.**

Fractus says Petitioners’ Ground 1-2 combinations violate Dou’s “design constraints” (POR, 41), eliminate spatial diversity (*id.*, 43-44), and “cannot provide pattern diversity” because Ciais’s antenna has an “omnidirectional radiation pattern[]” (*id.*, 47). Fractus is wrong.

The Petition meets the content requirements in 37 C.F.R. §§42.22 and 42.104, including specifying where each claim element “is found in the prior art.” The Petition need not demonstrate how the combinations achieve antenna diversity because no claim requires antenna diversity. Petitioners were not obligated to foresee and preemptively rebut every erroneous argument Fractus might advance in challenging whether POSAs would have made the Dou+Ciais combinations with an expectation of success. *Rembrandt Diagnostics v. Alere*, 76 F.4th 1376, 1384-1385 (Fed. Cir. 2023) ); *Apple v. Andrea Elecs.*, 949 F.3d 697, 705-707 (Fed. Cir. 2020)..

The Petition established a motivation to combine and explained that implementing the Dou+Ciais combinations to comply with Dou’s “design constraints” was well-within a POSA’s capabilities. Petition, 33-36; *infra* §II.B.

Fractus identifies one Dou “design constraint”—antenna diversity—the combinations purportedly cannot satisfy. POR, 41-45. Consistent with *Rembrandt* and *Apple*, this Reply refutes those false assertions using the same grounds, combining the same prior art, in the same combinations.

**B. The Petition’s Combinations Meet Dou’s Design Constraints.**

The Petition explained POSAs expected success in using Ciais’s antenna in Dou’s device because, *inter alia*, “***Dou describes antenna placement within the device according to ‘various performance and design constraints’***” and “[i]t was well within the POSA’s ordinary skill to implement Dou’s wireless device with Ciais’s quadband antenna.” Petition, 35-36.

The Petition acknowledged that Dou’s “design constraints” include antenna diversity. Petition, 32 (Dou’s device has “an internal ***diversity antenna architecture***”), citing Dou, Abstract, [0015] and EX1007, ¶113 (“***A diversity architecture such as that described in Dou can be implemented in various forms: spatial diversity*** (using physically separated antennas), ***pattern diversity*** (using antennas with different radiation patterns), ***and/or polarization diversity*** (using orthogonally polarized elements).”). The Petition mapped the claimed antenna system to Dou’s “***diversity antenna architecture***” implemented using Ciais’s antenna. Petition, 37.

## **C. The Dou+Ciais Combinations Provide Antenna Diversity.**

### **1. Pattern Diversity**

Fractus falsely asserts that Dou’s “objective... is to achieve *spatial* diversity” (POR, 41). Dou describes other “diversity techniques.” Dou, [0018]; Weide, ¶113. Only Dou dependent claim 8 recites “quarter wavelength” separation for spatial diversity; Dou’s independent claims do not. That confirms Dou does not require *spatial* diversity. The Board recognized this. DI, 46 (only “some type of diversity antenna architecture” is required).

Pattern diversity was a well-known type of antenna diversity using antennas with differently-oriented radiation patterns to improve reliability. Weide, ¶113; Weide-Reply, ¶21; DI, 46-47; EX2029, ¶7. Petitioners’ expert is unequivocal that the Dou+Ciais combinations provide pattern diversity. Weide-Reply, ¶¶22-43.

Fractus says the Dou+Ciais combinations cannot provide pattern diversity because Ciais’s antenna has an “omnidirectional radiation pattern[.]” POR, 45. Fractus’s attorney argument is wrong. Weide-Reply, ¶¶44-51. An omnidirectional antenna easily provides an antenna array with pattern diversity. Weide-Reply, ¶¶44-48. Regardless, Ciais’s antenna is not omnidirectional. *Id.*, ¶¶28-31, 49-51. Fractus’s expert, who opined on antenna diversity generally, does not disagree. EX2029. He never alleges that the Dou+Ciais combinations lack pattern diversity, or supports Fractus’s mischaracterization of Ciais’s antenna as omnidirectional.

