EXHIBIT 1

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

APEX BEAM TECHNOLOGIES LLC,	§	Case No. 2:21-cv-00438-JRG
Plaintiff,	§	**JURY TRIAL DEMANDED**
v.	§	
TCT MOBILE INTERNATIONAL LIMITED, TCL ELECTRONICS HOLDINGS LIMITED, TCL TECHNOLOGY GROUP CORPORATION, TCL COMMUNICATION LIMITED, and TCL COMMUNICATION TECHNOLOGY HOLDINGS LIMITED,	§	
Defendants.	§	

SECOND AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Apex Beam Technologies LLC ("ABT" or "Plaintiff") for its Second Amended Complaint against Defendants TCT Mobile International Limited, TCL Electronics Holdings Limited, TCL Technology Group Corporation, TCL Communication Limited, and TCL Communication Technology Holdings Limited ("TCL" or "Defendants") 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. Upon information and belief, Defendant TCT Mobile International Limited is a corporation organized and existing under the laws of Hong Kong, with its principal place of business located at 1910-12A Tower 3, China Hong Kong City, 33 Canton Road, Tsim Sha Tsui,

31802888 Hong Kong, and may be served pursuant to the provisions of the Hague Convention. TCT is a leading manufacturer and seller of smartphones and tablets in the world and in the United States. Upon information and belief, TCT does business in Texas and in the Eastern District of Texas, directly or through intermediaries.

3. Upon information and belief, Defendant TCL Electronics Holdings Limited is a corporation organized and existing under the laws of the Cayman Islands with its principal place of business located at 5/F Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong, and may be served pursuant to the provisions of the Hague Convention. TCL is a leading manufacturer and seller of smartphones and tablets in the world and in the United States. Upon information and belief, TCL does business in Texas and in the Eastern District of Texas, directly or through intermediaries.

4. Upon information and belief, Defendant TCL Technology Group Corporation is a corporation organized and existing under the laws of China with its principal place of business located at TCL Tech Building, 17 Huifeng Third Road, Zhongkai Hi-Tech Development District, Huizhou City, Guangdong Province, China and may be served pursuant to the provisions of the Hague Convention. Defendant TCL Technology Group Corporation is a leading manufacturer and seller of smartphones and tablets in the world and in the United States. Upon information and belief, Defendant TCL Technology Group Corporation does business in Texas and in the Eastern District of Texas, directly or through intermediaries. Upon information and belief, Defendant TCL Technology Group Corporation owns the trademark "TCL" which is marked on each of the Accused Products (*e.g.*, 5G mobile handsets and tablets).[1]

[1] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-

5. Upon information and belief, Defendant TCL Communication Limited is a corporation organized and existing under the laws of Hong Kong, with its principal place of business located at 5/F Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong, and may be served pursuant to the provisions of the Hague Convention. TCL is a leading manufacturer and seller of smartphones and tablets in the world and in the United States. Upon information and belief, TCL does business in Texas and in the Eastern District of Texas, directly or through intermediaries.

6. Upon information and belief, Defendant TCL Communication Technology Holdings Limited is a corporation organized and existing under the laws of China, with its principal place of business located at TCL Communication Technology Building, Block F4, TCL International E City, Zhong Shan Yuan Road, Nanshan District, Shenzhen, 518052 P.R. China, and may be served pursuant to the provisions of the Hague Convention. TCL is a leading manufacturer and seller of smartphones and tablets in the world and in the United States. Upon information and belief, TCL does business in Texas and in the Eastern District of Texas, directly or through intermediaries.

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uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf.

JURISDICTION

7. 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 and 1338(a) and 1367.

8. 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 Defendants transact substantial business in the State of Texas and in this Judicial District. Further, the Defendants have, directly or through subsidiaries or intermediaries, committed and continue to commit acts of patent infringement in the State of Texas and in this Judicial District as alleged in this Second Amended Complaint, as alleged more particularly below. For example, on information and belief, the Accused Products are available for purchase in this Judicial District.

9. Venue is proper in this Judicial District pursuant to 28 U.S.C. § 1391(b) and (c) because the Defendants are foreign companies that may be sued in any Judicial District, including the Eastern District of Texas. The Defendants are subject to personal jurisdiction in this Judicial District and have committed acts of patent infringement in this Judicial District. On information and belief, the Defendants through their 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 the Judicial District such that this venue is a fair and reasonable one. 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

10. 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 https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/10462767.

11. 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 https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/10568113.

12. 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 https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/10912081.

13. 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 https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/10944527.

14. 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 https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/10951271.

15. On March 30, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,965,434 (the "'434 Patent") entitled "Scheduling Activation and

Release." A true and correct copy of the '434 Patent is available at https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/10965434.

16. On May 25, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 11,018,946 (the "'946 Patent") entitled "Wireless Device Feedback for Semi-Persistent Scheduling Release." A true and correct copy of the '946 Patent is available at https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/11018946.

17. On April 20, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,986,695 (the "'695 Patent") entitled "Uplink Cancellation Indication Signaling." A true and correct copy of the '695 Patent is available at https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/10986695.

18. On April 13, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,979,128 (the "'128 Patent") entitled "Beam Failure and Consistent Listen Before Talk Failure Recovery." A true and correct copy of the '128 Patent is available at https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/10979128.

19. On July 13, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 11,063,655 (the "'655 Patent") entitled "Random Access and Consistent LBT Failure Recovery." A true and correct copy of the '655 Patent is available at https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/11063655.

20. 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 and to seek

injunctive relief as appropriate under the law.

FACTUAL ALLEGATIONS

21. The Patents-in-Suit generally cover systems and methods for transmission schemes in wireless communication systems.

22. The '767 Patent generally relates to technology that determines paging interval schedules that enable mobile handsets to be reached by paging with minimal complexity 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 handsets and tablets).

23. 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 and tablets).

24. 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).

25. 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 and tablets).

26. 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 and tablets).

27. The ’434 Patent generally relates to technology that enables scheduling activation or scheduling release of semi-persistent or configured grants in a wireless device. The technology described in the ’434 Patent was developed by Alireza Babaei of PanPsy Technologies, LLC. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets and tablets).

28. The ’946 Patent generally relates to technology that enables wireless device feedback for semi-persistent scheduling release. The technology described in the ’434 Patent was developed by Alireza Babaei of PanPsy Technologies, LLC. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets and tablets).

29. The ’695 Patent generally relates to technology that enables signaling and determination of uplink cancellation indication in a wireless device. The technology described in the ’695 Patent was developed by Alireza Babaei of PanPsy Technologies, LLC. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets and tablets).

30. The ’128 Patent generally relates to technology for beam failure and enables consistent listen-before-talk (LBT) failure recovery. The technology described in the ’128 Patent

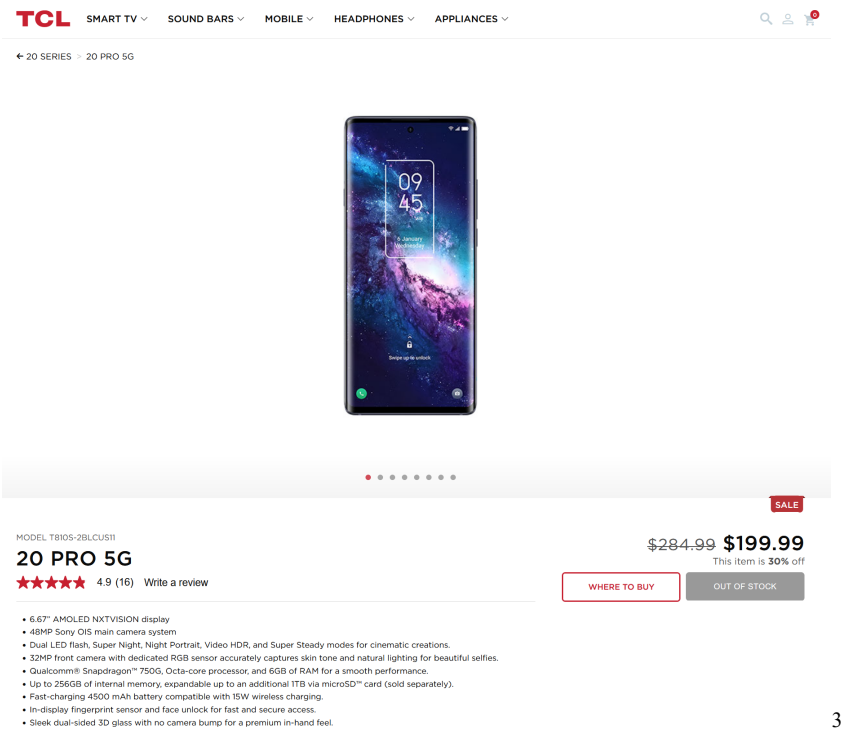
was developed by Alireza Babaei of PanPsy Technologies, LLC. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets and tablets).

31. The '655 Patent generally relates to technology for beam failure and enables consistent listen-before-talk (LBT) failure recovery. The technology described in the '655 Patent was developed by Alireza Babaei of PanPsy Technologies, LLC. By way of example, this technology is implemented today in the Accused Products (*e.g.*, 5G mobile handsets and tablets).

32. Defendants have infringed and continue to infringe one or more of the Patents-in-Suit by making,[2] using, selling, offering to sell, and/or importing, and by actively inducing others to make, use, sell, offer to sell, and/or importing, products that implement the 5G standards. For example, the Accused Products include at least the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 5G.

33. For example, Defendants sell and offer to sell the Accused Products in the United Staes through online stores such as Amazon, Walmart, and https://www.tcl.com/us/en. Upon information and belief, Defendants sell and offer to sell the Accused Products directly to customers and end-users through their website, as well as through their stores on Amazon and Walmart.

[2] https://www.prnewswire.com/news-releases/tcl-communication-records-strong-smartphone-and-tablet-growth-in-q3-2021-301431486.html (indicating that "For nearly 40 years TCL has operated its *manufacturing and R&D centers worldwide*, with products sold in more than 160 countries throughout North America, Latin America, Europe, the Middle East, Africa, and the Asia Pacific. TCL specializes in the research, development, and manufacturing of consumer electronics ranging from TVs, mobile phones, audio devices, and smart home products as part of the company's 'AI x IoT' strategy. ") (emphasis added).



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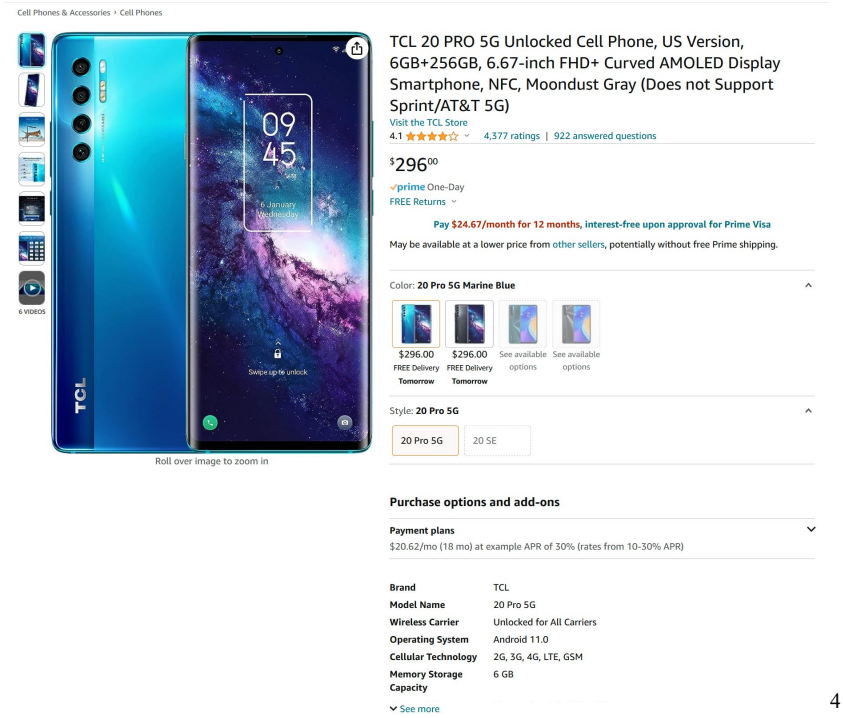

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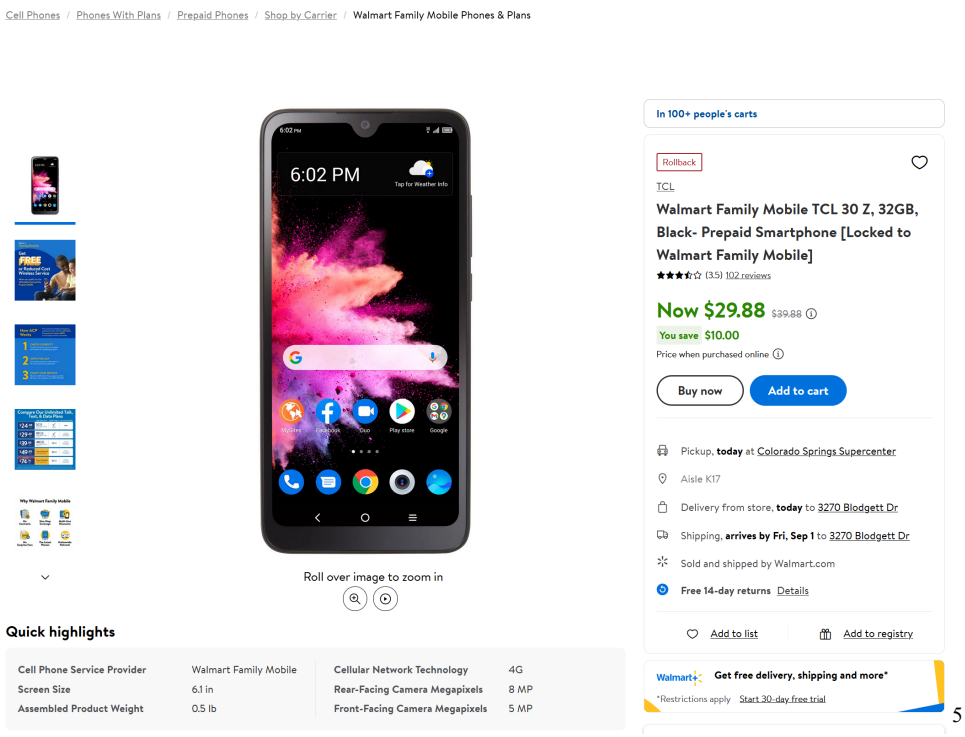
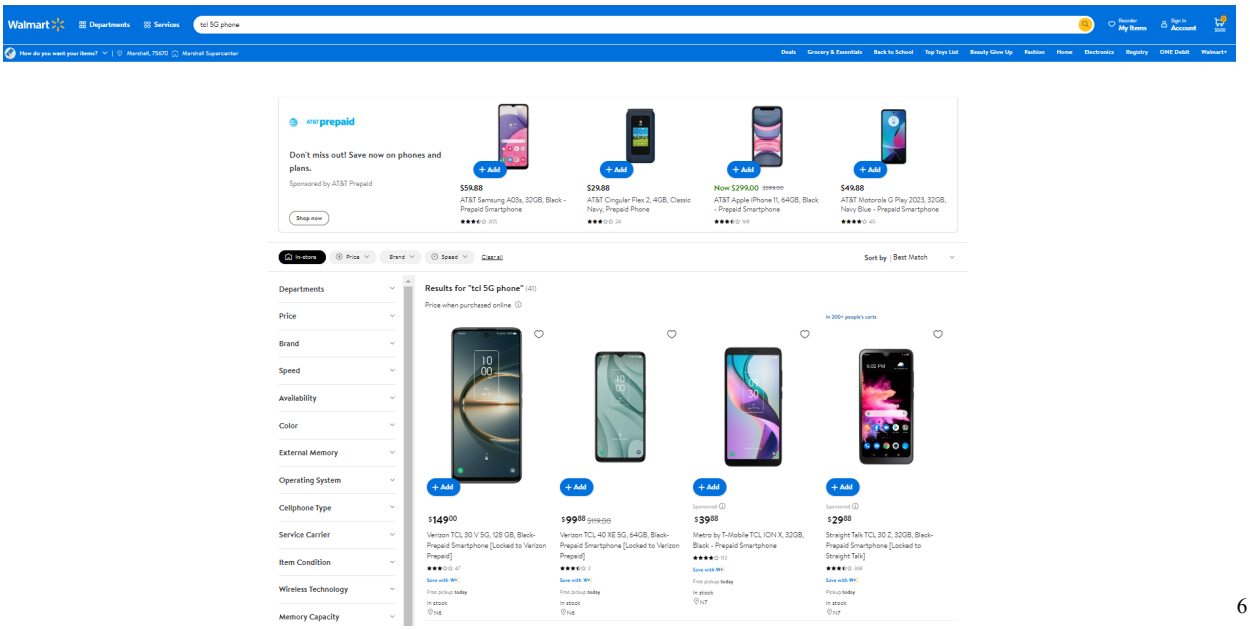
[3] https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray.html
[4] https://www.amazon.com/TCL-Unlocked-Smartphone-Wireless-Cellphone/dp/B09728VTDK?th=1



[5]

34. For further example, Defendants sell and offer to sell the Accused Products directly to customers and end-users in this District at the Walmart Supercenter in Marshall, TX 75670 for in-store purchase.

