IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

APEX BEAM TECHNOLOGIES LLC,	§	Case No.
Plaintiff,	§	**JURY TRIAL DEMANDED**
v.	§	
SAMSUNG ELECTRONICS CO. LTD., and SAMSUNG ELECTRONICS AMERICA, INC.,	§	
Defendants.	§	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Apex Beam Technologies LLC ("ABT" or "Plaintiff") for its Complaint against Defendants Samsung Electronics Co., Ltd. ("Samsung Electronics") and Samsung Electronics America, Inc. ("Samsung Electronics America") (collectively "Samsung" or "Defendants"), for patent infringement under 35 U.S.C. § 271 and alleges as follows:

THE PARTIES

1. ABT is a limited liability company organized and existing under the laws of the State of Texas, with its principal place of business located at 104 East Houston Street, Suite 180, Marshall, Texas 75670.

2. Defendant Samsung Electronics is a corporation organized and existing under the laws of the Republic of Korea, with its principal place of business at 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742, Republic of Korea. Upon information and belief, Samsung Electronics does business in Texas, directly or through intermediaries, and offers its products and/or services, including those accused herein of infringement, to customers and potential customers located in Texas, including in the Judicial District of the Eastern District of Texas.

3. Defendant Samsung Electronics America is a corporation organized under the laws of New York, with its principal place of business at 85 Challenger Road, Ridgefield Park, New Jersey 07660. Upon information and belief, Samsung Electronics America has corporate offices in the Eastern District of Texas at 1303 East Lookout Drive, Richardson, Texas 75082 and 2800 Technology Drive, Suite 200, Plano, Texas 75074. Samsung Electronics America has publicly indicated that in early 2019, it would be centralizing multiple offices in a new location in the Eastern District of Texas at the Legacy Central office campus,[1] located at 6225 Declaration Drive, Plano, Texas 75023. Samsung Electronics America may be served with process through its registered agent CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201-3136.

4. Defendants have authorized sellers and sales representatives that offer and sell products pertinent to this Complaint through the State of Texas, including in this Judicial District, and to consumers throughout this Judicial District, such as: Best Buy, 422 West TX-281 Loop, Suite 100, Longview, Texas 75605; AT&T Store, 1712 East Grand Avenue, Marshall, Texas 75670; T-Mobile, 1806 East End Boulevard North, Suite 100, Marshall, Texas 75670; T-Mobile, 900 East End Boulevard North, Suite 100, Marshall, Texas 75670; Verizon authorized retailers, including Russell Cellular, 1111 East Grand Avenue, Marshall, Texas 75670; Victra, 1006 East End Boulevard, Marshall, Texas 75670; and Cricket Wireless authorized retailer, 120 East End Boulevard South, Marshall, Texas 75670.

[1] https://news.samsung.com/us/samsung-electronics-america-open-flagship-north-texas-campus/, last accessed Apr. 11, 2022.

JURISDICTION

5. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1, *et seq*. This Court has jurisdiction over this action pursuant to 28 U.S.C. §§ 1331, 1332, 1338 and 1367.

6. This Court has specific and personal jurisdiction over the Defendants consistent with the requirements of the Due Process Clause of the United States Constitution and the Texas Long Arm Statute. Upon information and belief, the Defendants have sufficient minimum contacts with the forum because each Defendant transacts substantial business in the State of Texas and in this Judicial District. Further, each Defendant has, directly or through subsidiaries or intermediaries, committed and continues to commit acts of patent infringement in the State of Texas and in this Judicial District as alleged in this Complaint, as alleged more particularly below.

7. Venue is proper in this Judicial District pursuant to 28 U.S.C. §§ 1400(b) and 1391(b) and (c) because each Defendant is subject to personal jurisdiction in this Judicial District, has committed acts of patent infringement in this Judicial District, and has a regular and established place of business in this Judicial District. Each Defendant, through its own acts and/or through the acts of each other Defendant, makes, uses, sells, and/or offers to sell infringing products within this Judicial District, regularly does and solicits business in this Judicial District, and has the requisite minimum contacts with this Judicial District such that this venue is a fair and reasonable one. Further, venue is proper in this Judicial District because Samsung Electronics is a foreign corporation formed under the laws of Korea with a principal place of business in Korea. Further, upon information and belief, the Defendants have admitted or not contested proper venue in this Judicial District in other patent infringement actions.

PATENTS-IN-SUIT

8. On October 29, 2019, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,462,767 (the "'767 Patent") entitled "Method and Device in UE and Base Station Used for Paging." A true and correct copy of the '767 Patent is available at http://pdfpiw.uspto.gov/.piw?PageNum=0&docid=10462767.

