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

FOUR BATONS WIRELESS, LLC, **Plaintiff,** **v.** **SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC.,** **Defendants.**	**Civil Action No. 2:24-cv-284** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

1. Plaintiff Four Batons Wireless, LLC, complains against Defendants Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc., as follows:

THE PARTIES

2. Plaintiff Four Batons Wireless, LLC ("Four Batons") is a limited liability company organized and existing under the laws of Delaware, with its principal place of business at 14 Wall Street, 20th Floor, New York, NY 10005.

3. On information and belief, Defendant Samsung Electronics Co., Ltd. ("Samsung Electronics") is a company organized and existing under the laws of the Republic of Korea, with its principal place of business at 129 Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-Do, Korea 443-742.

4. On information and belief, Defendant Samsung Electronics America, Inc. ("Samsung USA") (collectively with Samsung Electronics, "Samsung") is a corporation organized and existing under the laws of New York, with its principal place of business at 85 Challenger

Road, Ridgefield Park, New Jersey 07660. Samsung USA may be served through its registered agent for service of process, CT Corporation System, 1999 Bryant Street, Suite 900, Dallas, Texas 75201.

JURISDICTION AND VENUE

5. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a) because this action arises under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq.*

6. This Court has personal jurisdiction over Samsung Electronics and Samsung USA because Defendants have committed acts within Texas and this judicial district giving rise to this action and/or have established minimum contacts with this forum such that the exercise of jurisdiction would not offend traditional notions of fair play and substantial justice.

7. On information and belief, Defendants conduct substantial business in this forum, including (a) engaging in the infringing conduct alleged herein in Texas and in this judicial district; (b) regularly and consistently doing and soliciting business; (c) engaging in other persistent courses of conduct such as providing customer service and warranty repairs in connection with its business operations in Texas and in this judicial district; (d) deriving substantial revenue by its offering of infringing products and services and providing infringing goods to consumers in Texas and in this judicial district; and (e) purposefully establishing substantial, systematic, and continuous contacts with the state of Texas and with this District such that they should reasonably expect to be subject to suit here in this judicial district.

8. In the alternative, Federal Rule of Civil Procedure 4(k)(1)(A) confers personal jurisdiction over Defendants because, upon information and belief, Defendants regularly conduct, transact, and/or solicit business in Texas and in this judicial district; derive substantial revenue from its business transactions in Texas and in this judicial district; and otherwise avail themselves

of the privileges and protection of the laws of the State of Texas such that this Court's assertion of jurisdiction over Defendants does not offend traditional notions of fair play and due process. On information and belief, Defendants' unlawful infringing actions have caused and will continue to cause injury to Four Batons in Texas and in this judicial district such that Defendants should reasonably expect such actions to have consequences in Texas and in this judicial district.

9. This Court has personal jurisdiction over Samsung Electronics and Samsung USA because, directly or through intermediaries, each has committed acts and continues to commit acts of patent infringement in the state of Texas and within this judicial district, including making, using, offering to sell and/or selling the Accused Instrumentalities in Texas, and/or importing the Accused Instrumentalities into Texas, and/or inducing others to commit acts of patent infringement in Texas.

10. For example, Samsung USA maintains regular and established offices in the Eastern District of Texas, including at 6625 Excellence Way, Plano, Texas 75023. Further, on information and belief, Samsung Electronics directs and controls the actions of Samsung USA such that it too maintains regular and established offices in the Eastern District of Texas, including at 6625 Excellence Way, Plano, Texas 75023.

11. Defendants' Plano office is referred to as Defendants' "Mobile Innovation hub."[1] Samsung has described this 216,000 square foot "flagship" Plano office, with over 1,000 employees, as part of its "longstanding and growing commitment to Texas."[2]

12. In addition, Samsung Electronics and Samsung USA have placed or contributed to placing infringing products (including the Accused Instrumentalities) into the stream of commerce

[1] https://www.samsung.com/us/careers/life-at-samsung.
[2] https://news.samsung.com/us/samsung-electronics-america-open-flagship-north-texas-campus.

via an established distribution channel knowing, understanding, or intending that such products would be sold and used in the United States, including in the Eastern District of Texas.