[5] https://www.walmart.com/ip/Walmart-Family-Mobile-TCL-30-Z-32GB-Black-Prepaid-Smartphone-Locked-to-Walmart-Family-Mobile/972364678?athbdg=L1103&from=/search.



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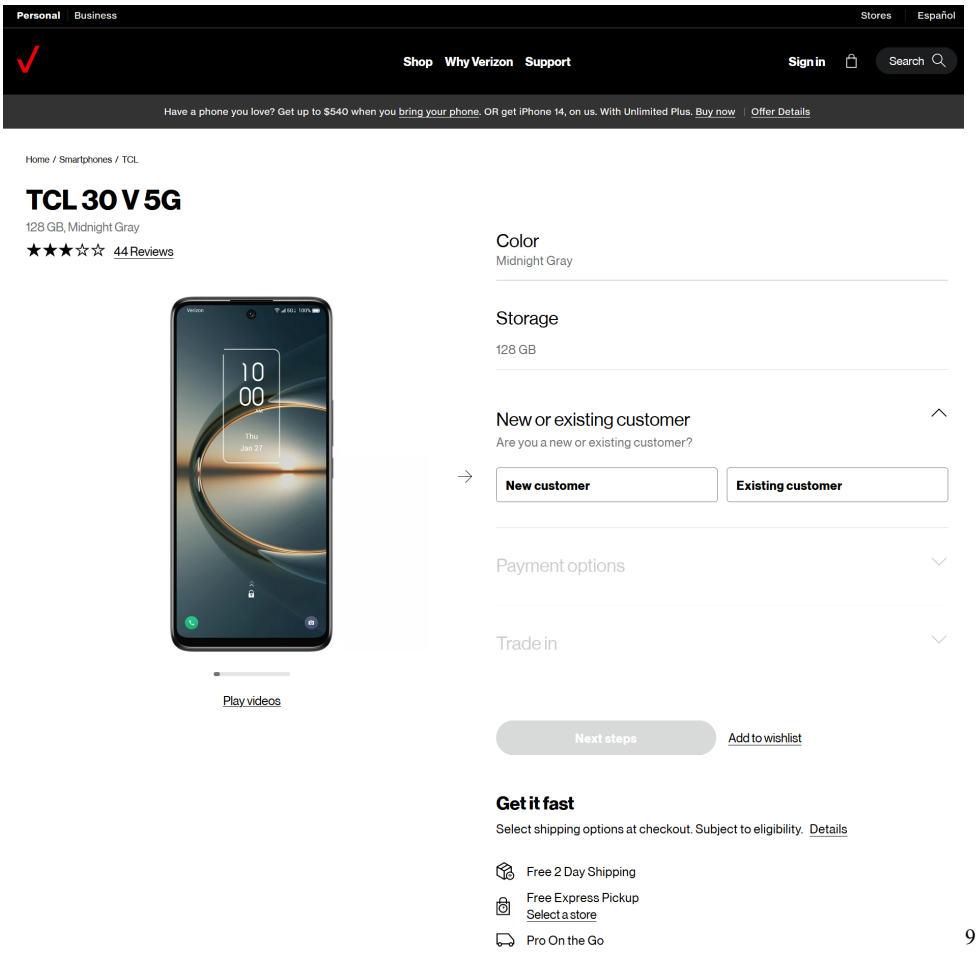
35. Upon information and belief, Defendants are jointly responsible for the sale of the Accused Products to customers in the United States, including through their store at www.tcl.com. For example, the TCL global privacy policy available on www.tcl.com and https://www.tcl.com/us/en/ (and which applies to all of its subdomains) is on behalf of "TCL and/or its affiliates and subsidiaries (collectively "TCL", "we", "us" or "our")."[7] For example, upon information and belief, Defendants further sell and offer to sell the Accused Products directly to retailers and carriers in the United States, such as Walmart, Best Buy, Target, Micro Center, Costco, T-Mobile, AT&T, Verizon, Cricket, Boost Mobile, and the like.[8] For example, upon information and belief, Defendants further sell and offer to sell the Accused Products to their own

[6]https://www.walmart.com/search?q=tcl+5G+phone&facet=fulfillment_method_in_store%3AIn-store

[7] https://www.tcl.com/us/en/terms-privacy.

[8] See https://www.prnewswire.com/news-releases/tcl-communication-records-strong-smartphone-and-tablet-growth-in-q3-2021-301431486.html ("We have invested more than 1 billion USD in R&D, including the creation of dedicated 5G labs. Through partnerships with more than 80 carriers in 160 countries, TCL is delivering on its mission to provide lightning fast, affordable yet powerful and reliable 5G for everyone to enjoy a smarter home and life.").

subsidiaries and sister entities in the United States, such as to TCT Mobile and TCL North America.



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36. Upon information and belief, Defendants offer the Accused Products' user guides through partnership with its U.S. carriers. For example, Defendants offer the user guide of the TCL 10 5G UW through Verizon.[10] For U.S. customers who wish to avail themselves of the warranty on such a TCL 10 5G UW device, the user guide directs the customer to Defendants' USA and Canada websites, highlighting that "TCL Communication Technology Holdings Limited. reserves

[9] https://www.verizon.com/smartphones/tcl-30-v-5g
[10] https://ss7.vzw.com/is/content/VerizonWireless/tcl-10-5g-uw-en-userguide-10212020

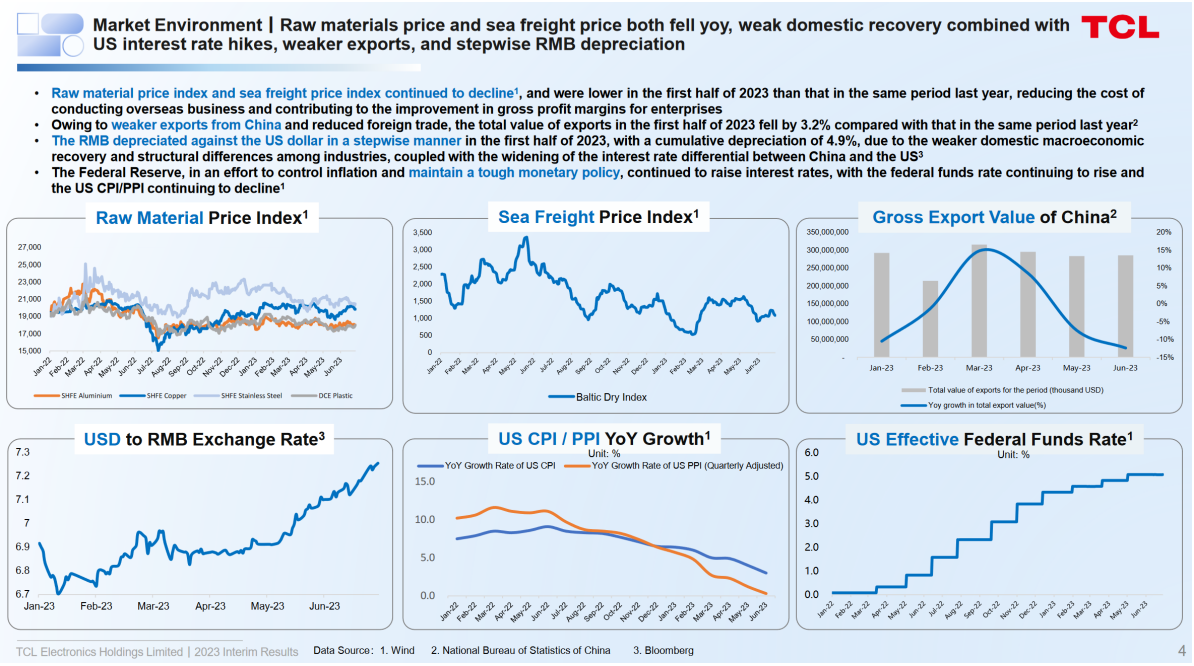
the right to alter material or technical specification without prior notice."[11] The manual also alerts U.S. customers that they should "Use only batteries, battery chargers, and accessories which are recommended by TCL Communication Ltd. and its affiliates and are compatible with your phone model. TCL Communication Ltd. and its affiliates disclaim any liability for damage caused by the use of other chargers or batteries."[12] The manual also indicates that data of U.S. customers is shared with TCL Communication Ltd.: "Note that any data shared with TCL Communication Ltd. is stored in accordance with applicable data protection legislation. For these purposes TCL Communication Ltd. implements and maintains appropriate technical and organizational measures to protect all personal data." [13]

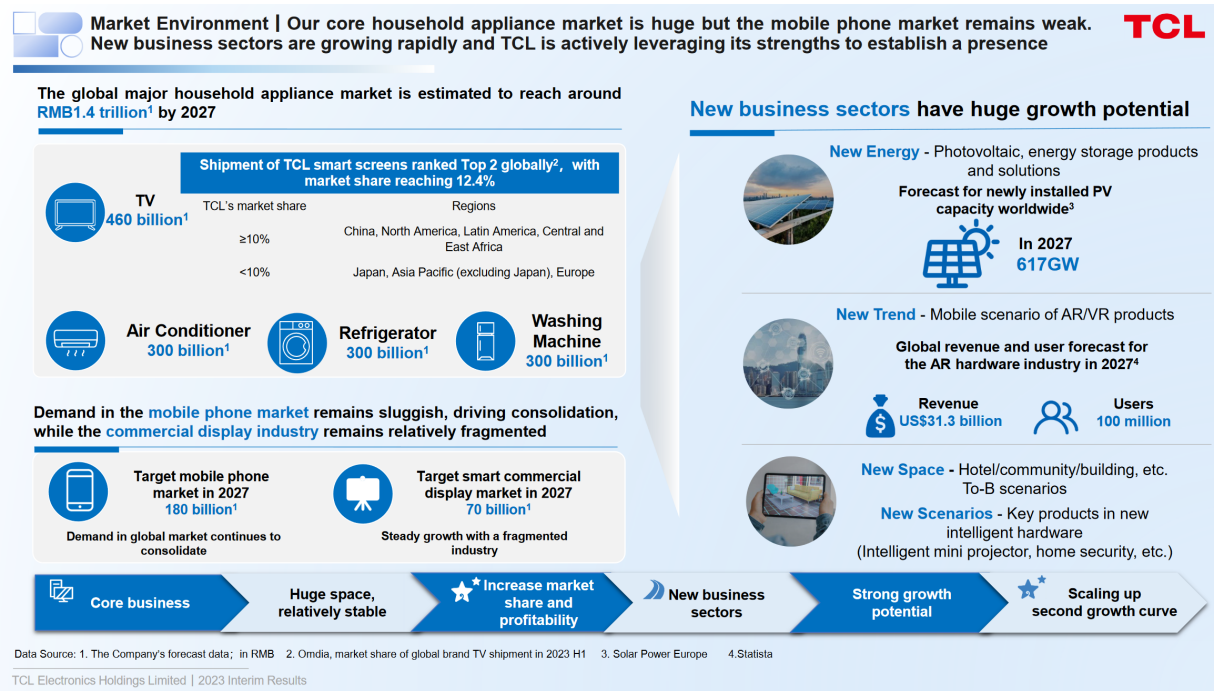
37. For example, Defendants sell and offer to sell the Accused Products in the United States, and track sales and growth of the Accused Products on a quarterly basis. "NEWS PROVIDED BY TCL Communication Technology Holdings Ltd." stated that "In the North American market, TCL's tablet shipment surged 73% in the third quarter compared with the previous quarter, ranking first among the Top 5 vendors in terms of growth rate. TCL forecasts its recently launched TAB Pro 5G in the United States will drive more sales and growth in the next quarter."[14]

38. Defendants' joint responsibility for the aforementioned sales and offers to sell in the United States are further shown by TCL financial statements, which are published by TCL Electronics Holdings Limited on behalf of all TCL group entities, and which show their efforts to maximize their device sales, including of the accused devices, to the United States. For example,

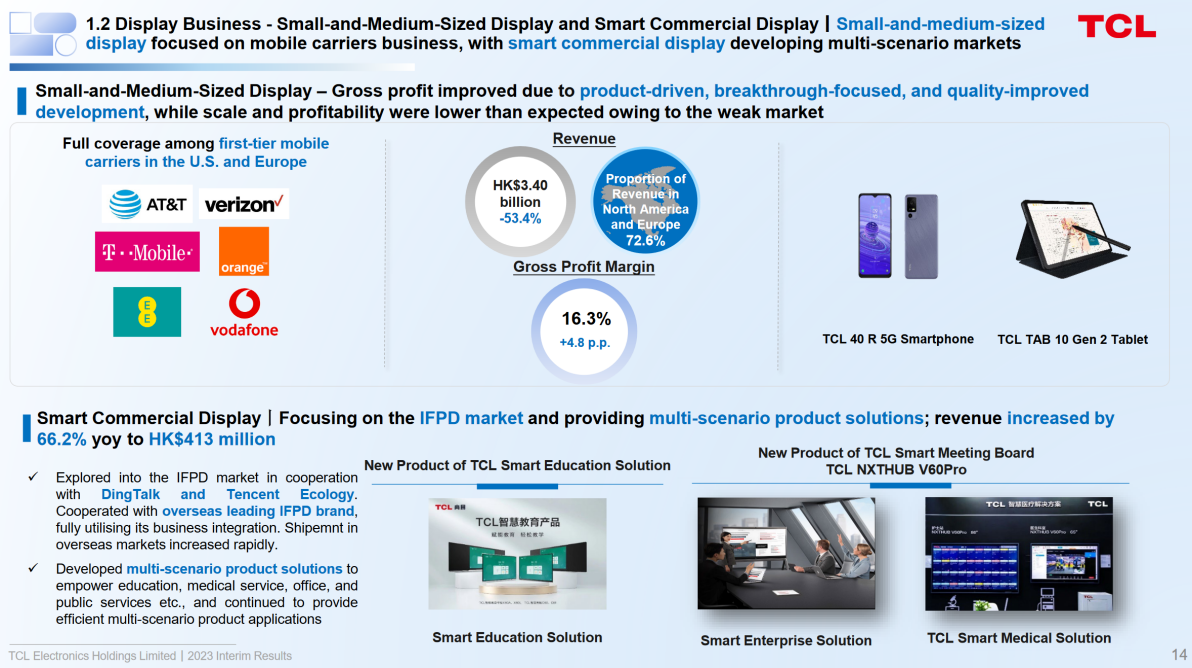
[11] *Id.* at 107.
[12] *Id.* at 7.
[13] *Id.* at 18.
[14] https://www.prnewswire.com/news-releases/tcl-communication-records-strong-smartphone-and-tablet-growth-in-q3-2021-301431486.html

TCL has stated that it makes 72.6% of its global revenue for phone sales (which it refers to as "small-and-medium-sized display" business) in North America:





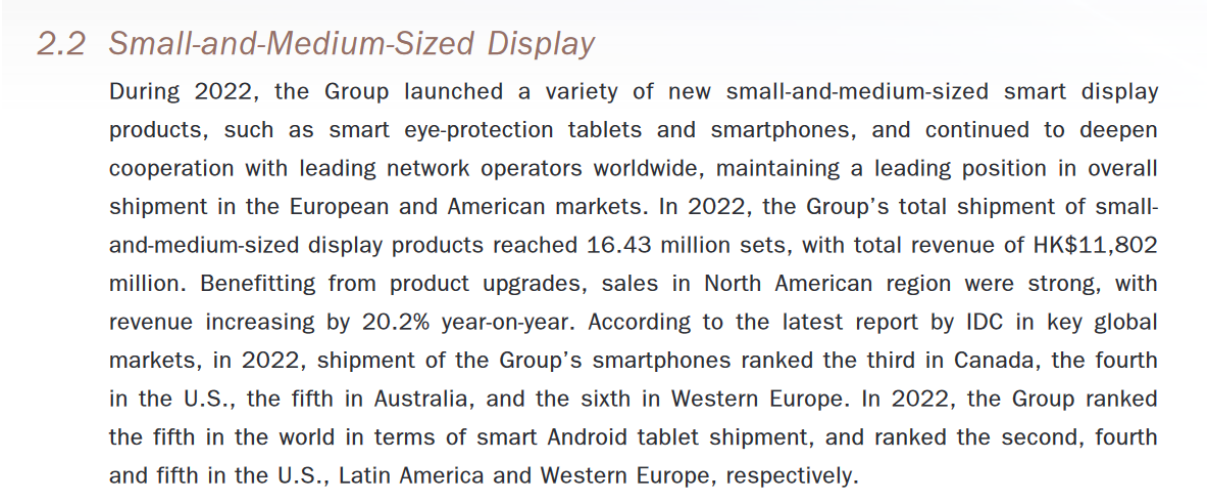
[15] https://doc.irasia.com/listco/hk/tclelectronics/cpresent/pre230825.pdf at 4-5.