Ciais Fig. 4 (annotated below) shows two planes (x-z and y-z) of the antenna's radiation pattern at 920 and 1940 MHz. Weide-Reply, ¶¶22-27; Ciais, 921; Fig. 1 (below illustrating the x, y, z axes). Ciais's radiation pattern is asymmetric. Weide-Reply, ¶¶28-31. For example, the annotated  $E_{\phi}$  measurement in the y-z plane at 1940 MHz (below-right) illustrates the radiation pattern's asymmetric shape. Weide-Reply, ¶28. The measured field amplitude varies by more than 10 dB between the directions marked “null” and “high gain.” Weide-Reply, ¶¶30-31.

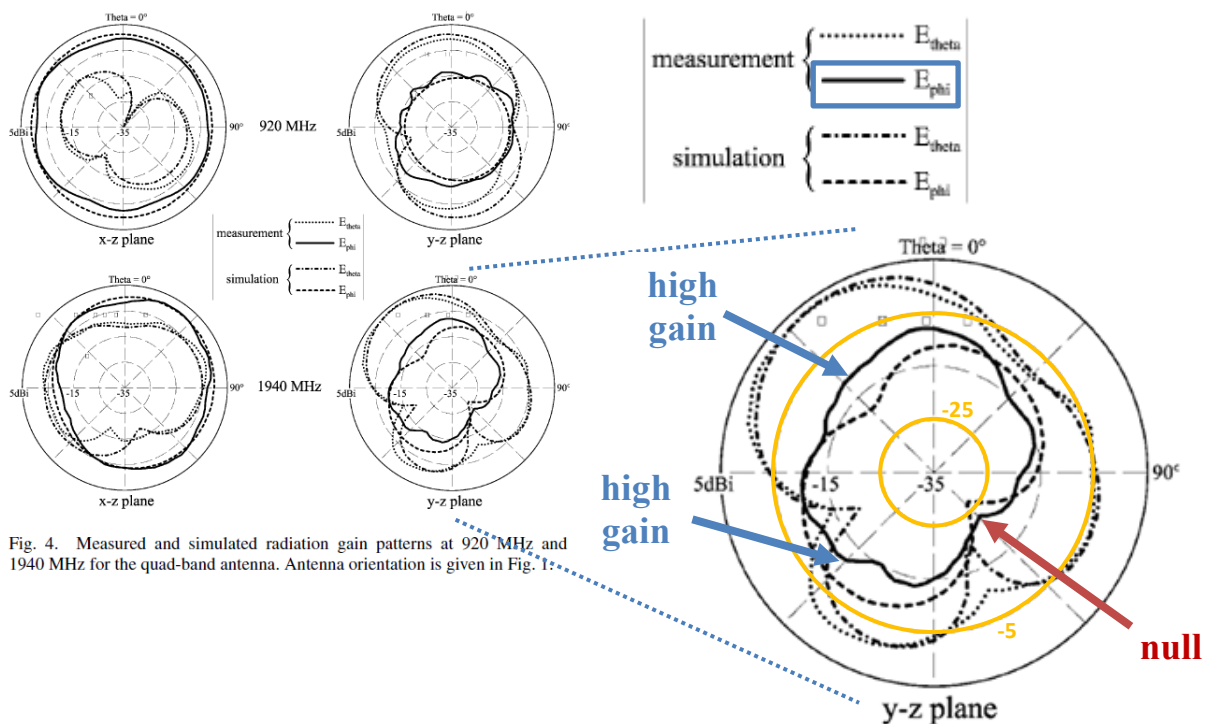
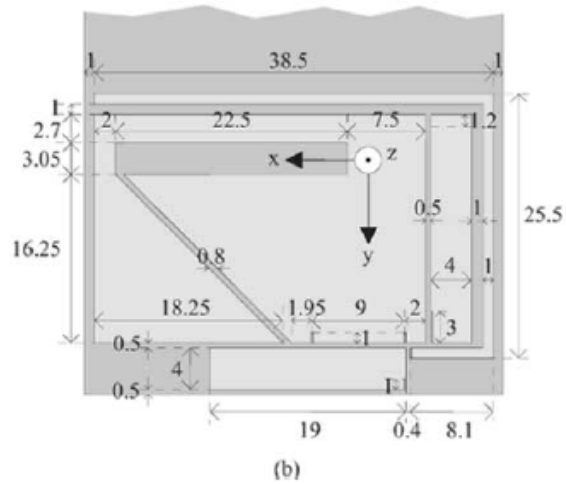
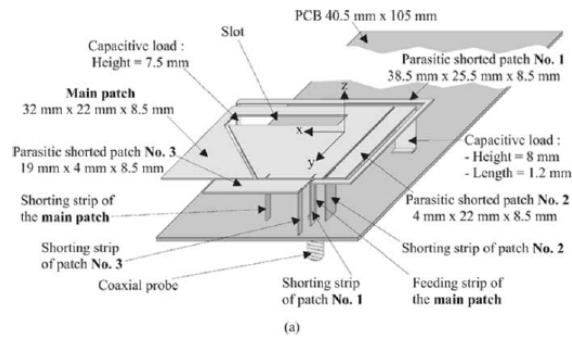
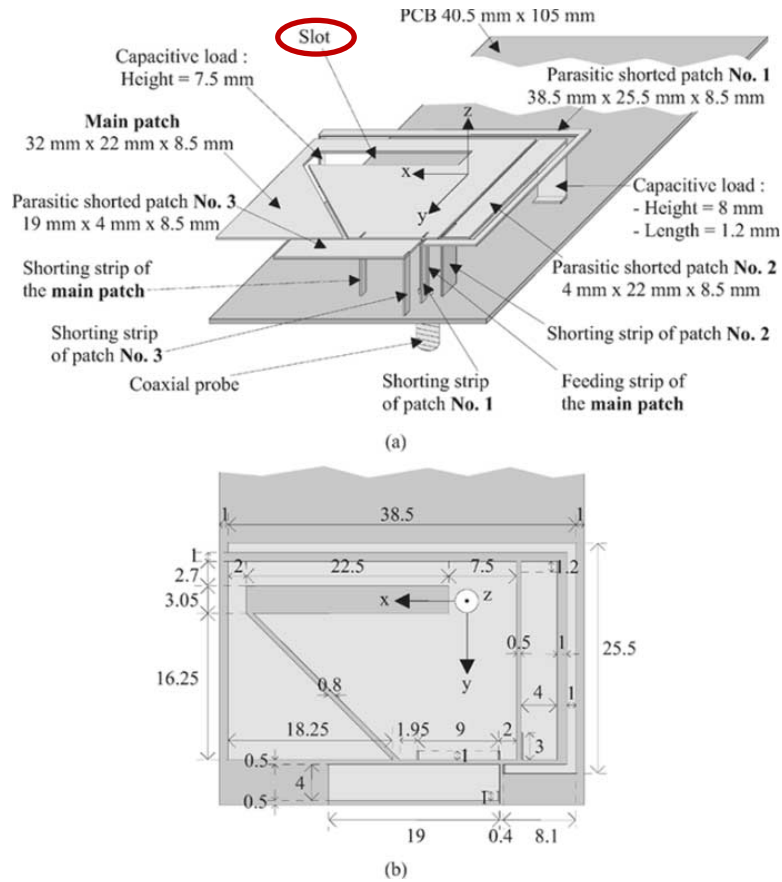


Fig. 4. Measured and simulated radiation gain patterns at 920 MHz and 1940 MHz for the quad-band antenna. Antenna orientation is given in Fig. 1.