13. On information and belief, Samsung Electronics and Samsung USA each also has derived substantial revenues from infringing acts in the Eastern District of Texas, including from the sale and use of infringing products and the Accused Instrumentalities.

14. Venue is proper as to Samsung Electronics because, *inter alia*, pursuant to 28 U.S.C. § 1391(b)-(c) and/or 28 U.S.C. § 1400(b), Samsung Electronics is not resident in the United States and thus may be sued in any judicial district, including this one. In particular, Samsung Electronics is a corporation organized and existing under the laws of the Republic of Korea. Venue is proper against Samsung Electronics pursuant to 28 U.S.C. § 1391(c)(3) because venue is proper in any judicial district against a foreign corporation. *In re HTC Corp.*, 889 F.3d 1349, 1354 (Fed. Cir. 2018).

15. Venue is proper as to Samsung USA because, *inter alia*, pursuant to 28 U.S.C. § 1400(b), Samsung USA has committed acts of infringement in this District and has maintained regular and established places of business in this District including at least at 6625 Excellence Way, Plano, Texas 75023. *In re Cray Inc.*, 871 F.3d 1355, 1362–63 (Fed. Cir. 2017).

16. Defendants have not disputed this Court's personal jurisdiction over them in other recent patent-infringement actions. *See, e.g.*, Samsung Defendants' Answer ¶ 10, *Barkan Wireless v. Samsung Elecs. Co.*, No. 18-cv-28 (E.D. Tex. Apr. 23, 2018), ECF No. 25.

17. Defendants have not contested that venue properly lies in this District in other recent patent-infringement actions against them. *See, e.g.*, Samsung Defendants' Answer ¶ 12, *Barkan Wireless*, No. 18-cv-28, ECF No. 25.

PATENTS-IN-SUIT

18. Four Batons is the assignee of all substantial rights granted in United States Patent No. 8,798,006 (the "'006 Patent"), titled "Real-time comparison of quality of interfaces," a true and correct copy of which is attached as **Exhibit A**.

19. Four Batons is the assignee of all substantial rights granted in United States Patent No. 8,239,671 (the "'671 Patent"), titled "Channel binding mechanism based on parameter binding in key derivation," a true and correct copy of which is attached as **Exhibit B**.

20. Four Batons is the assignee of all substantial rights granted in United States Patent No. 7,502,348 (the "'348 Patent"), entitled "Silent proactive handoff," a true and correct copy of which is attached as **Exhibit C**.

21. Four Batons is the assignee of all substantial rights granted in United States Patent No. 8,073,436 (the "'436 Patent"), entitled "Applications and/or situation responsive utilization of silent periods," a true and correct copy of which is attached as **Exhibit D**.

22. Collectively, the '006, '671, '348, and '436 patents are referred to as the "Patents-in-Suit."

SAMSUNG'S KNOWLEDGE OF THE PATENTS-IN-SUIT AND WILLFUL INFRINGEMENT

23. Samsung makes, uses, offers to sell, sells and/or imports into the United States products and/or systems that infringe the Patents-in-Suit.

24. Four Batons put Samsung on notice of its patents and infringement thereof on November 11, 2021. On July 12, 2022, and again on September 13, 2022, Four Batons provided infringement claim charts to Samsung. Four Batons and Samsung engaged in correspondence regarding Four Batons' patent portfolio including the Patents-in-Suit, which is enclosed within **Exhibit E**. In response to Four Batons' preliminary infringement claim charts, Samsung did not

address the merits of Four Batons' infringement allegations. Instead, Samsung claimed without support to have a license to the Patents-in-Suit. Despite repeated requests by Four Batons, Samsung never provided any proof of this alleged prior license.

25. Both Toshiba Corp. and Toshiba America Research, Inc. (collectively "Toshiba"), from whom Four Batons acquired the Patents-in-Suit, confirmed in writing that they have not licensed the Patents-in-Suit to Samsung. After Four Batons acquired the patents, Toshiba, at Four Batons's request, directly contacted Ericsson, Inc., whose affiliate Telcordia Technologies, Inc. was involved in developing the Patents-in-Suit along with Toshiba America Research, Inc. Ericsson confirmed that Samsung is not a party to a license for the Patents-in-Suit that would preclude Four Batons from asserting those patents against Samsung. Accordingly, on information and belief, Samsung is not licensed to the Patents-in-Suit and its infringement of the Patents-in-Suit is willful and deliberate since at least November 11, 2021.