[16]

39. For example, TCL's 2022 Annual Report describes the "principal activities"" of defendants as including, among other things, sale and distribution of its products, or otherwise describes share capital which are, upon information and belief, based on funds from the sale and distribution of those products. Upon information and belief, Defendants further sell, and offer to sell the Accused Products to customers in the United States through related intermediary entities, including those listed.[17] TCL's annual report also touts that "[t]he Group has strengthened its leading position in the display business, delivering outstanding performance . . . [t]he market share of TCL mobile phones ranked the third and fourth in Canada and the U.S., respectively."[18] TCL's Annual report expressly describes U.S. sales by reference to "shipment of **the Group's smartphones."**

[16] *Id.* at 14
[17] https://doc.irasia.com/listco/hk/tclelectronics/annual/2022/ar2022.pdf at 139-142.
[18] *Id.* at 13.[19] https://doc.irasia.com/listco/hk/tclelectronics/annual/2022/ar2022.pdf at 22.



2.2 Small-and-Medium-Sized Display

During 2022, the Group launched a variety of new small-and-medium-sized smart display products, such as smart eye-protection tablets and smartphones, and continued to deepen cooperation with leading network operators worldwide, maintaining a leading position in overall shipment in the European and American markets. In 2022, the Group's total shipment of small-and-medium-sized display products reached 16.43 million sets, with total revenue of HK$11,802 million. Benefitting from product upgrades, sales in North American region were strong, with revenue increasing by 20.2% year-on-year. According to the latest report by IDC in key global markets, in 2022, shipment of the Group's smartphones ranked the third in Canada, the fourth in the U.S., the fifth in Australia, and the sixth in Western Europe. In 2022, the Group ranked the fifth in the world in terms of smart Android tablet shipment, and ranked the second, fourth and fifth in the U.S., Latin America and Western Europe, respectively.

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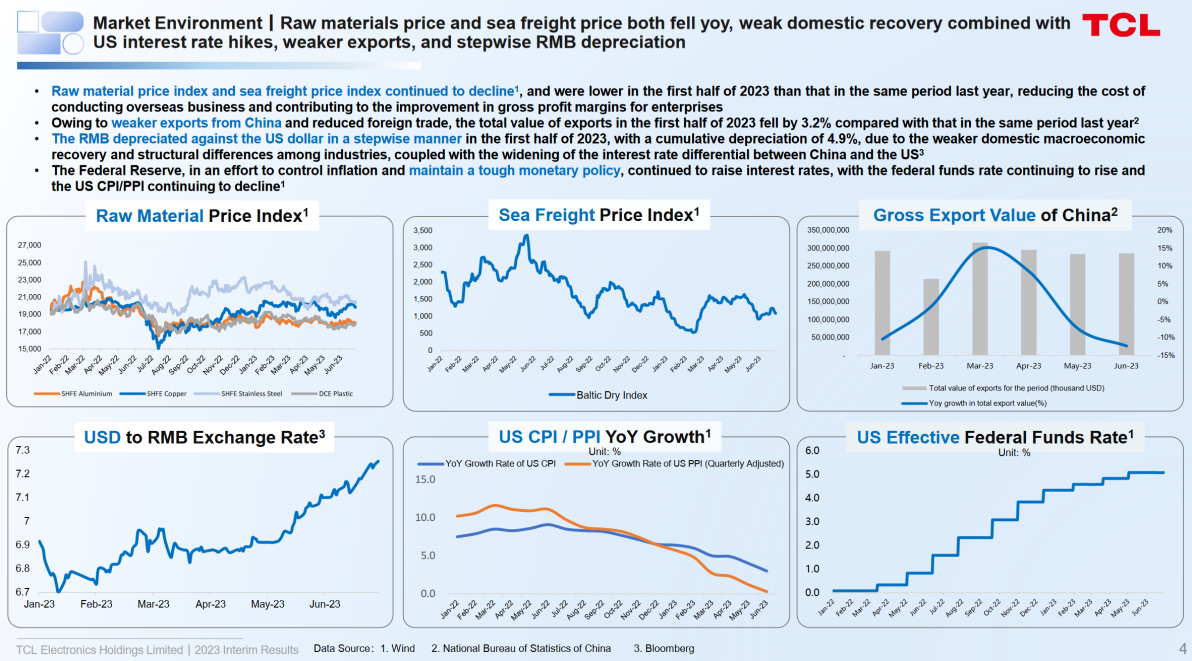
40. For example, upon information and belief, Defendants import the Accused Products into the United States, including for at least the aforementioned sales, by paying for and arranging the shipment of the Accused Products into the United States, and specifying their destinations within the United States. For example, TCL's 2023 interim financial statement discusses sea fright costs in detail, and further details the impact of US Federal Reserve fund rates on its US CPI/PPI growth:

[19] https://doc.irasia.com/listco/hk/tclelectronics/annual/2022/ar2022.pdf at 22.



[20]

41. For example, upon information and belief, Defendants use the Accused Products in the United States for demonstration, marketing, and to create tutorials and instructions, inducing those based on which end users and other buyers are induced to infringe. For example, TCL regularly attends the CES conference where it demonstrates and markets its products, including, upon information and belief, the accused 5G smartphones.[21]

COUNT I
(Infringement of the '767 Patent)

42. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

43. 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.

44. 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,

[20] https://doc.irasia.com/listco/hk/tclelectronics/cpresent/pre230825.pdf at 4
[21] https://www.tcl.com/global/en/ces-2022; https://www.tcl.com/ab/en/ces2021/index.html.

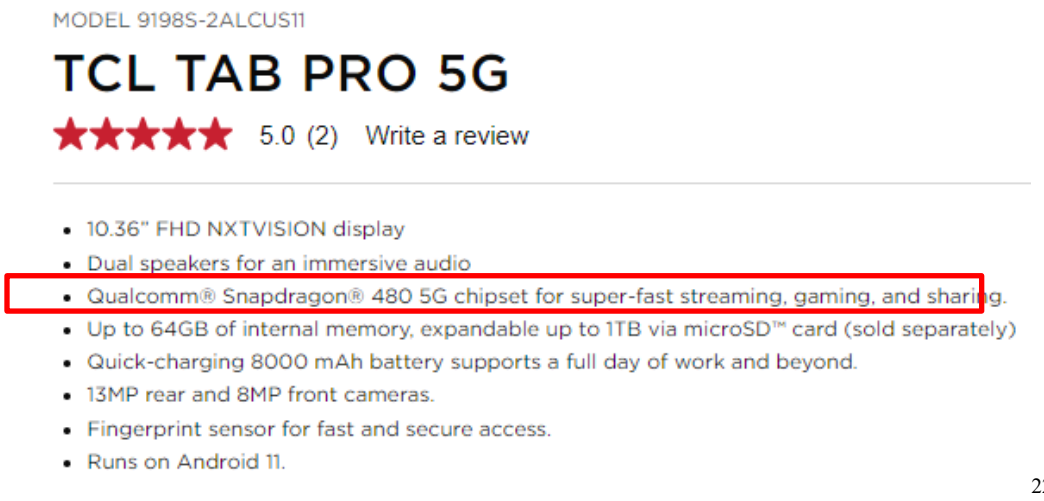
using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '767 Patent. Such products include at least the Accused Products including, but not limited to, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 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.

45. 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 and tablets). For example, the TCL Tab Pro 5G operates on 5G networks and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

46. The Accused Products perform a method in a User Equipment (such as the TCL Tab Pro 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.

47. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 15.



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[22] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G
[23] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)

Qualcomm Expands 5G Capabilities to Mobile Devices Powered by New Snapdragon 480 5G Mobile Platform, a First in the Snapdragon 4-Series

Snapdragon 480 Accelerates Global 5G Commercialization and Delivers Series-Defying Features to Mass-Volume Smartphone Segment

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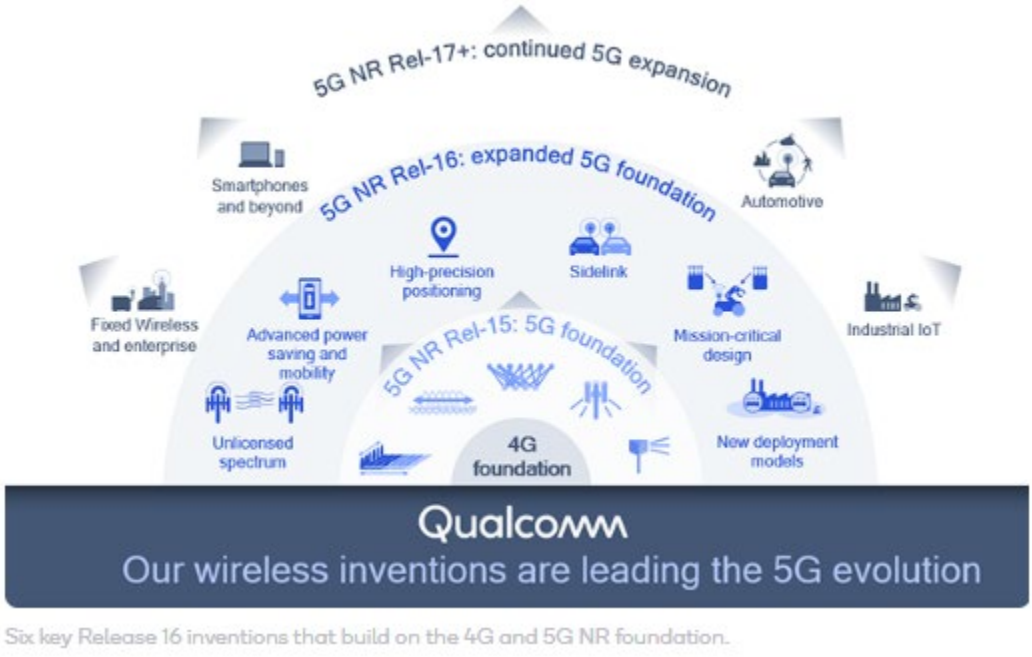
[24]



Six key Release 16 inventions that build on the 4G and 5G NR foundation.

[25]

48. For example, the Accused Products each perform the paging method defined in TS38.300 V15.3.0 Section 9.2.5, supplemented with procedures and definitions in TS38.101, TS38.211, TS38.212, TS38.213, TS38.214, TS38.300, TS8.304, TS38.321, and TS38.331).

[24] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020).

[25] https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).

49. For example, the Accused Products monitor a first signaling (e.g., paging DCI, P-RNTI) in X time intervals (e.g., paging occasion or PDCCH monitoring occasions) and receives a first radio signal (e.g., paging messages on the paging control channel/PDSCH) wherein X is a positive integer (e.g., multiple time slots).[26] For example, in the Accused Products, the first signaling (e.g., paging DCI, P-RNTI) is used for determining scheduling information for the first radio signal; the scheduling information comprises occupied time-frequency resource (e.g., frequency domain resource assignment; time domain resource assignment) and adopted Modulation Coding Scheme (MCS) (e.g., modulation and coding scheme).[27]

50. For example, the Accused Products practice the first radio signal (e.g., paging messages on the paging control channel/PDSCH) carries a paging message.[28]

51. For example, the frequency domain resource used for transmitting the first signaling (e.g., PDSCH, PDCCH) belongs to a first subband (e.g., bandwidth part). The bandwidth part (BWP) comprises of a set of Physical Resource Blocks (PRBs) which are measured from a reference resource block termed as Common Resource Block. As each of the Physical Resource Blocks comprises 12 subcarriers, the BWP comprises of a positive integer number of consecutive subcarriers in frequency domain.[29]

52. For example, the location of the first subband in frequency domain (e.g., pdcch-ConfigSIB1) and subcarrier spacing of subcarriers (e.g., subcarrierSpacingCommon) included in the first subband (e.g., BWP) are used for determining X time intervals (e.g., firstPDCCH-

[26] *See* TS38.304 V15.3.0, Section 7.1; TS38.212 V15.3.0, Section 4.2; and TS38.300 V15.5.0, Sections 6.2.2, 6.2.3, 9.2.5
[27] *See* TS38.212 V15.3.0, Section 7.3.1.2.1
[28] *See* TS38.300 V15.5.0, Section 6.2.2, 9.2.5
[29] *See* TS38.211 V15.2.0, Sections 4.4.5, 4.4.4.1, 4.2, 4.4.3, 4.4.4.3, 4.4.4.4; TS38.213 V15.3.0, Section 12; TS38.331 V15.3.0, Definition of BWP; TS38.321 V15.3.0, Section 5.15; TS38.101 V15.3.0, Sections 5.3.1, 5.3.2; TS38.214 V15.3.0, Section 5.1.2.2.2

MonitoringOccasionOfPO).[30]

53. For example, in identifying the time interval of a subband, the subcarrier spacing information is sufficient to determine the time interval. The standard include a disclosure that the subcarrier spacing information provided by μ can be used to derive subband location (e.g., BWP) with respect to a common resource block (e.g., CRB0).[31]

54. For example, subcarrier spacing information (e.g., subcarrierSpacingCommon) is already included in the MIB information element (such as the second radio signal) and can be transmitted from network to UE in BCH/BCCH channel (such as the claimed second radio signal).[32] The BWP information element comprises: 1) locationAndBandwidth; and 2) subcarrier spacing.[33]

55. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '767 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce 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

[30] *See* TS38.304 V15.3.0, Section 7.1; TS38.331 V15.3.0, Section 6.3.2, firstPDCCH-MonitoringOccasionOfPO;
[31] *See* https://www.sharetechnote.com/html/5G/5G_ResourceGrid.html; https://www.rfwireless-world.com/5G/5G-NR-Resource-Grid-vs-Resource-Block-vs-Resource-Element.html
[32] *See* TS38.331 V15.3.0, Section 6.2.2, *MIB*
[33] *See* TS38.331 V15.3.0, Section 6.3.2, *BWP*

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.[34] Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '767 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '767 Patent, but while remaining willfully blind to the infringement.

56. Defendants, with knowledge that these products, or the use thereof, infringe the '767 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '767 Patent by providing these products to end-users for use in an infringing manner.

57. 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. ABT has suffered, and will

[34] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf; https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

continue to suffer, irreparable harm as a result of Defendants' infringement of the '767 Patent, for which there is no adequate remedy at law, unless Defendants' infringement is enjoined by this Court.

COUNT II
(Infringement of the '113 Patent)

58. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

59. 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.

60. 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, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 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

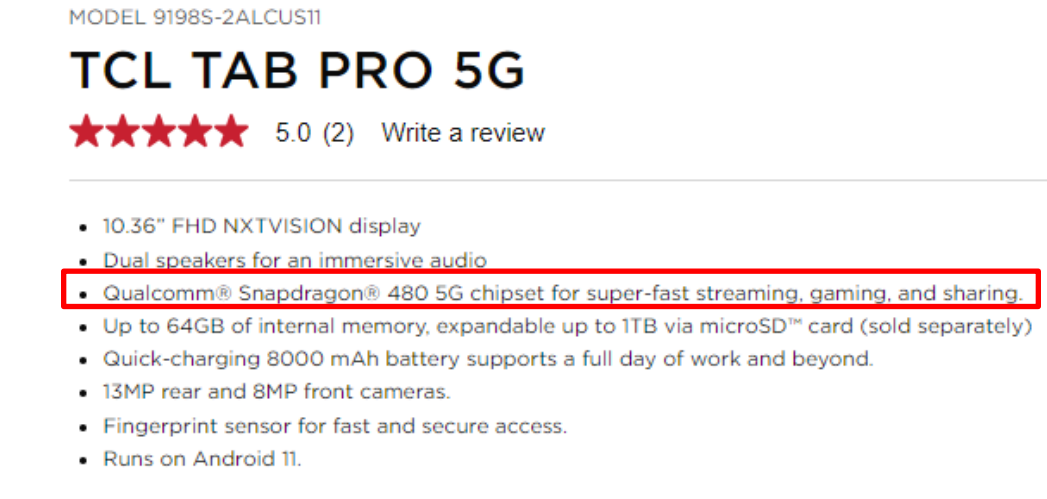
occupied by the second radio signal is used for determining a third time window, and the end time of the third time window is the end time of the first time window; and the second time window and the third time window have overlapped time domain resource(s).