9. On February 18, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,568,113 (the "'113 Patent") entitled "Method and Device in UE and Base Station Used for Wireless Communication." A true and correct copy of the '113 Patent is available at http://pdfpiw.uspto.gov/.piw?PageNum=0&docid=10568113.

10. On February 2, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,912,081 (the "'081 Patent") entitled "Method and Device used for Wireless Communication in UE and Base Station." A true and correct copy of the '081 Patent is available at http://pdfpiw.uspto.gov/.piw?PageNum=0&docid=10912081.

11. On March 9, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,944,527 (the "'527 Patent") entitled "Method and Device for Multi-Antenna Transmission in UE and Base Station." A true and correct copy of the '527 Patent is available at http://pdfpiw.uspto.gov/.piw?PageNum=0&docid=10944527.

12. On March 16, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,951,271 (the "'271 Patent") entitled "Method and Device for Multi-Antenna Transmission in UE and Base Station." A true and correct copy of the '271 Patent is available at http://pdfpiw.uspto.gov/.piw?PageNum=0&docid=10951271.

13. ABT is the sole and exclusive owner of all right, title, and interest in the '767 Patent, the '113 Patent, the '081 Patent, the '527 Patent, and the '271 Patent (collectively, the "Patents-

in-Suit") and holds the exclusive right to take all actions necessary to enforce its rights to the Patents-in-Suit, including the filing of this patent infringement lawsuit. ABT also has the right to recover all damages for past, present, and future infringement of the Patents-in-Suit.

FACTUAL ALLEGATIONS

14. The Patents-in-Suit generally relate to systems and methods for transmission schemes in wireless communication systems.

15. The '767 Patent generally relates to paging interval schedules that enable simplified paging to mobile handsets while maintaining low power consumption. The technology described in the '767 Patent was developed by Xiaobo Zhang of Shanghai Langbo Communication Technology Company Limited. By way of example, this technology is implemented today in the Accused Products (*e.g.,* 5G mobile handset, tablets, and notebooks).

16. The '113 Patent generally relates to technology that uses signal timing to improve signal delivery upon a beam recovery request. The technology described in the '113 Patent was developed by Xiaobo Zhang of Shanghai Langbo Communication Technology Company Limited. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks).

17. The '081 Patent generally relates to technology that uses symbol reception timing to determine beam or port location to improve communication quality. The technology described in the '081 Patent was developed by Xiaobo Zhang of Shanghai Langbo Communication Technology Company Limited. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks).

18. The '527 Patent generally relates to technology that provides mobile handsets with antenna virtualization information to determine correct beam alignment to enhance transmission

quality. The technology described in the ’527 Patent was developed by Xiaobo Zhang of Shanghai Langbo Communication Technology Company Limited. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks).

19. The ’271 Patent generally relates to technology that uses channel qualities and differential-based reporting compared to a threshold to assist in beam selection. The technology described in the ’271 Patent was developed by Xiaobo Zhang of Shanghai Langbo Communication Technology Company Limited. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks).

20. Defendants have infringed and continue to infringe one or more of the Patents-in-Suit by making, using, selling, offering to sell, and/or importing, and by actively inducing others to make, use, sell, offer to sell, and/or import products, including handsets, tablets, smart devices, and chipsets thereof, that implement the 5G standards. For example, the Accused Products include, but are not limited to, the Galaxy A13 5G, Galaxy A22 5G, Galaxy A32 5G, Galaxy A33 5G, Galaxy A42 5G, Galaxy A51 5G, Galaxy A52 5G, Galaxy A52s 5G, Galaxy A53 5G, Galaxy A71 5G, Galaxy A73 5G, Galaxy A90 5G, Galaxy Book Go 5G, Galaxy Book Pro 360 5G, Galaxy F42 5G, Galaxy F52 5G, Galaxy Fold 5G, Galaxy M32 5G, Galaxy M42 5G, Galaxy M52 5G, Galaxy Note 10 5G, Galaxy Note 10+ 5G, Galaxy Note 20 5G, Galaxy Note 20 Ultra 5G, Galaxy Quantum 2, Galaxy S10 5G, Galaxy S20 5G, Galaxy S20 FE 5G, Galaxy S20 Ultra 5G, Galaxy S20 UW, Galaxy S20+ 5G, Galaxy S21 5G, Galaxy S21 Ultra 5G, Galaxy S21+ 5G, Galaxy S22, Galaxy S22 5G, Galaxy S22 Ultra, Galaxy S22+, Galaxy Tab S7 5G, Galaxy Tab S7 FE 5G, Galaxy Tab S7+ 5G, Galaxy Tab S8+ 5G, Galaxy Z Flip 5G, Galaxy Z Flip3 5G, Galaxy Z Fold 2 5G, and the Galaxy Z Fold3 5G.