COUNT 1
(Infringement of the '006 Patent)

26. Four Batons repeats and re-alleges the allegations in the preceding paragraphs as if fully set forth herein.

27. On August 5, 2014, the United States Patent and Trademark Office duly and legally issued the '006 Patent entitled "Real-time comparison of quality of interfaces."

28. On November 28, 2005, Eric Van Den Berg and Tao Zhang, and on December 1, 2005, Sunil Madhani, the inventors of the '006 Patent, assigned all title, rights, and interest in and to U.S. Patent Application No. 11/209,331, including all divisionals, renewals, and continuations thereof, jointly to Toshiba America Research, Inc. and Telcordia Technologies, Inc. The '006 Patent issued from a divisional application claiming priority to U.S. Patent Application No.

11/209,331. The assignment was recorded with the United States Patent and Trademark Office on December 13, 2005.

29. On October 14, 2020, Telcordia Legacy Inc., formerly known as Telcordia Technologies Inc., assigned all title, rights, and interest in and to the '006 Patent to Toshiba America Research, Inc. The assignment was recorded with the United States Patent and Trademark Office on December 11, 2020.

30. On June 11, 2021, Toshiba America Research, Inc., assigned all title, rights, and interest in and to the '006 Patent to Four Batons. The assignment was recorded with the United States Patent and Trademark Office on June 17, 2021.

31. Four Batons is the owner of all rights, title, and interest in and to the '006 Patent, including the right to assert all causes of action arising under the '006 Patent and the right to any remedies for the past, current, and future infringement of the '006 Patent.

32. Samsung is not licensed under the '006 Patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '006 Patent whatsoever.

33. Claim 1 of the '006 Patent recites:

> 1. A method for substantially real-time comparison of quality of interfaces (QoIs) by mobile devices having multiple heterogeneous interfaces that communicate over heterogeneous wireless networks, comprising:
>
> a mobile device comparing in substantially real-time the qualities of multiple interfaces, including at least one cellular radio interface and at least one wireless local area network interface, of said mobile device that connect to heterogeneous networks using path quality metrics that are independent of how the QoI is measured, whether measured by a path through a wireless network alone or a path through both a wireless network and through a wired network,
>
> said method including said mobile device comparing path quality as a quickest change detection problem for observations from a new interface or comparing path quality based on sequential two sample tests,
>
> said mobile device performing said comparing of said multiple interfaces concurrently in real time during use of a current interface, and
>
> said mobile device selecting one of said interfaces based on said comparing.

Samsung has directly infringed and continues to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including at least claim 1, of the '006 Patent in violation of 35 U.S.C. § 271(a) because Samsung makes, uses, offers for sale, sells, and/or imports certain products, including within this District, that perform the above method, including all Samsung products that support Intelligent Wi-Fi, formerly known as "Adaptive Wi-Fi"[3] (the "'006 Accused Instrumentalities"). Samsung's infringing use of the '006 Accused Instrumentalities includes its internal use and testing of the '006 Accused Instrumentalities.

34. The '006 Accused Instrumentalities satisfy all claim limitations of one or more of the claims of the '006 Patent, including at least claim 1.

35. The '006 Accused Instrumentalities implement a method for comparing in substantially real time quality of interfaces ("QoIs") (*e.g.*, comparing the quality of cellular and Wi-Fi networks by processing measurement at the rate they occur) by mobile devices (*e.g.*, smartphones, tablets, wearables, and notebook computers) having multiple heterogeneous interfaces (*e.g.*, cellular and Wi-Fi interfaces) that communicate over heterogeneous wireless networks (*e.g.*, cellular and Wi-Fi networks). For example, Samsung products implement an "Adaptive Wi-Fi" or "Intelligent Wi-Fi" process which measures the quality of interfaces in real time and selects one of the interfaces (*e.g.*, Wi-Fi or cellular) based on said measuring and determination of the quality of each interface.