61. 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 and tablets). For example, the TCL Tab Pro 5G operates on 5G networks and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

62. The Accused Products perform a method in a User Equipment (such as the TCL Tab Pro 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).

63. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 16.



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[36]

[35] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G
[36] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)

Qualcomm Expands 5G Capabilities to Mobile Devices Powered by New Snapdragon 480 5G Mobile Platform, a First in the Snapdragon 4-Series

Snapdragon 480 Accelerates Global 5G Commercialization and Delivers Series-Defying Features to Mass-Volume Smartphone Segment

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64. For example, the Accused Products practice a method for wireless communication defined in TS38.321 V16.1.0 Section 5.1 et seq., supplemented with procedures and definitions in TS38.213 and TS38.331.

65. For example, the Accused Products are configured to receive a target radio signal (e.g., synchronization signal (SS)).[38]

66. For example, the Accused Products are configured to transmit a first radio signal (e.g., Random Access Preamble for Msg1) on a first channel (e.g., PRACH). For example, the "first radio signal" may additionally be "Msg1" OR "Random Access Preamble" and can be transmitted on PRACH (first channel) on a PRACH occasion.[39]

67. For example, the Accused Products are configured to transmits a second radio signal (e.g., Msg3) on a second channel (e.g., PUSCH scheduled by a RAR UL grant).[40]

68. For example, the Accused Products are configured to monitor (e.g., matches) a third radio signal (e.g., UE contention Resolution Identity) in a first time window (e.g., msgB-Response

[37] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020)
[38] *See* TS38.213 V16.0.0, Section 4.1
[39] *See* TS38.321 V16.1.0, Section 5.1.1
[40] *See* TS38.213 V16.0.0, Section 8; TS38.321 V16.0.0, Section, 5.1.4a

Window; ra-ContentionResolutionTimer).[41]

69. For example, a first time window covering "msgB-ResponseWindow" and "ra-Contention ResolutionTimer", which are triggered by the event that “fallbackRAR MAC subPDU" is detected in "msgB-ResponseWindow". For example, at least the MsgB received by the UE may satisfy the claimed third signal. For example, MsgB comprises of Msg2 and Msg4 for 2 -step RA process. Therefore, the first time window may be completed as the UE receives the complete MsgB from the base station. The end of the MsgB response window may be the end of the first time window, whose indication is ra-ContentionResolutionTimer in section 5.1.5 TS 38.321 V16.0.0. The first-time window may start from the indication of ra-ResponseWindow.[42]

70. For example, the Accused Products practice a measurement for the target radio signal (e.g., downlink pathloss reference) obtains a target measurement value (e.g., RSRP), the target measurement value, when higher than (e.g., above) a target threshold (e.g., RSRP_THRESHOLD_RA_TYPE_SELECTION) is used for triggering the transmission of (e.g., setting RA_TYPE to 2-stepRA) the first radio signal (e.g., MsgA) and the second radio signal (e.g., Msg3).[43]

71. For example, the Accused Products practice a time resource occupied by (e.g., at the end of) the first radio signal (e.g., MsgA) is used for determining (e.g., at the first PDCCH occasion) the start time of the first time window (e.g., a time window starting from the “second time window” and ending at the third time window).[44]

72. For example, the Accused Products practice a time domain resource occupied by

[41] *See* TS38.321 V16.0.0, Section, 5.1.4a; TS38.321 V16.0.0, Section 5.1.5
[42] *See* TS38.321 V16.0.0, Section 5.4.1
[43] *See* TS38.321 V16.0.0, Sections 5.1.1, 5.1.2a, 5.1.3a, 5.1.4a
[44] *See* TS38.321 V16.0.0, Section 5.1.4a

the first radio signal (e.g., MsgA) is used for determining (e.g., at the first PDCCH occasion) a second time window (e.g., msgB-ResponseWindow),[45]

73. For example, the Accused Products practice a time domain resource occupied by the second radio signal (e.g., Msg3) is within the second time window (e.g., msgB-ResponseWindow), and the second time window is within the first time window (e.g., a time window starting from the "second time window" and ending at the third time window).[46]

74. For example, the Accused Products practice a time domain resource occupied by (e.g., in the first symbol at the end of) the second radio signal (e.g. Msg3) is used for determining a third time window (e.g., ra-ContentionResolutionTimer), and the end time of (e.g., when the MAC PDU is successfully decoded) the third time window (e.g., ra-ContentionResolutionTimer) is the end time of the first time window (e.g., a time window starting from the "second time window" and ending at the third time window --- the end of the Random Access procedure). For example, when MAC PDU is successfully decoded, the ra-ContentionResolutionTimer is stopped (i.e., the end of the third time window), and the UE will stop monitor the third radio signals (i.e., the end of the first time window) no matter whether the decoded MAC PDU matches the CCCH SDU in Msg3 or not.[47]

75. For example, the Accused Products practice a second time window (e.g., msgB-ResponseWindow-r16) and the third time window (e.g., the running time of ra-ContentionResolution timer which is essentially triggered by fallbackRAR) have overlapped time domain resources. As the fallbackRAR can be received at any time of the second time window,

[45] *See* TS38.321 V16.0.0, Section 5.1.4a; TS38.331 V16.0.0, Section 6.3.2 *RACH-ConfigGenericTwoStepRA*, *msgB-ResponseWindow*
[46] *See* TS38.321 V16.0.0, Section 5.1.4a
[47] *See* TS38.321 V16.0.0, Section 5.1.5

and hence without losing generality, the end of the second time window can be "after the beginning of the third time window" and "before the end of the third time window."[48]

76. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '113 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce 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.[49] Because of Defendants' inducement, Defendants' customers and end-

[48] *See* TS38.331 V16.0.0, Section 6.3.2 RACH-*ConfigGenericTwoStepRA*, *msgB-ResponseWindow*

[49] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf; https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl;

users use the Accused Products in a way Defendants intend and they directly infringe the '113 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '113 Patent, but while remaining willfully blind to the infringement.

77. Defendants, with knowledge that these products, or the use thereof, infringe the '113 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '113 Patent by providing these products to end-users for use in an infringing manner.

78. 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.

79. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants' infringement of the '113 Patent, for which there is no adequate remedy at law, unless Defendants' infringement is enjoined by this Court.

COUNT III
(Infringement of the '081 Patent)

80. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

81. 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.

82. 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

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https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

and every limitation of one or more claims of the '081 Patent. Such products include at least Accused Products including, but not limited to, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 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.

83. 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 and tablets). For example, the TCL Tab Pro 5Goperates on 5G networks and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

84. The Accused Products perform a method in a User Equipment (*e.g.*, TCL Tab Pro 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.

85. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 15.

MODEL 9198S-2ALCUS11

TCL TAB PRO 5G

★★★★★ 5.0 (2) Write a review

- 10.36" FHD NXTVISION display
- Dual speakers for an immersive audio
- Qualcomm® Snapdragon® 480 5G chipset for super-fast streaming, gaming, and sharing.
- Up to 64GB of internal memory, expandable up to 1TB via microSD™ card (sold separately)
- Quick-charging 8000 mAh battery supports a full day of work and beyond.
- 13MP rear and 8MP front cameras.
- Fingerprint sensor for fast and secure access.
- Runs on Android 11.

50

2020

Year of 5G proliferation.

This year, global mobile operators are eyeing on expanding their 5G network footprint and device manufacturers have leapfrogged in their plans to roll out 5G enabled devices for market dominance. On the technology side, 3GPP will see the completion of Release16 early this year, expanding 5G technologies to new verticals: automotive, industrial IoT, and many more.

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Qualcomm Expands 5G Capabilities to Mobile Devices Powered by New Snapdragon 480 5G Mobile Platform, a First in the Snapdragon 4-Series

Snapdragon 480 Accelerates Global 5G Commercialization and Delivers Series-Defying Features to Mass-Volume Smartphone Segment

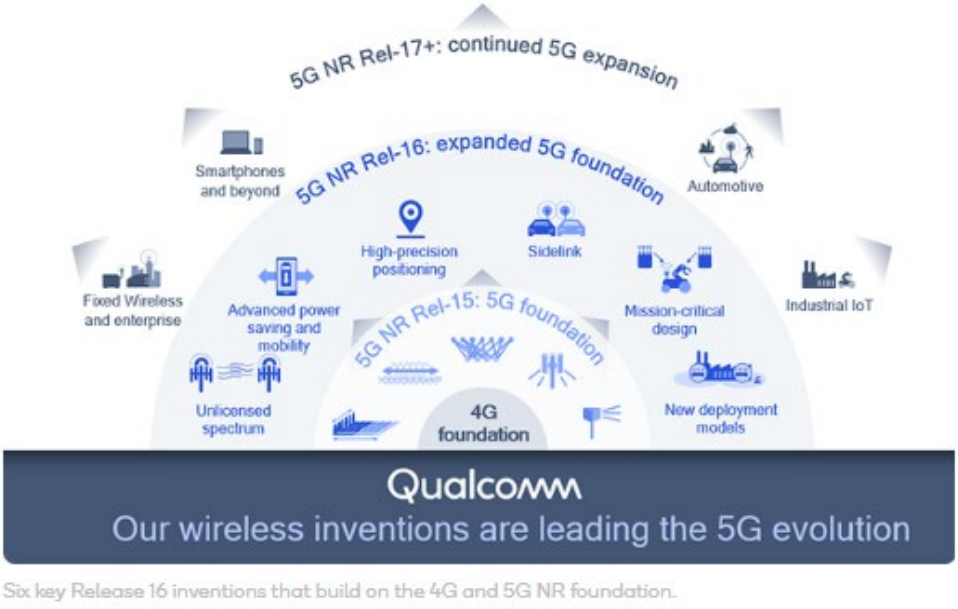
JAN 3, 2021 | SAN DIEGO | Qualcomm products mentioned within this press release are offered by Qualcomm Technologies, Inc. and/or its subsidiaries.

52

[50] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G

[51] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020).

[52] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020).



53

86. For example, the Accused Products practice a method for wireless communication defined in TS38.214 V15.2.0 Section 5.1.5, supplemented with procedures and definitions in TS38.306 and TS38.331.

87. For example, the Accused Products receive a second radio signal (e.g., DL DCI).[54]

88. For example, the Accused Products receive a first radio signal (e.g., a PDSCH corresponding to the DL DCI).[55]

89. For example, the first radio signal (*e.g.*, a PDSCH corresponding to the DL DCI) is transmitted within a first time unit (*e.g.*, the time between slot n and slot $\left\lfloor n \cdot \frac{2^{\mu_{PDSCH}}}{2^{\mu_{PDCCH}}} \right\rfloor + K_0$), a first bit block (*e.g.*, transport block) is used for generating (*e.g.*, using the modulation and coding scheme,

[53] https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).
[54] *See* TS38.214 V15.2.0, Section 5.1.5
[55] *See* TS38.214 V15.2.0, Section 5.1.5

number of layers, rate matching) the first radio signal (*e.g.*, a PDSCH corresponding to the DL DCI), and the first radio signal comprises G (*e.g.*, the number *L*) multicarrier symbols (*e.g.*, consecutive OFDM symbols).[56]

90. For example, the second radio signal (*e.g.*, DL DCI) is transmitted within the first time unit (*e.g.*, the slot with DL DCI), and the second radio signal (*e.g.*, DL DCI) is used for determining (*e.g.*, time domain resource assignment) a time-domain resource (*e.g.*, the slot offset K_0, and the start and length indicator *SLIV*) occupied by the G (*e.g.*, the number *L*) multicarrier symbols (*e.g.*, consecutive OFDM symbols).[57]

91. For example, for any one given multicarrier symbol of the G multicarrier symbols (e.g., corresponding PDSCH), the multi-antenna related receiving (quasi-colocation parameters – e.g., Doppler shift, Doppler spread, average delay, average spread, Spatial Rx parameter) for the given multicarrier symbol (e.g., the first symbol of the corresponding PDSCH) is related to the relative position of a time-domain resource (e.g., time offset between the reception of the DL-DCI and corresponding PDSCH) occupied by the given multicarrier symbol with respect to a first time point (e.g., the reception time of the DL DCI delayed by Threshold-Sched-Offset) in time domain. For example, the first symbol of the PDSCH may be any multicarrier symbol. The Transmitting Antenna port may include a logical antenna port which is related to the QCL parameters. QCL can be used to support reception of both PDSCH and PDCCH at UE. In both cases, the gNB can indicate the antenna port used by a specific SS/PBCH block is QCL with the antenna port used by the PDSCH and PDCCH. Additionally, gNB can indicate that the antenna port used by specific CSI Reference signal is QCL with the antenna port used by PDSCH or PDCCH transmission.For

[56] *See* TS38.214 V15.2.0, Sections 5.1.2.1, 5.1.3, 5.1.5
[57] *See* TS38.214 V15.2.0, Section 5.1.5

example, all the G multicarrier symbols have the same relative position with respect to a first time point, i.e., behind the first time point, or, in front of the first time point.[58]

92. For example, when the time-domain resource (e.g., time offset between the reception of the DL-DCI and corresponding PDSCH) occupied by the given multicarrier symbol (e.g., the first symbol of the corresponding PDSCH) is behind (e.g., is equal to or greater than) the first time point (e.g., the reception time of the DL DCI delayed by Threshold-Sched-Offset), the second radio signal (e.g., detected PDCCH with DCI) is used for determining (e.g., using the TCI-State according to the value of the 'Transmission Configuration Indication' field) the multi-antenna related receiving (e.g., quasi-colocation parameters) for the given multicarrier symbol (e.g., the first symbol of the corresponding PDSCH).[59]

93. For example, when the time-domain resource (e.g., time offset between the reception of the DL-DCI and corresponding PDSCH) occupied by the given multicarrier symbol (e.g., the first symbol of the corresponding PDSCH) is before (e.g., less than) the first time point (e.g., the reception time of the DL DCI delayed by Threshold-Sched-Offset), the multi-antenna related receiving (e.g., quasi-colocation parameters) for the given multicarrier symbol (e.g., the first symbol of the corresponding PDSCH) is related to (e.g., is quasi-located with) the multi-antenna related receiving (e.g., TCI state with respect to the QCL parameters(s)) for the second radio signal (e.g., the PDCCH of the lowest CORESET-ID in the latest slot). For example, without loss of generality, the second radio signal belongs to a Searchspace being allocated with the lowest CORESET-ID in the latest slot.[60]

94. For example, the first time point (*e.g.*, the reception time of the DL DCI delayed by

[58] *See* TS38.214 V15.2.0, Section 5.1.5
[59] *See* TS38.214 V15.2.0, Section 5.1.5
[60] *See* TS38.214 V15.2.0, Section 5.1.5

Threshold-Sched-Offset) is one time point within the first time unit (*e.g.*, the time between slot n and slot $\left\lfloor n \cdot \frac{2^{\mu_{PDSCH}}}{2^{\mu_{PDCCH}}} \right\rfloor + K_0$). G is a positive integer. For example, the *Threshold-Sched-Offset* can be OFDM symbols, which is within the configuration scope of SLIV.[61]

95. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '081 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce 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.[62] Because of Defendants' inducement, Defendants' customers and end-

[61] *See* TS38.214 V15.2.0, Sections 5.1.2.1, 5.1.5; TS38.306 V 15.3.0, Section 4.2.7.5; TS38.331 V 15.2.0, Section 6.3.3 *FeatureSetDownlink*

[62] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-

users use the Accused Products in a way Defendants intend and they directly infringe the '767 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '081 Patent, but while remaining willfully blind to the infringement.

96. Defendants, with knowledge that these products, or the use thereof, infringe the '081 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '081 Patent by providing these products to end-users for use in an infringing manner.

97. 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.

98. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants' infringement of the '081 Patent, for which there is no adequate remedy at law, unless Defendants' infringement is enjoined by this Court.

COUNT IV
(Infringement of the '527 Patent)

99. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

100. 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.