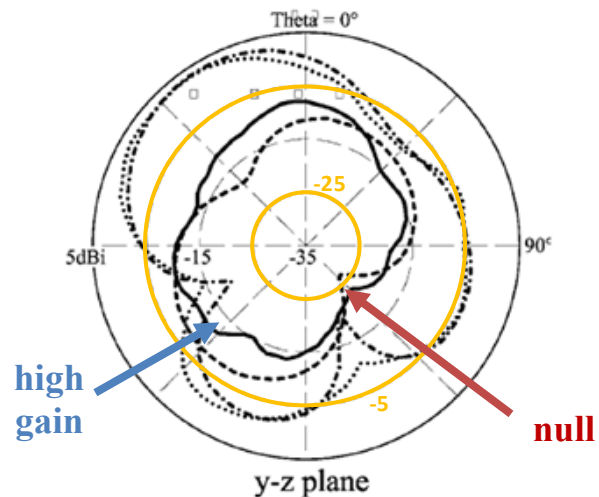
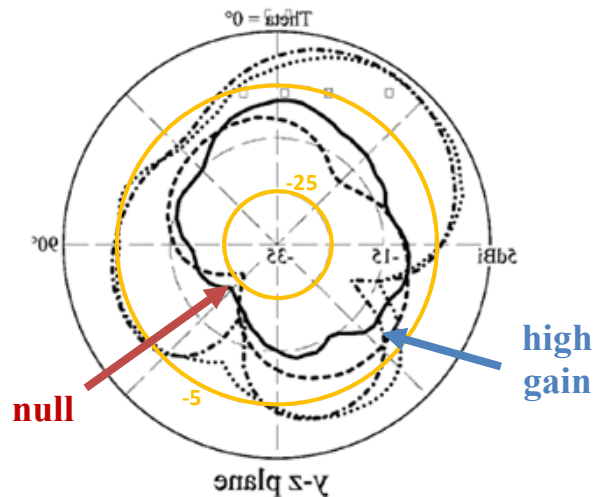


Ciais “plac[es] the quadband antenna at the *end of a PCB* ‘on the *corner of a ground plane*’ where Dou places its antennas 206 and 208.” Petition, 36; Ciais, Fig. 1 and 148. Ciais’s asymmetric antenna is oriented relative to the PCB “end” and ground plane “corner” in a particular way. Ciais, Fig. 1 (below); Weide-Reply, ¶¶33-34. As one landmark, the antenna’s “Slot” is positioned away from the shorter (40.5 mm) PCB edge. Weide-Reply, ¶34.



The Dou+Ciais combinations have a second Ciais antenna at the other PCB end. Petition, 33-36. To be consistent with Ciais’s teaching of how to orient the antenna relative to the PCB “end” and ground plane “corner” (Ciais, 148), the antenna is oriented with its slot away from the PCB’s short edge. Weide-Reply, ¶¶34-35; Ciais, Fig. 1. Thus, as shown below, in the Dou+Ciais combination the two Ciais antennas have 180° relative rotation between them. Weide-Reply, ¶¶35-36.





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Reply, ¶43. This refutes Fractus’s erroneous assertion that “the combinations are *not consistent with*” (POR, 45) and “*cannot provide pattern diversity*” (*id.*, 47).

Fractus’s assertion that the Dou+Ciais combinations violate Dou’s antenna diversity design constraint fails at least because the combinations provide pattern diversity.

## 2. Spatial Diversity

The benefits of spatial diversity were well-known. Dou, [0001], [0022]; Weide, ¶113. POSAs had reason to implement Dou+Ciais to meet Dou’s antenna diversity “design constraint[]” by employing spatial diversity, consistent with the Petition’s reasons to combine. Petition, 33-36; Dou, [0028]-[0030], [0022]; Weide, ¶¶118-122. Choosing a diversity technique to implement Dou’s “diversity antenna architecture” in Dou+Ciais was a design choice with a finite number of options. Petition, 32 (citing Weide, ¶113) and 37; Weide, ¶113 (Dou’s “diversity architecture... can be implemented [using]: spatial diversity... pattern diversity..., and/or polarization diversity”); *KSR v. Teleflex*, 550 U.S. 398, 421 (2007).