21. Samsung has had notice of the Asserted Patents, at least as of the filing date of this complaint.

COUNT I
(Infringement of the ’767 Patent)

22. Paragraphs 1 through 21 are incorporated by reference as if fully set forth herein.

23. ABT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the ’767 Patent.

24. Defendants have and continue to directly infringe the ’767 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the ’767 Patent. Such products include at least the Accused Products including, but not limited to, the Galaxy A13 5G, Galaxy A22 5G, Galaxy A32 5G, Galaxy A33 5G, Galaxy A42 5G, Galaxy A51 5G, Galaxy A52 5G, Galaxy A52s 5G, Galaxy A53 5G, Galaxy A71 5G, Galaxy A73 5G, Galaxy A90 5G, Galaxy Book Go 5G, Galaxy Book Pro 360 5G, Galaxy F42 5G, Galaxy F52 5G, Galaxy Fold 5G, Galaxy M32 5G, Galaxy M42 5G, Galaxy M52 5G, Galaxy Note 10 5G, Galaxy Note 10+ 5G, Galaxy Note 20 5G, Galaxy Note 20 Ultra 5G, Galaxy Quantum 2, Galaxy S10 5G, Galaxy S20 5G, Galaxy S20 FE 5G, Galaxy S20 Ultra 5G, Galaxy S20 UW, Galaxy S20+ 5G, Galaxy S21 5G, Galaxy S21 Ultra 5G, Galaxy S21+ 5G, Galaxy S22, Galaxy S22 5G, Galaxy S22 Ultra, Galaxy S22+, Galaxy Tab S7 5G, Galaxy Tab S7 FE 5G, Galaxy Tab S7+ 5G, Galaxy Tab S8+ 5G, Galaxy Z Flip 5G, Galaxy Z Flip3 5G, Galaxy Z Fold 2 5G, and the Galaxy Z Fold3 5G which practice a method in a User Equipment (UE) for paging, comprising: monitoring a first signaling in X time intervals; and receiving a first radio signal; wherein X is a positive integer; the first signaling is used for determining scheduling information for the first radio signal; the scheduling information comprises at least one of

(occupied time-frequency resource, adopted Modulation Coding Scheme (MCS), subcarrier spacing of subcarriers in occupied frequency domain resource); the first radio signal carries a paging message; the frequency domain resource used for transmitting the first signaling belongs to a first subband; the first subband comprises a positive integer number of consecutive subcarriers in frequency domain; and at least one of (location of the first subband in frequency domain, subcarrier spacing of subcarriers included in the first subband) is used for determining the X time intervals.

25. For example, Defendants have and continue to directly infringe at least claim 1 of the ’767 Patent by making, using, offering to sell, selling, and/or importing into the United States products that implement the 5G standards such as the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks). For example, the Galaxy Z Fold3 5G operates on 5G networks and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

26. The Accused Products perform a method in a User Equipment (such as the Galaxy Z Fold3 5G) for paging comprising: monitoring a first signaling (*e.g.*, Paging DCI) in X time intervals (*e.g.*, PDCCH monitoring occasions); and receiving a first radio signal (*e.g.*, PCCH, PCH, or PDSCH); wherein X is a positive integer; the first signaling is used for determining scheduling information for the first radio signal; the scheduling information comprises at least one of occupied time-frequency resource, adopted Modulation Coding Scheme (MCS), subcarrier spacing of subcarriers in occupied frequency domain resource); the first radio signal carries a paging message; the frequency domain resource used for transmitting the first signaling belongs to a first subband (*e.g.*, a BWP); the first subband comprises a positive integer number of consecutive subcarriers in frequency domain; and at least one of (location of the first subband in frequency domain, subcarrier spacing of subcarriers included in the first subband) is used for determining the X time intervals.

27. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’767 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung’s customers and end-users, in this District and elsewhere in the United States. For example, Samsung’s customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the ’767 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung’s inducement, Samsung’s customers and end-users use the Accused Products in a way Samsung intends and they directly infringe the ’767 Patent. Samsung performs these affirmative acts with knowledge of the ’767 Patent and with the intent, or willful blindness, that the induced acts directly infringe the ’767 Patent.

28. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’767 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung’s affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold, and offered for sale contribute to others’ use and manufacture of the Accused Products such that the ’767 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, chipsets manufactured by Samsung, are material to the invention of the ’767 Patent, are not staple articles or commodities of commerce, have no

substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the ’767 Patent. Samsung performs these affirmative acts with knowledge of the ’767 Patent and with intent, or willful blindness, that they cause the direct infringement of the ’767 Patent.

29. ABT has suffered damages as a result of Defendants’ direct and indirect infringement of the ’767 Patent in an amount to be proved at trial.

COUNT II
(Infringement of the ’113 Patent)

30. Paragraphs 1 through 21 are incorporated by reference as if fully set forth herein.

31. ABT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the ’113 Patent.

32. Defendants have and continue to directly infringe the ’113 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the ’113 Patent. Such products include at least Accused Products including, but not limited to, Galaxy A13 5G, Galaxy A22 5G, Galaxy A32 5G, Galaxy A33 5G, Galaxy A42 5G, Galaxy A51 5G, Galaxy A52 5G, Galaxy A52s 5G, Galaxy A53 5G, Galaxy A71 5G, Galaxy A73 5G, Galaxy A90 5G, Galaxy Book Go 5G, Galaxy Book Pro 360 5G, Galaxy F42 5G, Galaxy F52 5G, Galaxy Fold 5G, Galaxy M32 5G, Galaxy M42 5G, Galaxy M52 5G, Galaxy Note 10 5G, Galaxy Note 10+ 5G, Galaxy Note 20 5G, Galaxy Note 20 Ultra 5G, Galaxy Quantum 2, Galaxy S10 5G, Galaxy S20 5G, Galaxy S20 FE 5G, Galaxy S20 Ultra 5G, Galaxy S20 UW, Galaxy S20+ 5G, Galaxy S21 5G, Galaxy S21 Ultra 5G, Galaxy S21+ 5G, Galaxy S22, Galaxy S22 5G, Galaxy S22 Ultra, Galaxy S22+, Galaxy Tab S7 5G, Galaxy Tab S7 FE 5G, Galaxy Tab S7+ 5G, Galaxy Tab S8+ 5G, Galaxy Z Flip 5G, Galaxy Z Flip3 5G, Galaxy

Z Fold 2 5G, and the Galaxy Z Fold3 5G which practice a method in a User Equipment (UE) for wireless communication, comprising: receiving a target radio signal; transmitting a first radio signal on a first channel; transmitting a second radio signal on a second channel; and monitoring a third radio signal in a first time window; wherein a measurement for the target radio signal obtains a target measurement value, the target measurement value, when higher than a target threshold is used for triggering the transmission of the first radio signal and the second radio signal; a time resource occupied by the first radio signal is used for determining the start time of the first time window; a time domain resource occupied by the first radio signal is used for determining a second time window, a time domain resource occupied by the second radio signal is within the second time window, and the second time window is within the first time window; a time domain resource occupied by the second radio signal is used for determining a third time window, and the end time of the third time window is the end time of the first time window; and the second time window and the third time window have overlapped time domain resource(s).

33. For example, Defendants have and continue to directly infringe at least claim 1 of the ’113 Patent by making, using, offering to sell, selling, and/or importing into the United States products that implement the 5G standards, such as the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks). For example, the Galaxy Z Fold3 5G operates on 5G networks and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

34. The Accused Products perform a method in a User Equipment (such as the Galaxy Z Fold3 5G) for wireless communication, comprising: receiving a target radio signal (*e.g.*, SS); transmitting a first radio signal (*e.g.*, MsgA) on a first channel (*e.g.*, PRACH, PUSCH); transmitting a second radio signal (*e.g.*, PUSCH scheduled by a RAR UL grant) on a second channel (*e.g.*, PUSCH); and monitoring a third radio signal in a first time window (*e.g.*, covering

the time from the beginning of the second time window to the end of the third time window); wherein a measurement for the target radio signal obtains a target measurement value, the target measurement value, when higher than a target threshold is used for triggering the transmission of the first radio signal and the second radio signal; a time resource occupied by the first radio signal is used for determining the start time of the first time window; a time domain resource occupied by the first radio signal is used for determining a second time window (*e.g.*, *msgB-ResponseWindow* configured by RRC signaling), a time domain resource occupied by the second radio signal is within the second time window, and the second time window is within the first time window; a time domain resource occupied by the second radio signal is used for determining a third time window (*i.e.*, running time of *ra-ContentionResolutionTimer*), and the end time of the third time window is the end time of the first time window; and the second time window and the third time window have overlapped time domain resource(s).

35. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’113 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung’s customers and end-users, in this District and elsewhere in the United States. For example, Samsung’s customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the ’113 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung’s inducement, Samsung’s customers and end-users use the Accused Products in a way Samsung intends and they

directly infringe the ’113 Patent. Samsung performs these affirmative acts with knowledge of the ’113 Patent and with the intent, or willful blindness, that the induced acts directly infringe the ’113 Patent.

36. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’113 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung’s affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold, and offered for sale contribute to others’ use and manufacture of the Accused Products such that the ’113 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, chipsets manufactured by Samsung, are material to the invention of the ’113 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the ’113 Patent. Samsung performs these affirmative acts with knowledge of the ’113 Patent and with intent, or willful blindness, that they cause the direct infringement of the ’113 Patent.

37. ABT has suffered damages as a result of Defendants’ direct and indirect infringement of the ’113 Patent in an amount to be proved at trial.

COUNT III
(Infringement of the ’081 Patent)

38. Paragraphs 1 through 21 are incorporated by reference as if fully set forth herein.

39. ABT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the ’081 Patent.

40. Defendants have and continue to directly infringe the ’081 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the ’081 Patent. Such products include at least Accused Products including, but not limited to, Galaxy A13 5G, Galaxy A22 5G, Galaxy A32 5G, Galaxy A33 5G, Galaxy A42 5G, Galaxy A51 5G, Galaxy A52 5G, Galaxy A52s 5G, Galaxy A53 5G, Galaxy A71 5G, Galaxy A73 5G, Galaxy A90 5G, Galaxy Book Go 5G, Galaxy Book Pro 360 5G, Galaxy F42 5G, Galaxy F52 5G, Galaxy Fold 5G, Galaxy M32 5G, Galaxy M42 5G, Galaxy M52 5G, Galaxy Note 10 5G, Galaxy Note 10+ 5G, Galaxy Note 20 5G, Galaxy Note 20 Ultra 5G, Galaxy Quantum 2, Galaxy S10 5G, Galaxy S20 5G, Galaxy S20 FE 5G, Galaxy S20 Ultra 5G, Galaxy S20 UW, Galaxy S20+ 5G, Galaxy S21 5G, Galaxy S21 Ultra 5G, Galaxy S21+ 5G, Galaxy S22, Galaxy S22 5G, Galaxy S22 Ultra, Galaxy S22+, Galaxy Tab S7 5G, Galaxy Tab S7 FE 5G, Galaxy Tab S7+ 5G, Galaxy Tab S8+ 5G, Galaxy Z Flip 5G, Galaxy Z Flip3 5G, Galaxy Z Fold 2 5G, and the Galaxy Z Fold3 5G which practice a method in a User Equipment (UE) for wireless communication, comprising: receiving a second radio signal; receiving a first radio signal; wherein the first radio signal is transmitted within a first time unit, a first bit block is used for generating the first radio signal, and the first radio signal comprises G multicarrier symbols; the second radio signal is transmitted within the first time unit, and the second radio signal is used for determining a time-domain resource occupied by the G multicarrier symbols; as for any one given multicarrier symbol of the G multicarrier symbols, the multi-antenna related receiving for the given multicarrier symbol is related to the relative position of a time-domain resource occupied by the given multicarrier symbol with respect to a first time point in time domain; when the time-domain resource occupied by the given multicarrier symbol is behind the first time point, the

second radio signal is used for determining the multi-antenna related receiving for the given multicarrier symbol; and when the time-domain resource occupied by the given multicarrier symbol is before the first time point, the multi-antenna related receiving for the given multicarrier symbol is related to the multi-antenna related receiving for the second radio signal; the first time point is one time point within the first time unit; and G is a positive integer.

41. For example, Defendants have and continue to directly infringe at least claim 1 of the ’081 Patent by making, using, offering to sell, selling, and/or importing into the United States products that implement the 5G standards, such as the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks). For example, the Galaxy Z Fold3 5G operates on 5G networks and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

42. The Accused Products perform a method in a User Equipment (*e.g.*, Galaxy Z Fold3 5G) for wireless communication, comprising: receiving a second radio signal (*e.g.*, DL DCI); receiving a first radio signal (*e.g.*, PDSCH); wherein the first radio signal is transmitted within a first time unit, a first bit block is used for generating the first radio signal, and the first radio signal comprises G multicarrier symbols; the second radio signal is transmitted within the first time unit, and the second radio signal is used for determining a time-domain resource (*e.g.*, time offset) occupied by the G multicarrier symbols; as for any one given multicarrier symbol of the G multicarrier symbols, the multi-antenna related receiving for the given multicarrier symbol is related to the relative position of a time-domain resource occupied by the given multicarrier symbol with respect to a first time point (*e.g.*, reception time of DCL DCI delayed by *Threshold-Sched-Offset*) in time domain; when the time-domain resource occupied by the given multicarrier symbol is behind the first time point, the second radio signal is used for determining the multi-antenna related receiving for the given multicarrier symbol; and when the time-domain resource

occupied by the given multicarrier symbol is before the first time point, the multi-antenna related receiving for the given multicarrier symbol is related to the multi-antenna related receiving for the second radio signal; the first time point is one time point within the first time unit; and G is a positive integer.

43. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’081 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung’s customers and end-users, in this District and elsewhere in the United States. For example, Samsung’s customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the ’081 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung’s inducement, Samsung’s customers and end-users use the Accused Products in a way Samsung intends and they directly infringe the ’081 Patent. Samsung performs these affirmative acts with knowledge of the ’081 Patent and with the intent, or willful blindness, that the induced acts directly infringe the ’081 Patent.

44. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’081 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung’s affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold,

and offered for sale contribute to others' use and manufacture of the Accused Products such that the '081 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, chipsets manufactured by Samsung, are material to the invention of the '081 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the '081 Patent. Samsung performs these affirmative acts with knowledge of the '081 Patent and with intent, or willful blindness, that they cause the direct infringement of the '081 Patent.

45. ABT has suffered damages as a result of Defendants' direct and indirect infringement of the '081 Patent in an amount to be proved at trial.

COUNT IV
(Infringement of the '527 Patent)

46. Paragraphs 1 through 21 are incorporated by reference as if fully set forth herein.

47. ABT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '527 Patent.

48. Defendants have and continue to directly infringe the '527 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '527 Patent. Such products include at least Accused Products including, but not limited to, the Galaxy A13 5G, Galaxy A22 5G, Galaxy A32 5G, Galaxy A33 5G, Galaxy A42 5G, Galaxy A51 5G, Galaxy A52 5G, Galaxy A52s 5G, Galaxy A53 5G, Galaxy A71 5G, Galaxy A73 5G, Galaxy A90 5G, Galaxy Book Go 5G, Galaxy Book Pro 360 5G, Galaxy F42 5G, Galaxy F52 5G, Galaxy Fold 5G, Galaxy M32 5G, Galaxy M42 5G, Galaxy M52 5G, Galaxy Note 10 5G, Galaxy Note 10+ 5G, Galaxy Note 20 5G, Galaxy Note 20

Ultra 5G, Galaxy Quantum 2, Galaxy S10 5G, Galaxy S20 5G, Galaxy S20 FE 5G, Galaxy S20 Ultra 5G, Galaxy S20 UW, Galaxy S20+ 5G, Galaxy S21 5G, Galaxy S21 Ultra 5G, Galaxy S21+ 5G, Galaxy S22, Galaxy S22 5G, Galaxy S22 Ultra, Galaxy S22+, Galaxy Tab S7 5G, Galaxy Tab S7 FE 5G, Galaxy Tab S7+ 5G, Galaxy Tab S8+ 5G, Galaxy Z Flip 5G, Galaxy Z Flip3 5G, Galaxy Z Fold 2 5G, and the Galaxy Z Fold3 5G which practice a method for multi-antenna transmission in a user equipment, comprising: receiving a first radio signal from a base station; and receiving a first signaling from the base station; wherein the first radio signal is transmitted by K antenna port groups of the base station; the antenna port group includes a positive integer number of antenna port(s); a first antenna port group is one of the K antenna port groups; the first signaling is used to determine a first time resource pool; at least one of a first antenna virtualization vector and a second antenna virtualization vector is associated with the first antenna port group; the first antenna virtualization vector is an antenna virtualization vector available to the base station in the first time resource pool; the second antenna virtualization vector is an antenna virtualization vector available to the user equipment in the first time resource pool; and the K is a positive integer greater than 1.