101. 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,

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xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf;
https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl;
https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

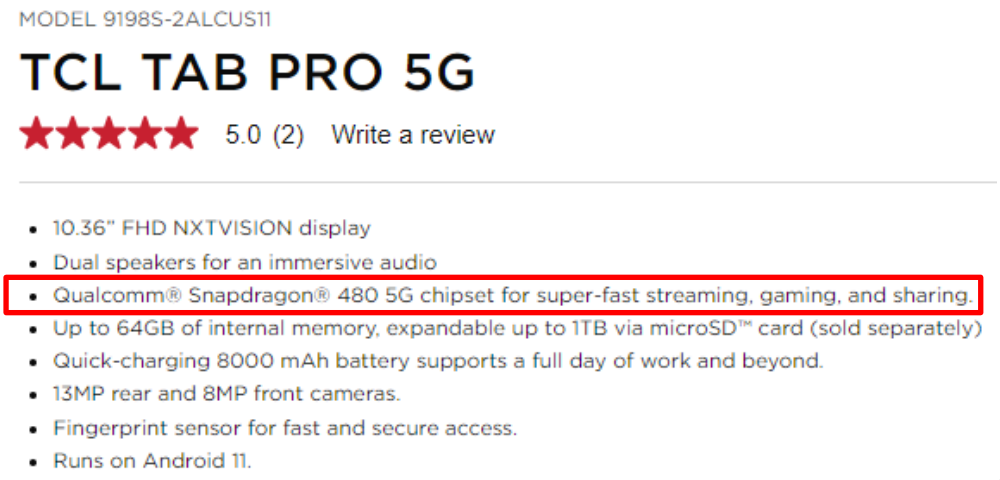
using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '527 Patent. Such products include at least Accused Products including, but not limited to, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 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.

102. 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 and tablets). For example, the TCL Tab Pro 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

103. The Accused Products perform a method for multi-antenna transmission in a user equipment (such as the TCL Tab Pro 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.

104. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 15.



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[63] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G

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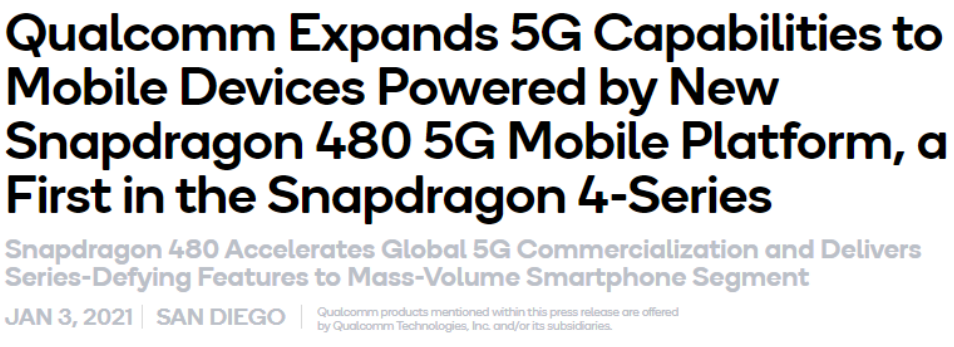

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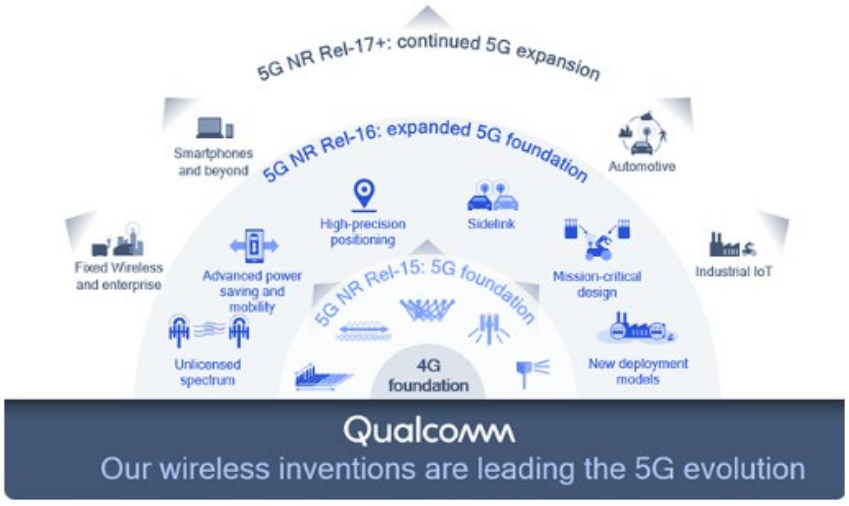

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[64] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)
[65] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020).
[66] *See* https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).

105. For example, the Accused Products practice a method for wireless communication defined in TS38.214 V15.2.0 Section 6.2.1, supplemented with procedures and definitions in TS38.202, TS38.212, TS38.213, TS38.214, and TS38.331.

106. For example, the Accused Products receive a first radio signal (e.g., CSI-RS or SS/PBCH) from a base station (e.g., gNB). For example, the first radio signal comprises CSI-RSresources and/or SS/PBCH Block resources.[67]

107. For example, the Accused Products receive a first signaling (e.g., SearchSpace IE, ConfiguredGrantConf IE, DCI format 1_0, DCI format 1_1, or DCI format 0_1) from the base station.[68]

108. For example. the first radio signal (e.g., CSI-RS or SS/PBCH) is transmitted by K antenna port groups of the base station. For example, the first radio signal comprises K CSI-RS resources / SS/PBCH block resources. The K antenna port groups correspond to the K CSI-RS resources / SS/PBCH block resources, respectively, with each antenna port group comprises one or more ports included in the corresponding CSI-RS resource / SS/PBCH block resources. The antenna port group includes a positive integer number of antenna port(s) (e.g., number of ports). A first antenna port group (e.g., one or more ports included in one CSI-RS or SS/PBCH) is one of the K antenna port groups.[69]

109. For example, the first time resource pool is the time domain resource occupied by a search space set. In other examples, the first time resource pool is the time domain resource occupied by a PUSCH. In other examples, the first time resource pool is the time domain resource

[67] *See* TS38.214 V15.0.0, Sections 5.2.1, 5.2.1.2
[68] *See* TS38.331 V15.1.0, Section 6.3.2 *SearchSpace*, *ConfiguredGrantConfig*; TS38.212 V15.0.0, Sections 7.3.1.2.1, 7.3.1.2.2, 7.3.1.1.2; TS38.214 V15.0.0, Section 6.2.1; TS38.331 V15.1.0, Section 6.3.2 *SRS-Config*
[69] TS38.214 V15.0.0, Section 5.2.1.2

occupied by a PDSCH or an SRS resource.In one example, the first signaling (e.g., IE SearchSpace) is used to determine a first time resource pool (e.g., monitoringSlotPeriodicityAndOffset; monitoringSymbolsWithinSlot). In another example, the first signaling (e.g., IE ConfiguredGrantConfig) is used to determine a first time resource pool (e.g., timeDomainOffset; timeDomainAllocation). In another example, the first signaling (e.g., DCI format 1_0; DCI format 1_1; DCI format 0_1) is used to determine a first time resource pool (e.g., time domain resource assignment). In another example, the first signaling (e.g., SRS-ResourceConfig) is used to determine a first time resource pool (e.g., Slot level periodicity; slot level offset; number of OFDM symbols in the SRS resource; starting OFDM symbol of the SRS resource within a slot including repetition factor R). In another example, the first signaling (e.g., SRS-Config IE) is used to determine a first time resource pool (e.g., startPosition; nrofSymbols; repetitionFactor).[70]

110. For example. the selection of the receiving depends on, for example, the QCL obtained and on the basis of that a spatial Receive (Rx) parameter is used by the UE as recited in claim element 1E. For example, according to TS38.331 v15.1.0 – clause 6.3.2, a search space set is associated with a CORESET. According to D2 – clause 10.1, a TCI-state is configured for a CORESET, which indicates at least one RS (CSI-RS or SS/PBCH, see TS38.331 v15.1.0 clause 6.2.3) providing QCL information for PDCCH reception in this CORESET (i.e., in the associated search space set in the first time resource pool). The first antenna port group contains the port(s) of the RS indicated by the TCI state. According to the definition of QCL in TS 38.214 v15.0.0 – clause 5.1.5, the QCL information include spatial Rx parameters. Spatial Rx parameters include

[70] TS38.331 V15.1.0, Section 6.3.2 *SearchSpace*, *ConfiguredGrantConfig*, *SRS-Config*; TS38.212 V15.0.0, Sections 7.3.1.2.1, 7.3.1.2.2, 7.3.1.1.2; TS38.214 V15.0.0, Section 6.2.1

Rx antenna vitalization vector. Therefore, the second antenna virtualization vector is associated with the first antenna port group. In another example, according to TS38.331 v15.1.0 clause 6.3.2 and TS38.212 v15.0.0 – clause 7.3.1.1.2, an SRI (SRS resource indicator) is indicated for a PUSCH (i.e., in the first time resource pool). The SRI indicates an SRS resource which is further associated with a CSI-RS or SS/PBCH (see TS38.214 v15.0.0 – clause 6.2.1). The first antenna port group contains port(s) of the CSI-RS or SS/PBCH associated with the SRS resource indicated by the SRI. According to TS38.214 v15.0.0 – clause 6.1.1, a PUSCH is transmitted over the ports in the SRS resource indicated by SRI, which means that the UE uses the same spatial domain transmission filter to transmit the PUSCH and the SRS resource indicated by SRI. According to TS38.214 v15.0.0 – clause 6.2.1, a UE transmit the SRS resource, i.e., the PUSCH in the first time resource pool, with the same spatial domain transmission filter used for the reception of the associated CSI-RS or SS/PBCH. The spatial domain transmission filter includes a transmit antenna virtualization vector, so the second antenna virtualization vector is associated with the first antenna port group. In another example, according to TS38.214 v15.0.0 – clause 5.1.5, when there is no TCI field in a DCI (e.g., DCI format 1_0), a default TCI state is used for the PDSCH (i.e., in the first time resource pool). The first antenna port group contains port(s) of the RS indicated by the default TCI state. According to the definition of QCL in TS38.214 v15.0.0 – clause 5.1.5, the QCL information includes spatial Rx parameters. Spatial Rx parameters include Rx antenna virtualization vector. Therefore, the second antenna virtualization vector is associated with the first antenna port group. In another example, according to TS38.212 v15.0.0 – clause 7.3.1.2.2, a TCI (Transmission Configuration Indication) state is indicated in DCI format 1_1 for a PDSCH (i.e., in the first time resource pool), which refers to a CSI-RS or SS/PBCH for QCL information. The first antenna port group contains port(s) of the RS indicated by the TCI state. According to the

definition of QCL in TS38.214 v15.0.0 – clause 5.1.5, the QCL information includes spatial Rx parameters. Spatial Rx parameters include the Rx antenna virtualization vector. Therefore, the second antenna virtualization vector is associated with the first antenna port group. In another example, according to TS38.214 v15.0.0 – clause 6.2.1, a CSI-RS or SS/PBCH is configured for an SRS resource (i.e., in the first time resource pool), and a UE transmit the SRS resource with the same spatial domain transmission filter used for the reception of the CSI-RS or SS/PBCH. The first antenna port group contains port(s) of the CSI-RS or SS/PBCH. The spatial domain transmission filter includes a transmit antenna virtualization vector, so the second antenna virtualization vector is associated with the first antenna port group.[71]

111. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '527 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce 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

[71] TS38.331 V15.1.0, Section 6.3.2 *Search Space*, *rrc-ConfiguredUplinkGrant*, *SRS-Config*, TCI-State; TS38.213 V15.0.0, Section 10.1; TS38.214 V15.0.0, Sections 5.1.5, 6.1.1.1, 6.1.1.2, 6.2.1; TS38.212 V15.0.0, Sections 7.3.1.2.2, 7.3.1.1.2

online documentation.[72] Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '527 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '527 Patent, but while remaining willfully blind to the infringement.

112. Defendants, with knowledge that these products, or the use thereof, infringe the '767 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '527 Patent by providing these products to end-users for use in an infringing manner.

113. 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.

114. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants' infringement of the '527 Patent, for which there is no adequate remedy at law, unless

[72] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf; https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

Defendants' infringement is enjoined by this Court.

COUNT V
(Infringement of the '271 Patent)

115. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

116. 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.

117. 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 TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 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.

118. 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 and tablets). For example, the TCL Tab Pro 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

119. The Accused Products perform a method for multi-antenna transmission in a user equipment (UE, such as the TCL Tab Pro 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.

120. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 15.

MODEL 9198S-2ALCUS11

TCL TAB PRO 5G

★★★★★ 5.0 (2) Write a review

- 10.36" FHD NXTVISION display
- Dual speakers for an immersive audio
- Qualcomm® Snapdragon® 480 5G chipset for super-fast streaming, gaming, and sharing.
- Up to 64GB of internal memory, expandable up to 1TB via microSD™ card (sold separately)
- Quick-charging 8000 mAh battery supports a full day of work and beyond.
- 13MP rear and 8MP front cameras.
- Fingerprint sensor for fast and secure access.
- Runs on Android 11.

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Qualcomm Expands 5G Capabilities to Mobile Devices Powered by New Snapdragon 480 5G Mobile Platform, a First in the Snapdragon 4-Series

Snapdragon 480 Accelerates Global 5G Commercialization and Delivers Series-Defying Features to Mass-Volume Smartphone Segment

JAN 3, 2021 | SAN DIEGO | Qualcomm products mentioned within this press release are offered by Qualcomm Technologies, Inc. and/or its subsidiaries.

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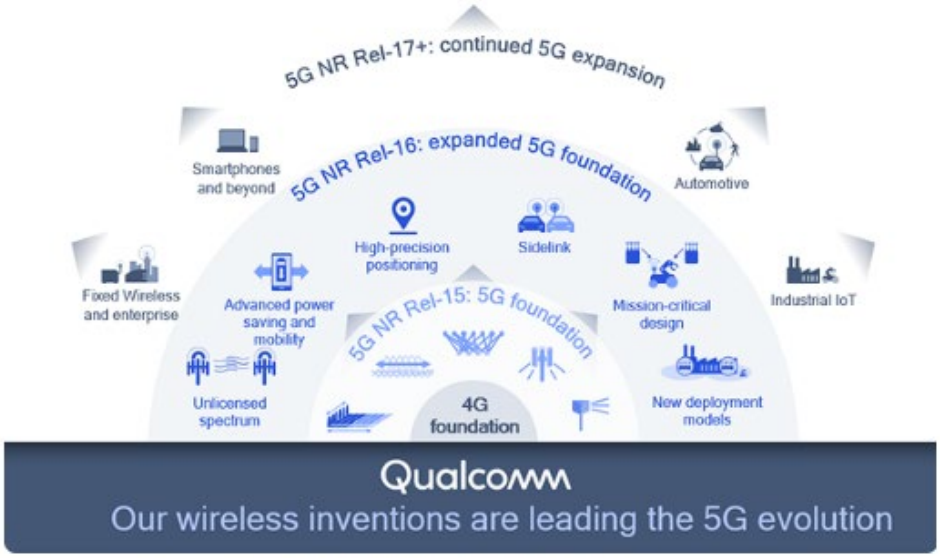
[73] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G
[74] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)
[75] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020)



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121. For example, the Accused Products practice a method for wireless communication defined in TS38.214 V15.2.0 Section 6.2.1, supplemented with procedures and definitions in TS38.133, TS38.202, TS38.213, TS38.214, TS38.215, TS38.321, and TS38.331.