Dou says to achieve spatial diversity, the distance “D” between antennas 206, 208 should be “no less than the quarter wavelength ( $\geq \lambda/4$ ) of the lowest frequency” the antennas share. Dou, [0024], Fig. 2A. Fractus argues Ciais’s antenna has a lowest frequency at 870 MHz. POR, 42; Weide-Reply, ¶52. The longest possible wavelength is in free-space; at 870 MHz the free-space

wavelength is  $\left(\frac{c_0}{f}\right) = \left[\frac{3 \times 10^{11} \left(\frac{mm}{sec}\right)}{870 \times 10^6 \left(\frac{1}{sec}\right)}\right] \approx 345 \text{ mm}$ , so a quarter wavelength is 86.2

mm. Weide-Reply, ¶53.

To implement spatial diversity in Dou's device using two Ciais antennas, POSAs would have mounted the Ciais antennas on Dou's PCB and dimensioned the PCB to accommodate an antenna separation D (Dou Fig. 2A) of at least 86.2 mm. Weide-Reply, ¶54. POSAs had an expectation of success in doing so. Weide-Reply, ¶¶54-55. Rectangular PCBs were conventional and taught by Ciais (Ciais, 920 and Fig. 1) and Dou (Dou Fig, 2A, PCB 204). Weide-Reply, ¶54. A rectangular PCB long enough to achieve 86.2 mm spacing between Ciais's antennas would have resulted in a wireless device with dimensions conventional for a handheld computer, mobile telephone or PDA as described in Dou, [0015]. Weide-Reply, ¶54.

Ciais describes a rectangular 38.5 × 28.5mm area enclosing the antenna and positions the antenna 0.5 mm from its respective short edge of the PCB (Ciais, 148, Fig. 1), so the antenna extends 29mm from the PCB's short edge. Weide-Reply, ¶54. Adhering to this while using Ciais's antenna for Dou's antennas 206 and 208, the PCB's length would be at least  $(29 + 29 + 86.2) = 144.2 \text{ mm}$  (about 5.7 inches)—well-within conventional dimensions for such handheld devices. Weide-Reply, ¶¶54-55; EX1111-EX1113.

Fractus never alleges that a conventionally-sized PCB provided insufficient room to provide spatial diversity in Dou+Ciais. Instead, Fractus mischaracterizes the Petition as “utilizing the ground plane teachings of Ciais-Quadband, including a 40.5 x 105 mm ground plane.” POR, 46 (citing Petition at 37 and 45).

Fractus ignores the Petition’s explanation of the Dou+Ciais combination (Petition, 33-36) which implements “*Dou’s wireless device* with Dou’s first antenna 206 and second antenna 208 each provided by a separate Ciais quadband antenna.” Petition, 35. The Petition says “Dou+Ciais-Quadband meets [1.b]”—i.e., the claimed “ground plane”—“because it uses *Dou’s ground plane* 210 to implement Ciais’s ground plane teaching.” Petition, 37. The combination uses Dou’s ground plane.

The Petition never relies on Ciais’s ground plane dimensions to meet Limitation [1.e], or any other claim limitation, as Fractus erroneously alleges. POR, 46 (citing Petition, 45). There was no need for the Petition to identify specific ground plane dimensions because the claims require none. Limitation [1.e] recites “a ground plane *rectangle* enclosing the ground plane.” The Petition mapped this onto *Dou’s* PCB 204 which “defines a rectangle (‘ground plane rectangle’).” Petition 45 (annotating *Dou’s* Figures as reproduced below); *see also id.*, 46 (“The top/shorter edge of [*Dou’s*] *PCB 204* is a ‘first short side’” of a ground plane rectangle).