36. In some if not all of the '006 Accused Instrumentalities, Intelligent Wi-Fi defaults to be turned on. Samsung also makes Intelligent Wi-Fi features available via its quick-access settings.

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[3] https://docs.samsungknox.com/admin/knox-platform-for-enterprise/kbas/kba-360034073174 ("Intelligent Wi-Fi is the new brand name of the existing "Adaptive Wi-Fi" which had been applied to models older than Galaxy S10 (e.g., Galaxy S9 or older models)."). Prior versions of this technology were known as "Switch to Mobile Data" and "Smart Network Switch." *Id.*

37. The '006 Accused Instrumentalities implement a method that includes comparing in substantially real-time the qualities of multiple interfaces (*e.g.*, quality of cellular and Wi-Fi networks), including at least one cellular radio interface (*e.g.*, LTE interface) and at least one wireless local area network interface (*e.g.*, Wi-Fi interface), of said mobile device (*e.g.*, smartphone or tablet) that connect to heterogeneous networks (*e.g.*, Wi-Fi and LTE) using path quality metrics that are independent of how QoI is measured, whether measured by path through a wireless network alone or path through both a wireless network and through a wired network (*e.g.*, using path quality metrics to identify gray zones where Wi-Fi signal strength is high but Internet connectivity is poor or nonexistent). For example, Samsung Intelligent Wi-Fi compares in substantially real-time the qualities of multiple interfaces, including one cellular interface and one Wi-Fi interface, that connect to heterogeneous networks, including one cellular network and one Wi-Fi network.[4]

38. Intelligent Wi-Fi compares the QoI using one or more path quality metrics that are independent of how the QoI is measured, whether the path measurement be through a wireless network alone or a path through both a wireless and wired network (*e.g.*, available bandwidth, packet loss rate, jitter, latency, and/or connectivity). The '006 Accused Instrumentalities run the Android operating system, which includes ConnectivityManager. The ConnectivityManager assesses the quality of network interfaces using metrics that are independent of how the QoI is measured. The ConnectivityManager indicates that network interfaces are scored based on path-independent measures such as packet loss rate, speed, connectivity, and/or latency. This

[4] *See* https://web.archive.org/web/20220522023431/https://www.verizon.com/support/knowledge-base-223759; https://docs.samsungknox.com/admin/knox-platform-for-enterprise/kbas/kba-360034073174.htm.

information is used to generate a scoring report, which then determines whether the interface is switched between Wi-Fi and LTE.[5]

39. Samsung documentation indicates that "Switch to Mobile Data" automatically switches between a Wi-Fi network and mobile data network (*e.g.*, cellular) based on network performance. Updates advertised by Samsung continue to be capable of assessing network quality, which, on information and belief, is based on path quality metrics that are independent of how the QoI is measured.[6] Further, Samsung markets the ability of the '006 Accused Instrumentalities to detect "gray areas" where "Wi-Fi signal seems to be strong" yet there is still "los[s] [of] Internet connection or . . . very low quality of service,"[7] supporting that the '006 Accused Instrumentalities employ path quality metrics that are independent of how QoI is measured.

40. The '006 Accused Instrumentalities also either compare path quality as a quickest change detection problem for observations from a new interface or compare path quality based on sequential two sample tests. For example, Intelligent Wi-Fi compares path quality based on "sequential two sample tests." In a preferred embodiment described in the patent, a "sequential two sample test" is used to compare the quality of the cellular and Wi-Fi interfaces. The data points observed for the two interfaces are treated as independent samples. The preferred embodiment "test[s] the difference in average quality by testing for a difference in location (mean/median) of the two samples." The '006 Accused Instrumentalities monitor and observe independent samples from the Wi-Fi and cellular interfaces, including collecting samples of the download bandwidth, network speed, and/or connectivity. Android source code documentation indicates that in

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5 *See* https://developer.android.com/reference/android/net/ConnectivityManager; https://developer.android.com/training/monitoring-device-state/connectivity-status-type#java; https://developer.android.com/reference/android/net/NetworkCapabilities.

6 https://docs.samsungknox.com/admin/knox-platform-for-enterprise/kbas/kba-360034073174.htm.