122. For example, the Accused Products practice a method for multi-antenna transmission in a User Equipment (UE).[77]

123. For example, the Accused Products practice receiving a first signaling (e.g., CSI-ReportConfig) originating from a base station (e.g., gNB).[78]

124. For example, the Accused Products receive a first wireless signal (e.g., CSI-RS resources; SS/PBCH Block resources) originating from the base station (e.g., gNB). For example, the first wireless signal comprises K CSI-RS resources and/or SS/PBCH block resources. More specifically, the first wireless signal comprises K CSI-RS resource and/or SS/PBCH block

[76] https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).
[77] *See* TS38.202 V15.1.0
[78] *See* TS38.214 V15.0.0, Section 5.2.1; TS38.331 V15.1.0, 6.3.2 CSI-*ReportConfig*

resources configured in a CSI resource setting (by a CSI-ResourceConfig IE) for channel measurement in a CSI-ReportConfig IE.[79]

125. For example, the Accused Products transmit first information (e.g., a single CSI report) to the base station (e.g., gNB).[80]

126. For example, K antenna port groups (e.g., number of ports) of the base station are used to transmit the first wireless signal (e.g., CSI-RS resources; SS/PBCH Block resources).[81]

127. For example, the first signaling (e.g., CSI-ReportConfig) is used by the Accused Products to determine the K antenna port groups (e.g., number of ports – nrofPorts) transmitting the first wireless signal (e.g., CSI-RS resources; SS/PBCH Block resources) received by the UE. K is a positive integer greater than 1.[82]

128. For example, the K antenna port groups (e.g., number of ports transmitting the first wireless signal) respectively correspond to K channel quality values (e.g., Reference Signal Received Powers, L1-RSRP). The K channel quality values are K non-negative real numbers (e.g., L1-RSRP are in Watts(W)).[83]

129. For example, the K1 antenna port groups of the K antenna port groups (e.g., nrofReportedRS) correspond to K1 channel quality values of the K channel quality values (e.g., L1-RSRP). the K1 is a positive integer less than or equal to the K. For example, the K1 channel quality values are K1 L1-RSRPs in W (watts). As shown in claim element 1[F], the linear L1-RSRP i.e., RSRP of layer 1 signals such as SS or CSI RS are stated in W(watts).[84]

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[79] *See* TS38.214 V15.0.0, Section 5.2.1; TS38.214 V15.0.0, Section 5.2.1.2
[80] *See* TS38.214 V15.0.0, Section 5.2.1; TS38.214 V15.0.0, Section 5.2.1.4
[81] *See* TS38.214 V15.0.0, Section 5.2.1.2
[82] *See* TS38.331 V15.1.0, Section 6.3.2 *CSI-ReportConfig*, *CSI-ResourceConfig*, *NZP-CSI-RS-ResourceSet*, *CSI-SSB-ResourceSet*, *NZP-CSI-RS-Resource*, *CSI-RS-ResourceMapping*
[83] *See* TS38.214 V15.0.0, Section 5.2.1.2; TS38.215 V15.0.0, Sections 5.1.1, 5.1.2
[84] *See* TS38.214 V15.0.0, Section 5.2.1.4

130. For example, a first proportional sequence (e.g., the differential L1-RSRP in dB) corresponds to a ratio(ratios) among the K1 channel quality values (e.g., between linear L1-RSRPs in W). For example, the differential L1-RSRP in dB is equivalent to the ratio(ratios) between linear L1-RSRPs in W. The reported value in table 10.1.6.1-2 of TS 38.133 is in dB (decibels). W units can be converted into dB units because both represent power.[85]

131. For example, the first information (e.g., a single CSI report) is used to determine the K1 antenna port groups (e.g., nrofReportedRS) and the first proportional sequence (e.g., the largest L1-RSRP and differential L1-RSRP).For example, the first proportional sequence depends upon the K1 channel quality values. As shown in the mapping the K1 antenna port groups are determined via CSI RS/SS resources comprising of first information. The Accused Products use the largest L1-RSRP and differential L1-RSRP which are quantized to a 7-bit value in the range [-140, -44] dBm and 4-bit value respectively as shown in section 5.2.1.4.3 TS38.214 V15.3.0. The quantized value is the first proportional sequence.[86]

132. For example, the first signaling (*e.g.*, CSI-ReportConfig) is used to determine a target threshold (*e.g.*, $Q_{inL,R}$). $Q_{inL,R}$ is a non-negative real number. For example, the first channel quality (*e.g.*, best L1=RSRP) is a best channel quality value among the K1 channel quality values. A second channel quality is a worse channel quality value (*e.g.*, worst L1=RSRP) 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 (*e.g.*, $Q_{inL,R}$). The threshold, $Q_{inL,R}$, corresponds to the channel quality measurements. For example, the first signaling indicates nrofReportedRS. With nrofReportedRS, and fixed values of (see TS38.214 v.15.0.0 – clause 5.2.1.4) the number of bits

[85] *See* TS38.214 V15.0.0, Section 5.2.1.4; TS38.133 V15.8.0, Table 10.1.5.1-2
[86] *See* TS38.214 V15.0.0, Section 5.2.1.4

per differential L1-RSRP and the step size of differential L1-RSRP, the minimum value (i.e. the target threshold) of the ratio between the worst L1-RSRP and the best L1-RSRP (i.e., the first channel quality) can be obtained as $Th = -(N_{RS} - 1) \cdot 2^{N_{bit}} \cdot 2$ (dB) with Th the target threshold, *NRS* = nrofReportedRS, *Nbit* = number of bits per differential L1-RSRP. For example, the ratio between any L1-RSRP other than the best L1-RSRP (the second channel quality) and the best L1-RSRP (i.e., the first channel quality) is no smaller than the target threshold.[87]

133. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '271 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce 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.[88] Because of Defendants' inducement, Defendants' customers and end-

[87] *See* TS38.331 V15.1.0, Section 6.3.2 CSI-*ReportConfig*; TS38.214 V15.0.0, Section 5.2.1.4; TS 38.213 V15.3.0, Section 6; TS 38.321 V15.3.0, Section 5.1.1

[88] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_Engli

users use the Accused Products in a way Defendants intend and they directly infringe the '271 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '271 Patent, but while remaining willfully blind to the infringement.

134. Defendants, with knowledge that these products, or the use thereof, infringe the '271 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '271 Patent by providing these products to end-users for use in an infringing manner.

135. 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.

136. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants' infringement of the '271 Patent, for which there is no adequate remedy at law, unless Defendants' infringement is enjoined by this Court.

COUNT VI
(Infringement of the '434 Patent)

137. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

138. ABT has not licensed or otherwise authorized Defendants to make, use, offer for

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sh_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf; https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

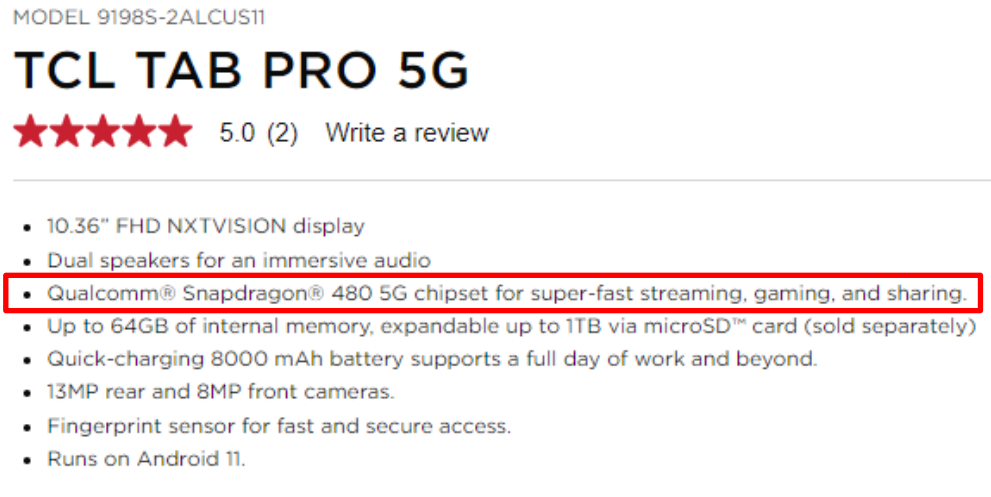
sale, sell, or import any products that embody the inventions of the '434 Patent.

139. Defendants have and continue to directly infringe the '434 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 '434 Patent. Such products include at least Accused Products including, but not limited to, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 5G which practice a method comprising: receiving, by a wireless device; a first configuration parameter used in determination of a first sequence of one or more bits for downlink control information (DCI) validation; a second configuration parameter used in determination of a second sequence of one or more bits for DCI validation; and a third configuration parameter indicating a configuration index of an uplink configured grant configuration; receiving a DCI comprising: a hybrid automatic repeat request process number field comprising one or more first bits; and a redundancy version field comprising one or more second bits; validating the DCI: based on comparing the one or more second bits with the second sequence and not based on the one or more first bits in response to the one or more first bits indicating the configuration index; and based on comparing the one or more second bits with the second sequence and comparing the one or more first bits with the first sequence in response to the one or more first bits not indicating the configuration index; and activating or deactivating resources associated with the uplink configured grant configuration.

140. For example, Defendants have and continue to directly infringe at least claim 1 of the '434 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

and tablets). For example, the TCL Tab Pro 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

141. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 16.



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[89] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G
[90] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)

Qualcomm Expands 5G Capabilities to Mobile Devices Powered by New Snapdragon 480 5G Mobile Platform, a First in the Snapdragon 4-Series

Snapdragon 480 Accelerates Global 5G Commercialization and Delivers Series-Defying Features to Mass-Volume Smartphone Segment

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Six key Release 16 inventions that build on the 4G and 5G NR foundation.

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142. For example, the Accused Products practice a method for wireless communication defined in TS 38.331 V16.5.0, TS 38.212 V16.6.0, TS 38.213 V16.6.0, 38.321 V16.5.0, and TS 38.300 V16.6.0.

143. For example, the Accused Products practice a method comprising: receiving, by a

[91] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020)

[92] https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).

wireless device.[93]

144. For example, the Accused Products practice a method where a first configuration parameter is used in determination of a first sequence of one or more bits for downlink control information (DCI) validation (e.g., a harq-ProcessNumberSizeDCI-0-2 configuration parameter "configure[s] the number of bits for the field "HARQ process number" in DCI format 0_2").[94]

145. For example, the Accused Products practice a method where a second configuration parameter is used in determination of a second sequence of one or more bits for DCI validation (e.g. a numberOfBitsRV-DCI-0-2 configuration parameter "configures the number of bits for "Redundancy version" in the DCI format 0_2").[95]

146. For example, the Accused Products practice a method where a third configuration parameter indicating a configuration index of an uplink (e.g., configuredGrantConfigIndex-r16 is a third configuration parameter that "indicates the index of the Configured Grant configuration within the BWP" or Bandwidth Part).[96]

147. For example, the Accused Products practice receiving a DCI comprising: a hybrid automatic repeat request process number field comprising one or more first bits (e.g., downlink control channel information includes a "HARQ process number" field that is a hybrid automatic repeat request process number field).[97]

148. For example, the Accused Products practice receiving a DCI comprising: a redundancy version field comprising one or more second bits (e.g., downlink control channel

[93] *See* TS 38.331 V16.5.0, Sections 5.1.2, 6.3.2.
[94] *Id.*; TS 38.212 V16.6.0, Section 7.3.1; TS 38.213 V16.6.0, Section 10.2.
[95] *Id.*
[96] *Id.*
[97] *See* TS 38.321 V16.5.0, Section 5.4.1; TS 38.212 V16.6.0, Sections 4.2, 7.3.1.

information includes a "Redundancy version" field).[98]

149. For example, the Accused Products practice validating the DCI: based on comparing the one or more second bits with the second sequence and not based on the one or more first bits in response to the one or more first bits indicating the configuration index (e.g., validating the DCI is based on the DCI format using multiple configured grant configurations, because under the multiple configured grant configurations (when a UE is provided multiple UL grant Type 2 configurations), only the "redundancy version" field corresponding to the second bits is compared with the second sequence).[99]

150. For example, the Accused Products practice validating the DCI: based on comparing the one or more second bits with the second sequence and comparing the one or more first bits with the first sequence in response to the one or more first bits not indicating the configuration index (e.g., validating the DCI is based on the DCI format using single configured grant configurations, because under the single configured grant configurations (when a UE is provided a single UL grant Type 2 configuration), both the "HARQ process" field corresponding to the first bits and the "redundancy version" field corresponding to the second bits are compared respectively with the first and second sequence).[100]

151. For example, the Accused Products practice activating or deactivating resources associated with the uplink configured grant configuration (e.g., PDCCH can be used for "activation and deactivation of configured PUSCH transmission with configured grant" and "L1 signalling indicat[es] configured uplink grant activation or deactivation.").[101]

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[98] *Id.*
[99] *See* TS 38.213 V16.6.0, Section 10.2; TS 38.331 V16.5.0, Section 6.3.2.
[100] *Id.*
[101] *See* TS 38.321 V16.5.0, Sections 5.4.1, 5.8; TS 38.213 V16.6.0, Section 10.2; TS 38.300 V16.6.0, Sections 5.2.3, 10.3.

152. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '434 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce 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.[102] Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '434 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others

[102] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf; https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '434 Patent, but while remaining willfully blind to the infringement.

153. Defendants, with knowledge that these products, or the use thereof, infringe the '434 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '434 Patent by providing these products to end-users for use in an infringing manner.

154. ABT has suffered damages as a result of Defendants' direct and indirect infringement of the '434 Patent in an amount to be proved at trial.

155. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants' infringement of the '434 Patent, for which there is no adequate remedy at law, unless Defendants' infringement is enjoined by this Court.

COUNT VII
(Infringement of the '946 Patent)

156. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

157. 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 '946 Patent.

158. Defendants have and continue to directly infringe the '946 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 '946 Patent. Such products include at least Accused Products including, but not limited to, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 5G which practice: a method comprising: receiving, by a wireless device, one

or more radio resource control (RRC) messages comprising: first configuration parameters, of a first semi-persistent scheduling (SPS) configuration, indicating a first hybrid automatic repeat request (HARQ) codebook identifier; second configuration parameters, of a second SPS configuration, indicating a second HARQ codebook identifier, wherein the second HARQ codebook identifier is the same as the first HARQ codebook identifier; and a third configuration parameter indicating a state that is mapped to the first SPS configuration and the second SPS configuration; receiving a downlink control information (DCI) comprising a HARQ process number field, wherein a value of one or more bits of the HARQ process number field indicates the state configured using the third configuration parameter; deactivating the first SPS configuration and the second SPS configuration in response to receiving the DCI; and transmitting an acknowledgment indicating reception of the DCI.

159. For example, Defendants have and continue to directly infringe at least claim 1 of the ’946 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 and tablets). For example, the TCL Tab Pro 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

160. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 16.

MODEL 9198S-2ALCUS11

TCL TAB PRO 5G

★★★★★ 5.0 (2) Write a review

- 10.36" FHD NXTVISION display
- Dual speakers for an immersive audio
- Qualcomm® Snapdragon® 480 5G chipset for super-fast streaming, gaming, and sharing.
- Up to 64GB of internal memory, expandable up to 1TB via microSD™ card (sold separately)
- Quick-charging 8000 mAh battery supports a full day of work and beyond.
- 13MP rear and 8MP front cameras.
- Fingerprint sensor for fast and secure access.
- Runs on Android 11.

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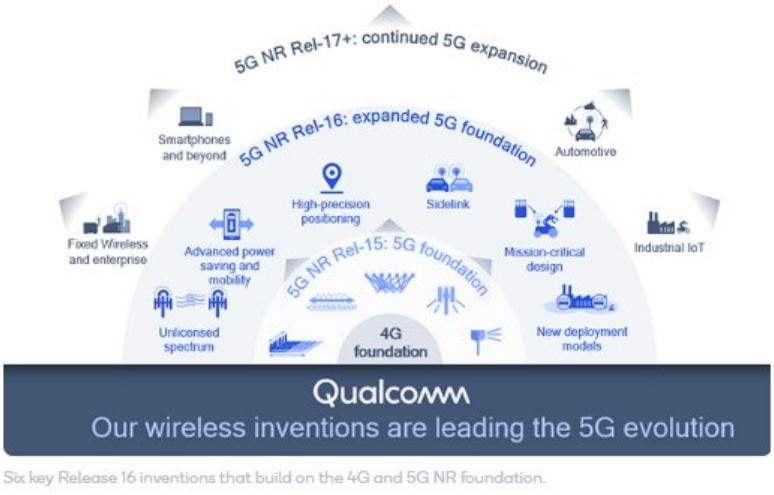
Qualcomm Expands 5G Capabilities to Mobile Devices Powered by New Snapdragon 480 5G Mobile Platform, a First in the Snapdragon 4-Series

Snapdragon 480 Accelerates Global 5G Commercialization and Delivers Series-Defying Features to Mass-Volume Smartphone Segment

JAN 3, 2021 | SAN DIEGO | Qualcomm products mentioned within this press release are offered by Qualcomm Technologies, Inc. and/or its subsidiaries.

105

[103] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G
[104] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)
[105] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020)



106

161. For example, the Accused Products practice a method for wireless communication defined in TS 38.331 V16.5.0, TS 38.321 V16.5.0, TS 38.212 V16.6.0, and TS 38.213 V16.6.0.