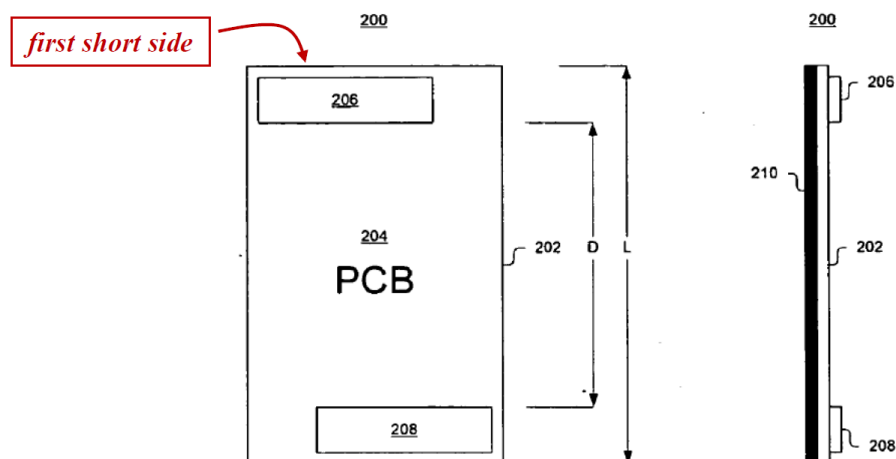


**FIG. 2A**

**FIG. 2B**

The Petition noted that “Ciais teaches a rectangular (40.5 mm x 105 mm) *PCB*, *also* backed by a ground plane... representative of PCBs for typical mobile phones” to reinforce the obviousness of using a *rectangular* ground plane (as claimed) in the Dou+Ciais combination given that both *Dou and Ciais* used rectangular ground planes. Petition, 45-46. The dimensions of Ciais’s PCB were cited only to substantiate that, like Dou, Ciais’s PCB is “rectangular.” Fractus’s assertion that the combination relied on “Ciais-Quadband’s 40.5 mm x 105 mm PCB” (POR, 46) is false and refuted by the Petition’s mapping of the claimed ground plane to “*Dou’s* ground plane 210” (Petition, 37) which is rectangular as shown by *Dou’s* PCB 204 (Petition, 45-46).

Finally, Fractus cites Ciais’s explanation that PCB size influences antenna performance and that a 40 x 105 mm PCB was chosen because it “equally helps” the GSM and DCS standards that Ciais’s antenna supports. POR, 47-48. Because

of this, Fractus suggests obviousness could only be established by bodily incorporating Cia's exact PCB size into Dou. POR, 47-48. That is not the law. *Intel v. PACT XPP Schweiz*, No. 2022-1038, 2023 WL 2198649, \*3-4 (Fed. Cir. Feb. 24, 2023) (reversing the Board's finding of non-obviousness because the Board required bodily incorporation of the references). Petitioners' expert is unequivocal that the Dou+Cia's PCB could be sized to provide spatial diversity and the antenna performance Cia's describes. Weide-Reply, ¶¶54-55. Fractus's expert never testified to the contrary.

### III. CONCLUSION

As shown in Grounds 1-3, claims 1-20 are unpatentable.

Respectfully submitted,  
*Geotab Inc. and Geotab USA, Inc.*

Date: May 20, 2026

By: /Adam R. Wichman/  
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## **CERTIFICATE OF WORD COUNT**

Pursuant to 37 C.F.R. §42.24, the undersigned certifies that the foregoing **PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE** contains 5,600 words excluding; a table of contents, a table of authorities, a certificate of service or word count, or appendix of exhibits or claim listing. Petitioners have relied on the word count feature of the word processing system used to create this paper in making this certification.

Date: May 20, 2026

/Dara Del Rosario/  
Dara Del Rosario  
Paralegal  
WOLF, GREENFIELD & SACKS, P.C.

**CERTIFICATE OF SERVICE UNDER 37 C.F.R. §42.6 (E)(4)**

I certify that on May 20, 2026, a copy of the foregoing document, including any exhibits filed therewith, is being served via electronic mail, as previously consented to by Patent Owner, upon the following:

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