49. For example, Defendants have and continue to directly infringe at least claim 1 of the ’527 Patent by making, using, offering to sell, selling, and/or importing into the United States products that implement the 5G standards, such as the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks). For example, the Galaxy Z Fold3 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

50. The Accused Products perform a method for multi-antenna transmission in a user equipment (such as the Galaxy Z Fold3 5G), comprising: receiving a first radio signal (*e.g.*, KCSI-RSresources and/or SS/PBCH blockresources) from a base station; and receiving a first signaling (*e.g.*, a DCI format signal) from the base station; wherein the first radio signal is transmitted by K

antenna port groups (*e.g.*, ports in the KCSI-RSresources and/or SS/PBCH blockresources) of the base station; the antenna port group includes a positive integer number of antenna port(s); a first antenna port group (*e.g.*, ports in a CSI-RS resource or SS/PBCH block resource) is one of the K antenna port groups; the first signaling is used to determine a first time resource pool (*e.g.*, time domain resource occupied by a PDSCH,); at least one of a first antenna virtualization vector and a second antenna virtualization vector (*e.g.*, Rx or Tx antenna virtualization vector) is associated with the first antenna port group; the first antenna virtualization vector is an antenna virtualization vector available to the base station in the first time resource pool; the second antenna virtualization vector is an antenna virtualization vector available to the user equipment in the first time resource pool; and the K is a positive integer greater than 1.

51. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’527 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung’s customers and end-users, in this District and elsewhere in the United States. For example, Samsung’s customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the ’527 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung’s inducement, Samsung’s customers and end-users use the Accused Products in a way Samsung intends and they directly infringe the ’527 Patent. Samsung performs these affirmative acts with knowledge of the

’527 Patent and with the intent, or willful blindness, that the induced acts directly infringe the ’527 Patent.

52. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’527 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung’s affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold, and offered for sale contributes to others’ use and manufacture of the Accused Products such that the ’527 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, chipsets manufactured by Samsung, are material to the invention of the ’527 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the ’527 Patent. Samsung performs these affirmative acts with knowledge of the ’527 Patent and with intent, or willful blindness, that they cause the direct infringement of the ’527 Patent.

53. ABT has suffered damages as a result of Defendants’ direct and indirect infringement of the ‘527 Patent in an amount to be proved at trial.

COUNT V
(Infringement of the ’271 Patent)

54. Paragraphs 1 through 21 are incorporated by reference as if fully set forth herein.

55. ABT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the ’271 Patent.

56. Defendants have and continue to directly infringe the ’271 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making,

using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the ’271 Patent. Such products include at least Accused Products including, but not limited to, the Galaxy A13 5G, Galaxy A22 5G, Galaxy A32 5G, Galaxy A33 5G, Galaxy A42 5G, Galaxy A51 5G, Galaxy A52 5G, Galaxy A52s 5G, Galaxy A53 5G, Galaxy A71 5G, Galaxy A73 5G, Galaxy A90 5G, Galaxy Book Go 5G, Galaxy Book Pro 360 5G, Galaxy F42 5G, Galaxy F52 5G, Galaxy Fold 5G, Galaxy M32 5G, Galaxy M42 5G, Galaxy M52 5G, Galaxy Note 10 5G, Galaxy Note 10+ 5G, Galaxy Note 20 5G, Galaxy Note 20 Ultra 5G, Galaxy Quantum 2, Galaxy S10 5G, Galaxy S20 5G, Galaxy S20 FE 5G, Galaxy S20 Ultra 5G, Galaxy S20 UW, Galaxy S20+ 5G, Galaxy S21 5G, Galaxy S21 Ultra 5G, Galaxy S21+ 5G, Galaxy S22, Galaxy S22 5G, Galaxy S22 Ultra, Galaxy S22+, Galaxy Tab S7 5G, Galaxy Tab S7 FE 5G, Galaxy Tab S7+ 5G, Galaxy Tab S8+ 5G, Galaxy Z Flip 5G, Galaxy Z Flip3 5G, Galaxy Z Fold 2 5G, and the Galaxy Z Fold3 5G which practice a method for multi-antenna transmission in a user equipment (UE), comprising: receiving, by the UE, a first signaling originating from a base station; receiving, by the UE, a first wireless signal originating from the base station; and transmitting, by the UE, first information to the base station; wherein, K antenna port groups of the base station are used to transmit the first wireless signal; the first signaling is used by the UE to determine the K antenna port groups transmitting the first wireless signal received by the UE; the K is a positive integer greater than 1; the K antenna port groups respectively correspond to K channel quality values; the K channel quality values are K non-negative real numbers; the K channel quality values are Reference Signal Received Powers (RSRPs) or a Signal to Interference plus Noise Ratios (SINRs); K1 antenna port groups of the K antenna port groups correspond to K1 channel quality values of the K channel quality values; the K1 is a positive integer less than or equal to the K; a first proportional sequence corresponds to a ratio (ratios) among the K1 channel

quality values; the first information is used to determine the K1 antenna port groups and the first proportional sequence; the first signaling is used to determine a target threshold; the target threshold is a non-negative real number; a first channel quality is a best channel quality value among the K1 channel quality values; a second channel quality is a worse channel quality value among the K1 channel quality values; a ratio between the second channel quality and the first channel quality is greater than or equal to the target threshold.