162. For example, the Accused Products practice receiving, by a wireless device, one or more radio resource control (RRC) messages comprising: first configuration parameters, of a first semi-persistent scheduling (SPS) configuration, indicating a first hybrid automatic repeat request (HARQ) codebook identifier (e.g., "IE SPS-Config" is a "first configuration parameter" that is used to configure downlink semi-persistent transmission, and one such SPS-Config is a harq-CodebookID which indicates the HARQ-ACK codebook index for a corresponding HARQ-ACK codebook).[107]

163. For example, the Accused Products practice receiving, by a wireless device, one or more radio resource control (RRC) messages comprising: second configuration parameters, of a second SPS configuration, indicating a second HARQ codebook identifier, wherein the second HARQ codebook identifier is the same as the first HARQ codebook identifier (e.g., a second SPS-

[106] https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).
[107] *See* TS 38.331 V16.5.0, Sections 5.1.2, 6.3.2.

Config including a harq-CodebookID that indicates the HARQ-ACK codebook index for a corresponding HARQ-ACK codebook since "Multiple Downlink SPS configurations may be configured" and "[i]f a state is mapped to multiple SPS configurations, each of these SPS configurations is configured with the same harq-codebookID").[108]

164. For example, the Accused Products practice receiving, by a wireless device, one or more radio resource control (RRC) messages comprising: a third configuration parameter indicating a state that is mapped to the first SPS configuration and the second SPS configuration (e.g., sps-ConfigDeactivationStateList ia a third configuration parameter since it "indicates a list of the deactivation states in which each state can be mapped to" and "multiple SPS configurations [can] be deactivated," including the first and second SPS configurations).[109]

165. For example, the Accused Products practice receiving a downlink control information (DCI) comprising a HARQ process number field, wherein a value of one or more bits of the HARQ process number field indicates the state configured using the third configuration parameter (e.g., "a downlink assignment for [a] PDCCH occasion [is] received" where the "PDCCH contents indicate SPS deactivation" and a "HARQ process number" is transmitted by means of the DCI format 1_0, DCI format 1_1, and DCI format 1_2, and further, if the UE is provided sps-ConfigDeactivationStateList, "a value of the HARQ process number field in a DCI format indicates a corresponding entry for scheduling release of one ore more UL grant Type 2 PUSCH or SPS PDSCH configurations").[110]

166. For example, the Accused Products practice deactivating the first SPS

[108] *Id.*
[109] *Id.*
[110] *See* TS 38.321 V16.5.0, Section 5.3.1; TS 38.212 V16.6.0, Section 4.2, 7.3.1; TS 38.213 V16.6.0, Section 10.2; TS 38.331 V16.5.0, Section 6.3.2.

configuration and the second SPS configuration in response to receiving the DCI (e.g., "deactivation of configured downlink assignments is done using a DCI command, which can either deactivate a single configured downlink assignment or multiple configured downlink assignments jointly," which includes both the first and second SPS configurations).[111]

167. For example, the Accused Products practice transmitting an acknowledgment indicating reception of the DCI (e.g., "[a] UE is expected to provide HARQ-ACK information in response to a SPS PDSCH release after N symbols from the last symbol of a PDCCH providing the SPS PDSCH release" and "if PDCCH contents indicate SPS deactivation:", the contents will "indicate a positive acknowledgement for the SPS deactivation to the physical layer").[112]

168. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '946 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce 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

[111] *See* TS 38.213 V16.6.0, Section 10.2; TS 38.300 V16.6.0, Section 10.2.
[112] *See* TS 38.213 V16.6.0, Section 10.2; TS 38.321 V16.5.0, Section 5.3.1.

online documentation.[113] Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '946 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '946 Patent, but while remaining willfully blind to the infringement.

169. Defendants, with knowledge that these products, or the use thereof, infringe the '946 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '946 Patent by providing these products to end-users for use in an infringing manner.

170. ABT has suffered damages as a result of Defendants' direct and indirect infringement of the '946 Patent in an amount to be proved at trial.

171. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants' infringement of the '946 Patent, for which there is no adequate remedy at law, unless

[113] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf; https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

Defendants' infringement is enjoined by this Court.

COUNT VIII
(Infringement of the '695 Patent)

172. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

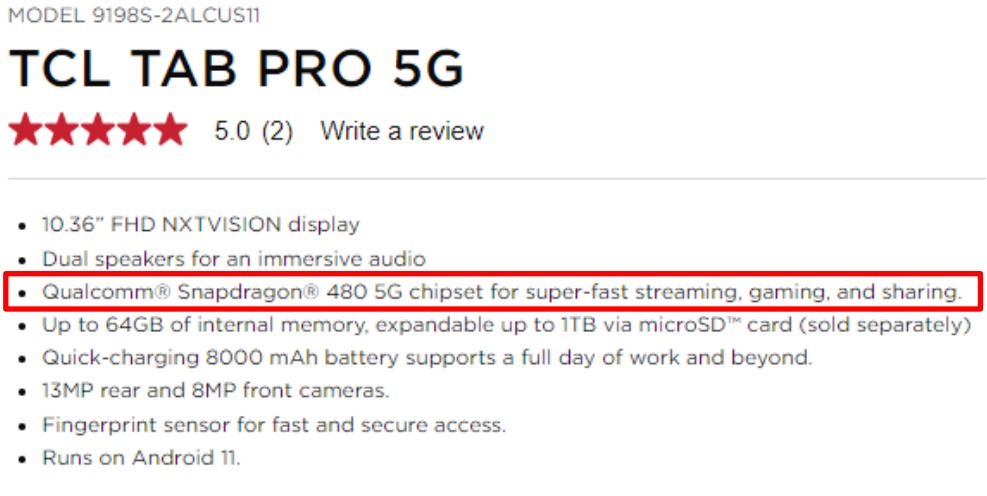
173. ABT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '695 Patent.

174. Defendants have and continue to directly infringe the '695 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 '695 Patent. Such products include at least Accused Products including, but not limited to, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 5G which practice a method comprising: receiving, by a wireless device, uplink cancellation configuration parameters comprising: a cancellation indication radio network temporary identifier (RNTI); and a sequence of serving cell-specific parameters comprising: an identifier of a serving cell; a first parameter indicating a first starting position in a downlink control information (DCI) for the serving cell; and a second parameter indicating a second starting position in a DCI for a supplementary uplink carrier of the serving cell; receiving a first DCI, associated with the cancellation indication RNTI, comprising cancellation indications; determining a first cancellation indication, in the cancellation indications, based on: the first starting position, in a first number of bit, when a scheduled uplink transmission is for a normal uplink carrier of the serving cell; and the second starting position, in a second number of bit, when the scheduled uplink transmission is for the supplementary uplink carrier of the serving cell; wherein the first number of bit and the second number of bit are based on a payload size of the first DCI; and cancelling the

scheduled uplink transmission based on the first cancellation indication.

175. For example, Defendants have and continue to directly infringe at least claim 1 of the '695 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 and tablets). For example, the TCL Tab Pro 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

176. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 16.



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[114] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G
[115] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)

Qualcomm Expands 5G Capabilities to Mobile Devices Powered by New Snapdragon 480 5G Mobile Platform, a First in the Snapdragon 4-Series

Snapdragon 480 Accelerates Global 5G Commercialization and Delivers Series-Defying Features to Mass-Volume Smartphone Segment

JAN 3, 2021 | SAN DIEGO | Qualcomm products mentioned within this press release are offered by Qualcomm Technologies, Inc. and/or its subsidiaries.

116

Six key Release 16 inventions that build on the 4G and 5G NR foundation.

117

177. For example, the Accused Products practice a method for wireless communication defined in TS 38.331 V16.5.0, TS 38.213 V16.6.0, TS 38.212 V16.6.0, TS 38.300 V16.6.0, and TS 38.321 V16.5.0.

178. For example, the Accused Products practice receiving, by a wireless device, uplink

[116] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020)

[117] https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).

cancellation configuration parameters (e.g., an "IE UplinkCancellation is used to configure the UE to monitor PDCCH for the CI-RNTI") comprising: a cancellation indication radio network temporary identifier (RNTI) (e.g., a ci-RNTI "used for indication cancellation in UL").[118]

179. For example, the Accused Products practice a receiving, by a wireless device, uplink cancellation configuration parameters (e.g., an "IE UplinkCancellation is used to configure the UE to monitor PDCCH for the CI-RNTI") comprising: a sequence of serving cell-specific parameters (e.g., "CI-ConfigurationPerServingCell-r16" which is a sequence of serving cell-specific parameters) comprising: an identifier of a serving cell (e.g., a "servingCellId" is an identifier of a serving cell); a first parameter indicating a first starting position in a downlink control information (DCI) for the serving cell (e.g., a "positioninDCI" which is a first parameter that indicates "starting position (in number of bit) of the ci-PayloadSize bit CI value applicable for this serving cell (servingCellId) within the DCI payload"); and a second parameter indicating a second starting position in a DCI for a supplementary uplink carrier of the serving cell (e.g., a "positioninDCI-ForSUL" is a second parameter that indicates "starting position (in number of bit) of the ci-PayloadSize bit CI value applicable for SUL of this serving cell (servingCellId) within the DCI payload").[119]

180. For example, the Accused Products practice receiving a first DCI (e.g., "detection of a DCI format 2_4), associated with the cancellation indication RNTI (e.g., DCI format 2_4 is transmitted "with CRC scrambled by ci-RNTI"), comprising cancellation indications (e.g., "Cancellation indication 1, Cancellation indication 2, …, Cancellation indication indication N.).[120]

181. For example, the Accused Products practice determining a first cancellation

[118] *See* TS 38.331 V16.5.0, Sections 5.1.2, 6.3.2; TS 38.213 V16.6.0, Section 11.2A.
[119] *Id.*
[120] *See* TS 38.212 V16.6.0, Section 7.3.1; TS 38.213 V16.6.0, Section 11.2A.

indication, in the cancellation indications (e.g., ci-PayloadSize that "configures the field size for each UL cancellation indicator of this serving cell (servingCellId)"), based on: the first starting position, in a first number of bit, when a scheduled uplink transmission is for a normal uplink carrier of the serving cell (e.g., positionInDCI which indicates "starting position (in number of bit) of the ci-PayloadSize bit CI value applicable for this serving cell (servingCellId) within the DCI payload").[121]

182. For example, the Accused Products practice determining a first cancellation indication, in the cancellation indications (e.g., ci-PayloadSize that "configures the field size for each UL cancellation indicator of this serving cell (servingCellId)"), based on: the second starting position, in a second number of bit, when the scheduled uplink transmission is for the supplementary uplink carrier of the serving cell (e.g., positionInDCI-ForSUL which indicates "starting position (in number of bit) of the ci-PayloadSize bit CI value applicable for SUL [supplementary uplink] of this serving cell (servingCellId) within the DCI payload").[122]

183. For example, the Accused Products practice a method wherein the first number of bit and the second number of bit are based on a payload size of the first DCI (e.g., dci-PayloadSizeForCI which indicates the "total length of the DCI payload scrambled with CI-RNTI").[123]

184. For example, the Accused Products practice cancelling the scheduled uplink transmission based on the first cancellation indication (e.g., "[t]he gNB can configure UEs to monitor cancelled transmission indications using CI-RNTI on a PDCCH" and "[i]f a UE receives

[121] *See* TS 38.331 V16.5.0, Sections 6.3.2, 6.4; TS 38.300 V16.6.0, Section 5.4.2; TS 38.321 V16.5.0, Section 5.16.
[122] *Id.*
[123] *Id.*

the cancelled transmission indication, the UE shall cancel the PUSCH transmission from the earliest symbol overlapped with the resource or the SRS transmission overlapped with the resource indicated by cancellation).[124]

185. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '695 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce 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.[125] Because of Defendants' inducement, Defendants' customers and end-

[124] *See* TS 38.300 V16.6.0, Section 10.3.

[125] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf;

users use the Accused Products in a way Defendants intend and they directly infringe the '695 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '695 Patent, but while remaining willfully blind to the infringement.

186. Defendants, with knowledge that these products, or the use thereof, infringe the '695 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '695 Patent by providing these products to end-users for use in an infringing manner.

187. ABT has suffered damages as a result of Defendants' direct and indirect infringement of the '695 Patent in an amount to be proved at trial.

188. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants' infringement of the '695 Patent, for which there is no adequate remedy at law, unless Defendants' infringement is enjoined by this Court.

COUNT IX
(Infringement of the '128 Patent)

189. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

190. 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 '128 Patent.

191. Defendants have and continue to directly infringe the '128 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making,

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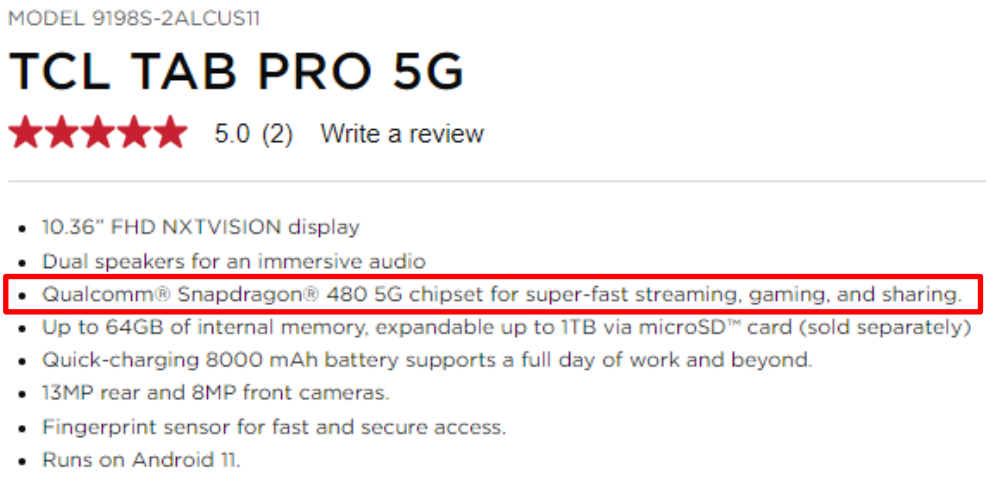
https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

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 '128 Patent. Such products include at least Accused Products including, but not limited to, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 5G which practice a method comprising: receiving, by a wireless device, one or more messages comprising: first configuration parameters for beam failure recovery, comprising first random access parameters; second configuration parameters for listen-before-talk (LBT) failure recovery; and second random access parameters; initiating, based on the first configuration parameters and in response to detecting a beam failure on a primary cell, a first random access process on a first bandwidth part (BWP) of the primary cell for beam failure recovery based on the first random access parameters; triggering, based on the second configuration parameters, consistent LBT failure for the primary cell; stopping the first random access process, for the beam failure recovery, based on the triggering the consistent LBT failure; switching from the first BWP of the primary cell to a second BWP of the primary cell as an active BWP of the primary cell; and initiating a second random access process on the second BWP of the primary cell for consistent LBT failure recovery and based on the second random access parameters.

192. For example, Defendants have and continue to directly infringe at least claim 1 of the '128 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 and tablets). For example, the TCL Tab Pro 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

193. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR

3GPP Release 16.