57. For example, Defendants have and continue to directly infringe at least claim 1 of the ’271 Patent by making, using, offering to sell, selling, and/or importing into the United States products that implement the 5G standards, such as the Accused Products (*e.g.*, 5G mobile handsets, tablets, and notebooks). For example, the Galaxy Z Fold3 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

58. The Accused Products perform a method for multi-antenna transmission in a user equipment (UE, such as the Galaxy Z Fold3 5G), comprising: receiving, by the UE, a first signaling (*e.g.*, CSI-ReportConfig IE or CSI-AperiodicTriggerStateList IE) originating from a base station; receiving, by the UE, a first wireless signal (*e.g.*, K CSI-RS resources and/or SS/PBCH block resources) originating from the base station; and transmitting, by the UE, first information (CSI report) to the base station; wherein, K antenna port groups (*e.g.*, ports in the K CSI-RS resources and/or SS/PBCH block resources) of the base station are used to transmit the first wireless signal; the first signaling is used by the UE to determine the K antenna port groups transmitting the first wireless signal received by the UE; the K is a positive integer greater than 1; the K antenna port groups respectively correspond to K channel quality values (*e.g.*, K L1-RSRPs corresponding to K CSI-RS resources and/or SS/PBCH block resources); the K channel quality values are K non-negative real numbers; the K channel quality values are Reference Signal Received Powers

(RSRPs) or a Signal to Interference plus Noise Ratios (SINRs); K1 (*e.g.*, nrofReportedRS) antenna port groups (*e.g.*, antenna port groups corresponding to nrofReportedRS CSI-RS resources and/or SS/PBCH block resources reported in a single CSI report) of the K antenna port groups correspond to K1 channel quality values (*e.g.*, nrofReportedRS L1-RSRPs corresponding to nrofReportedRS CSI-RS resources and/or SS/PBCH block resources reported in a single CSI report) of the K channel quality values; the K1 is a positive integer less than or equal to the K; a first proportional sequence (*e.g.*, the linear values of (nrofReportedRS-1) differential L1-RSRPs) corresponds to a ratio (ratios) among the K1 channel quality values; the first information is used to determine the K1 antenna port groups and the first proportional sequence; the first signaling is used to determine a target threshold (*e.g.*, the minimum value of the ratio between the worst one and the best one of the K1 L1-RSRPs); the target threshold is a non-negative real number; a first channel quality (*i.e.*, the best one of the nrofReporteedRS L1-RSRPs) is a best channel quality value among the K1 channel quality values; a second channel quality (one of the nrofReportedRS L1-RSRPs other than the best one of the nrofReportedRS L1-RSRPs) is a worse channel quality value among the K1 channel quality values; a ratio between the second channel quality and the first channel quality is greater than or equal to the target threshold.

59. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the ’271 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung’s customers and end-users, in this District and elsewhere in the United States. For example, Samsung’s customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the ’271 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions,

documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung's inducement, Samsung's customers and end-users use the Accused Products in a way Samsung intends and they directly infringe the '271 Patent. Samsung performs these affirmative acts with knowledge of the '271 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '271 Patent.

60. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '271 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung's affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products such that the '271 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, chipsets manufactured by Samsung, are material to the invention of the '271 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the '271 Patent. Samsung performs these affirmative acts with knowledge of the '271 Patent and with intent, or willful blindness, that they cause the direct infringement of the '271 Patent.

61. ABT has suffered damages as a result of Defendants' direct and indirect infringement of the '271 Patent in an amount to be proved at trial.

DEMAND FOR JURY TRIAL

Plaintiff hereby demands a jury for all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, ABT prays for relief against Defendants as follows:

a. Entry of judgment declaring that Defendants have directly and/or indirectly infringed one or more claims of each of the Patents-in-Suit;

b. An order pursuant to 35 U.S.C. § 283 permanently enjoining Defendants, their officers, agents, servants, employees, attorneys, and those persons in active concert or participation with them, from further acts of infringement of the Patents-in-Suit;

c. An order awarding damages sufficient to compensate ABT for Defendants' infringement of the Patents-in-Suit, but in no event less than a reasonable royalty, together with interest and costs;

d. Entry of judgment declaring that this case is exceptional and awarding ABT its costs and reasonable attorney fees under 35 U.S.C. § 285; and

e. Such other and further relief as the Court deems just and proper.

Dated: June 1, 2022

Respectfully submitted,

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