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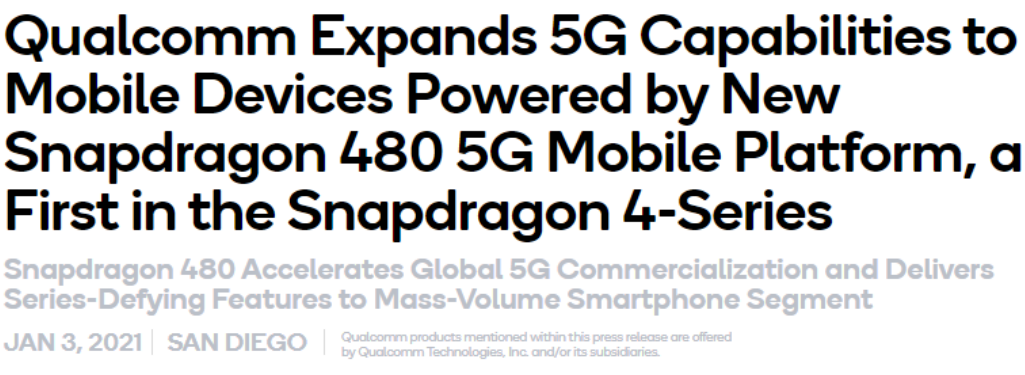

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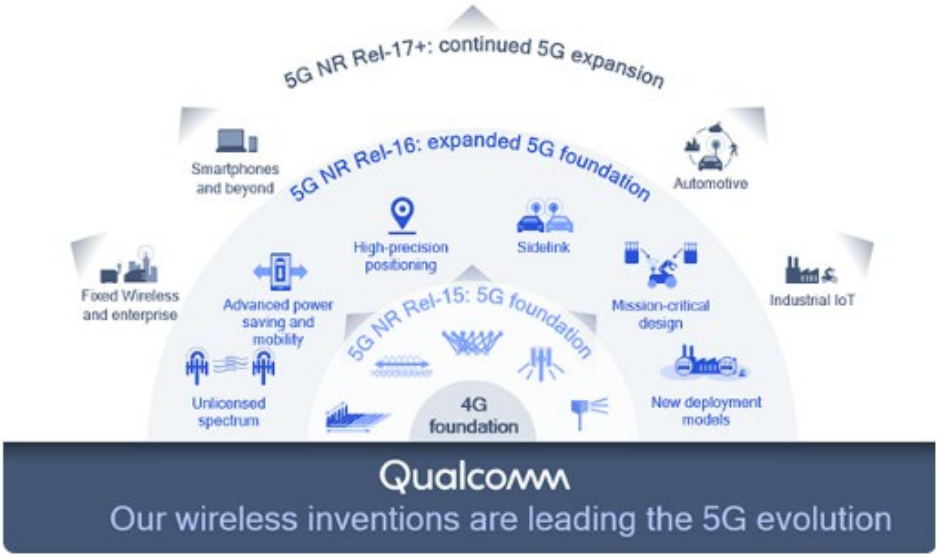
[126] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G
[127] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)
[128] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020)



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194. For example, the Accused Products practice a method for wireless communication defined in TS 38.331 V16.5.0, TS 38.321 V16.5.0, TS 38.300 V16.6.0, TS 38.213 V16.6.0, and TS 38.300 V16.6.0.

195. For example, the Accused Products practice a method comprising receiving, by a wireless device, one or more messages comprising: first configuration parameters for beam failure recovery, comprising first random access parameters (e.g., "BeamFailureRecoveryConfig" which is "used to configure the UE with RACH resources and candidate beams for beam failure recovery in case of beam failure detection" and comprises first random access parameters such as "ra-prioritization," "ra-PrioritizationTwoStep," "ra-ssb-OccasionMaskIndex," "rootSequenceIndex-BFR," and "ssb-perRach-Occasion"); second configuration parameters for listen-before-talk (LBT) failure recovery (e.g., LBT-FailureRecoveryConfig which is used to configure the parameters used for detection of consistent uplink LBT failures for operation with shared spectrum

[129] https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).

channel access, such as "Ibt-FailureDetectionTimer" and "Ibt-FailureInstanceMaxCount"); and second random access parameters (e.g., RACH-ConfigDedicated which is used to specify the dedicated random access parameters such as "ssb-perRach-Occasion," "ra-ssb-OccasionMaskIndex," "ra-prioritization," and "ra-PrioritizationTwoStep").[130]

196. For example, the Accused Products practice a method comprising initiating, based on the first configuration parameters (e.g., "BeamFailureRecoveryConfig" which is "used to configure the UE with RACH resources and candidate beams for beam failure recovery in case of beam failure detection") and in response to detecting a beam failure on a primary cell, a first random access process (e.g., "[a]fter beam failure is detected on PCell, the UE: triggers beam failure recovery by initiating a Random Access procedure on the PCell") on a first bandwidth part (BWP) of the primary cell for beam failure recovery based on the first random access parameters (e.g., "[a] UE [is] configured for operation in bandwidth parts (BWPs) of a serving cell").[131]

197. For example, the Accused Products practice a method comprising triggering, based on the second configuration parameters, consistent LBT failure for the primary cell (e.g., "trigger consistent LBT failure for the active UL BWP in this Serving Cell" based on configured parameters in the lbt-FailureRecoveryConfig such as "lbt-FailureInstanceMaxCount for the consistent LBT failure detection" and "lbt-FailureDetectionTimer for the consistent LBT failure detection").[132]

198. For example, the Accused Products practice a method comprising stopping the first random access process, for the beam failure recovery, based on the triggering the consistent LBT

[130] *See* TS 38.331 V16.5.0, Sections 5.1.2, 6.3.2; TS 38.321 V16.5.0, Sections 5.17, 5.21.
[131] *See* TS 38.300 V16.6.0, Section 9.2, TS 38.321 V16.5.0, Sections 3.1, 3.2, 5.17; TS 38.331 V16.5.0, Section 6.3.2; TS 38.213 V16.6.0, Section 12.
[132] TS 38.321 V16.5.0, Section 5.21.2.

failure (e.g., an "LBT failure detection and recovery procedure where, "if this Serving Cell is the SpCell," "stop any ongoing Random Access procedure in this Serving Cell").[133]

199. For example, the Accused Products practice a method comprising switching from the first BWP of the primary cell to a second BWP of the primary cell as an active BWP of the primary cell (e.g., "switch the active UL BWP to an UL BWP, on same carrier in this Serving Cell").[134]

200. For example, the Accused Products practice a method comprising initiating a second random access process on the second BWP of the primary cell for consistent LBT failure recovery (e.g., an "LBT failure detection and recovery procedure which "initiate[s] a Random Access Procedure" and where "[t]he random access procedure is triggered by a number of events" including "[c]onsistent UL LBT failure on SpCell") and based on the second random access parameters (e.g., second random access process parameters are configured via IEs other than BeamFailureRecoveryConfig such as via RACH-ConfigDedicated or RACH-ConfigCommon).[135]

201. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '128 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce this direct

[133] TS 38.321 V16.5.0, Section 5.21.2; TS 38.300 V16.6.0, Section 5.6, 9.2.6; TS 38.331 V16.5.0, Section 6.3.2.
[134] *Id.*
[135] *Id.*

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.[136] Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '128 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '128 Patent, but while remaining willfully blind to the infringement.

202. Defendants, with knowledge that these products, or the use thereof, infringe the '128 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '128 Patent by providing these products to end-users for use in an infringing manner.

[136] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf; https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

203. ABT has suffered damages as a result of Defendants' direct and indirect infringement of the '128 Patent in an amount to be proved at trial.

204. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants' infringement of the '128 Patent, for which there is no adequate remedy at law, unless Defendants' infringement is enjoined by this Court.

COUNT X
(Infringement of the '655 Patent)

205. Paragraphs 1 through 31 are incorporated by reference as if fully set forth herein.

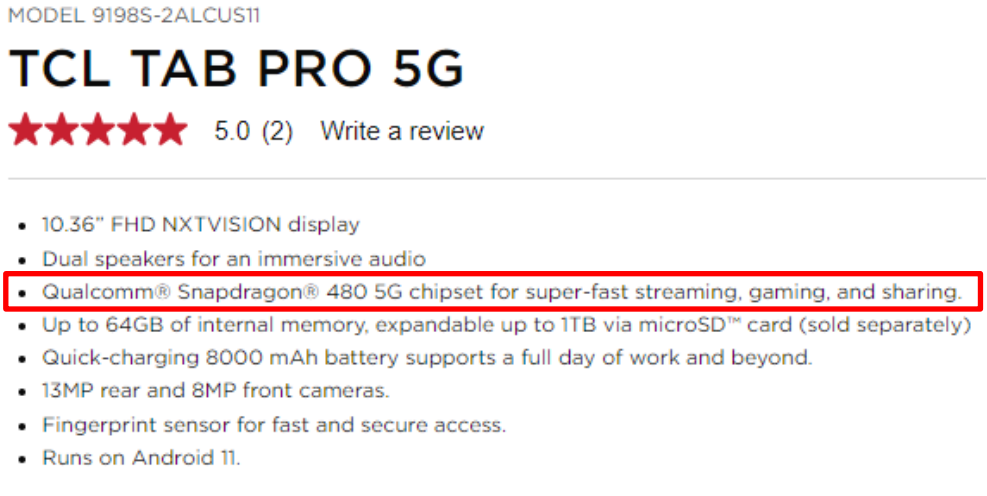
206. ABT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '655 Patent.

207. Defendants have and continue to directly infringe the '655 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 '655 Patent. Such products include at least Accused Products including, but not limited to, the TCL 30 5G, Stylus 5G, Tab Pro 5G, 30 V 5G, 30 XE 5G, 20 A 5G, 20 Pro 5G, 40 X 5G, Tab 10 5G, 40 XE 5G, 30 5G, 10 5G UW, LinkZone 5G UW, and 20 AX 5G which practice a method comprising: receiving, by a wireless device, configuration parameters comprising: first random access parameters associated with beam failure recovery; and second configuration parameters; initiating, in response to detecting a beam failure on a primary cell and based on the first configuration parameters, a first random access process on a first bandwidth part (BWP) of the primary cell; stopping the first random access process in response to triggering consistent listen-before-talk LBT failure for the primary cell; switching from the first BWP to a second BWP of the primary cell as an active BWP; and initiating a second random access process on the second BWP for consistent LBT failure recovery and based on the

second random access parameters.

208. For example, Defendants have and continue to directly infringe at least claim 1 of the '655 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 and tablets). For example, the TCL Tab Pro 5G operates on 5G and includes firmware for implementing 3rd Generation Partnership Product (3GPP) specifications).

209. For example, TCL Tab Pro 5G uses Snapdragon 480 5G, which implements 5G NR 3GPP Release 16.



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[137] https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G
[138] https://www.qualcomm.com/5g-timeline (showing 5G NR Release 16 was announced in 2020)

Qualcomm Expands 5G Capabilities to Mobile Devices Powered by New Snapdragon 480 5G Mobile Platform, a First in the Snapdragon 4-Series

Snapdragon 480 Accelerates Global 5G Commercialization and Delivers Series-Defying Features to Mass-Volume Smartphone Segment

JAN 3, 2021 | SAN DIEGO | Qualcomm products mentioned within this press release are offered by Qualcomm Technologies, Inc. and/or its subsidiaries.

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Six key Release 16 inventions that build on the 4G and 5G NR foundation.

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210. For example, the Accused Products practice a method for wireless communication defined in TS 38.331 V16.5.0, TS 38.321 V16.5.0, TS 38.300 V16.6.0, TS 38.213 V16.6.0, and TS 38.300 V16.6.0.

211. For example, the Accused Products practice a method comprising receiving, by a

[139] https://www.qualcomm.com/news/releases/2021/01/qualcomm-expands-5g-capabilities-mobile-devices-powered-new-snapdragon-480 (showing that Snapdragon 480 5G Mobile Platform was released after Release 16 was announced in 2020)

[140] https://www.qualcomm.com/news/onq/2020/07/what-key-technology-inventions-will-drive-5g-expansion (showing that 5G NR Release 16 builds upon 5G NR Release 15, and therefore includes the 5G NR Release 15 foundation).

wireless device, configuration parameters comprising first random access parameters (e.g., "BeamFailureRecoveryConfig" which is "used to configure the UE with RACH resources and candidate beams for beam failure recovery in case of beam failure detection" and comprises first random access parameters such as "ra-prioritization," "ra-PrioritizationTwoStep," "ra-ssb-OccasionMaskIndex," "rootSequenceIndex-BFR," and "ssb-perRach-Occasion"); and second random access parameters (e.g., RACH-ConfigDedicated which is used to specify the dedicated random access parameters such as "ssb-perRach-Occasion," "ra-ssb-OccasionMaskIndex," "ra-prioritization," and "ra-PrioritizationTwoStep").[141]

212. For example, the Accused Products practice a method comprising initiating, in response to detecting a beam failure on a primary cell and based on the first configuration parameters (e.g., "BeamFailureRecoveryConfig" which is "used to configure the UE with RACH resources and candidate beams for beam failure recovery in case of beam failure detection"), a first random access process (e.g., "[a]fter beam failure is detected on PCell, the UE: triggers beam failure recovery by initiating a Random Access procedure on the PCell") on a first bandwidth part (BWP) of the primary cell (e.g., "[a] UE [is] configured for operation in bandwidth parts (BWPs) of a serving cell").[142]

213. For example, the Accused Products practice a method comprising stopping the first random access process in response to triggering (e.g., "trigger consistent LBT failure for the active UL BWP in this Serving Cell" based on configured parameters in the lbt-FailureRecoveryConfig such as "lbt-FailureInstanceMaxCount for the consistent LBT failure detection" and "lbt-FailureDetectionTimer for the consistent LBT failure detection") consistent listen-before-talk

[141] *See* TS 38.331 V16.5.0, Sections 5.1.2, 6.3.2; TS 38.321 V16.5.0, Sections 5.17, 5.21.
[142] *See* TS 38.300 V16.6.0, Section 9.2, TS 38.321 V16.5.0, Sections 3.1, 3.2, 5.17; TS 38.331 V16.5.0, Section 6.3.2; TS 38.213 V16.6.0, Section 12.

(LBT) failure (e.g., an "LBT failure detection and recovery procedure where, "if this Serving Cell is the SpCell," "stop any ongoing Random Access procedure in this Serving Cell").[143]

214. For example, the Accused Products practice a method comprising switching from the first BWP to a second BWP of the primary cell as an active BWP (e.g., "switch the active UL BWP to an UL BWP, on same carrier in this Serving Cell").[144]

215. For example, the Accused Products practice a method comprising initiating a second random access process on the second BWP for consistent LBT failure recovery (e.g., an "LBT failure detection and recovery procedure which "initiate[s] a Random Access Procedure" and where "[t]he random access procedure is triggered by a number of events" including "[c]onsistent UL LBT failure on SpCell") and based on the second random access parameters (e.g., second random access process parameters are configured via IEs other than BeamFailureRecoveryConfig such as via RACH-ConfigDedicated or RACH-ConfigCommon).[145]

216. Defendants have indirectly infringed and continue to indirectly infringe one or more claims of the '655 Patent, as provided by 35 U.S.C. § 271(b), by knowingly and intentionally inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States products that include infringing technology, such as Accused Products (*e.g.*, 5G mobile handsets and tablets). Defendants induce this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise

[143] TS 38.321 V16.5.0, Section 5.21.2; TS 38.300 V16.6.0, Section 5.6, 9.2.6; TS 38.331 V16.5.0, Section 6.3.2.
[144] *Id.*
[145] *Id.*

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.[146] Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '655 Patent. Defendants perform these affirmative acts with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others, including end-users, infringe the '655 Patent, but while remaining willfully blind to the infringement.

217. Defendants, with knowledge that these products, or the use thereof, infringe the '655 Patent at least as of the date of the original Complaint in this case dated November 30, 2021, knowingly and intentionally induced, and continue to knowingly and intentionally induce direct infringement of the '655 Patent by providing these products to end-users for use in an infringing manner.

218. ABT has suffered damages as a result of Defendants' direct and indirect

[146] *See e.g.,* https://www.tcl.com/us/en/products/mobile/tcl-10-5g-uw/t790s; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-10-5g-uw/downloads/VZW%20TCL-T790S%20UM_20201020_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/20-pro-5g-grey-moondust-gray; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-pro-5g/downloads/us/Ottawa_TCL%2020%20Pro%205G_T810S%20for%20US%20OM_UM_English_FINAL.pdf; https://www.tcl.com/us/en/products/mobile/20-series/tcl-20-a-5g; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-20-a-5g/downloads/TCL_20_A-5G_QG_B%20version_EN_MEX_Final.pdf; https://www.tcl.com/us/en/products/mobile/tcl-tab/TCL-tab-pro-5G; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-tab-pro-5g/download/TCL-TAB-Pro-5G_UM_EN.pdf; https://www.tcl.com/us/en/products/mobile/tcl-30-series/tcl-30-xl-night-mist; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-30-xl/downloads/T671G_TCL%2030%20XL_UM_ENG.pdf; https://www.tcl.com/us/en/products/mobile/tcl-40-series/tcl-40-xl; https://www.tcl.com/usca/content/dam/tcl/product/mobile/tcl-40-xl/downloads/T608M_TCL%2040%20XL_UM_ENG.pdf.

infringement of the ’655 Patent in an amount to be proved at trial.

219. ABT has suffered, and will continue to suffer, irreparable harm as a result of Defendants’ infringement of the ’655 Patent, for which there is no adequate remedy at law, unless Defendants’ infringement is enjoined by this Court.

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 it, 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: January 29, 2024

Respectfully submitted,

/s/ *Alfred R. Fabricant*

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ATTORNEYS FOR PLAINTIFF
APEX BEAM TECHNOLOGIES, LLC

CERTICATE OF SERVICE

The undersigned hereby certifies that all counsel of record who are deemed to have consented to electronic service are being served with a copy of this document via the Court's CM/ECF system per Local Rule CV-5(a)(3) on January 29, 2024.

/s/ Alfred R. Fabricant
Alfred R. Fabricant