7 *Id.*

calculating the Wi-Fi scoring report, path quality metrics such as those that determine internet connectivity are used.[8]

41. Furthermore, Samsung's description of its gray area detection indicates that it is not based exclusively on signal strength, noting that "[c]onsumers are often frustrated when they lose Internet connection . . . even when the Wi-Fi signal seems to be strong."[9] Samsung's description strongly suggests that path metrics are being calculated on a per-interface basis, *i.e.*, two-sample (or more) tests are being performed to determine quality metrics in situations where signal strength may be high but signal strength alone cannot properly analyze the connectivity condition (*e.g.*, "buses" and "trains" where the Wi-Fi or cellular link quality may be strong but path quality is poor).[10]

42. Samsung's processes employed in the '006 Accused Instrumentalities enable "quickly switching" from one interface to another in real-time. The newest algorithms are said to "switch[] networks faster" including in situations where link-layer metrics such as signal strength are not sufficient and path quality metrics are required such as in "moving vehicles, including buses, trains, and subways." There is also indication that Samsung is implementing the method using "new software."[11]

43. The '006 Accused Instrumentalities perform said comparing of said multiple interfaces concurrently in real time during use of a current interface. For example, Intelligent Wi-Fi compares the quality of the Wi-Fi and cellular interfaces in real time during use of the Wi-Fi interface.[12]

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8 *See, e.g.*, https://source.android.com/docs/core/connect/wifi-network-selection.
9 https://docs.samsungknox.com/admin/knox-platform-for-enterprise/kbas/kba-360034073174.htm.
10 *Id.*
11 *Id.*
12 https://developer.android.com/reference/android/net/ConnectivityManager.NetworkCallback#onAvailable (android.net.Network).

44. When managing Wi-Fi connections, the '006 Accused Instrumentalities take into consideration "network performance." Upon information and belief, Samsung's '006 Accused Instrumentalities use metrics other than or in addition to link quality when managing Wi-Fi connections, including comparing interfaces on the basis of quality metrics that are independent of how the QoI is measured (*e.g.*, actual "network performance" on a path).[13] The Android operating system implemented in the '006 Accused Instrumentalities includes a ConnectivityManager class that monitors network connections, including both Wi-Fi and cellular interfaces. ConnectivityManager implements network changes based on comparison of networks (*e.g.*, "connectivity changes" and "'fail over' to another network").[14] Further, "fine-grained" and "coarse-grained" information on the network interfaces is maintained. Android source code also shows that the ConnectivityManager within the Accused Instrumentalities is performing said comparing of said multiple interfaces concurrently in real time during use of a current interface.[15]

45. Android source code also shows that the ConnectivityManager within the Accused Instrumentalities is performing said comparing of said multiple interfaces concurrently in real time during use of a current interface. For example, the getActiveNetwork() method indicates the current default network selection.[16] Android source code for the ConnectivityManager also contains a NetworkCallback class that is used for notifications about network changes. This indicates that the '006 Accused Instrumentalities perform a procedure that involves comparing of multiple interfaces concurrently in real time during use of a current interface. The code shows that

[13] https://docs.samsungknox.com/admin/knox-platform-for-enterprise/kbas/kba-360034073174.htm.
[14] https://developer.android.com/reference/android/net/ConnectivityManager.
[15] *Id.*
[16] *E.g.*, https://developer.android.com/reference/android/net/ConnectivityManager#getActiveNetwork().

when the comparison determines the primary network interface should change, applications may be notified via callbacks.[17]

46. Samsung's '006 Accused Instrumentalities select one of said interfaces (*e.g.*, Wi-Fi or cellular interface) based on said comparing. For example, Intelligent Wi-Fi will switch from Wi-Fi to cellular if it determines that the Wi-Fi connection is poor. Such comparison is not based on link quality alone.

47. The ConnectivityManager source code for Android indicates that a selection of networks is occurring and applications that registered a callback function are notified of the change.

48. The Android operating system running on the '006 Accused Instrumentalities selects an available network. For example, in Android 12 and later versions of the Android operating system, the operating system includes a NetworkScore class that is used to "select[] between available networks."[18]

49. Samsung has received notice and has had actual or constructive knowledge of the '006 Patent and the infringing nature of the '006 Accused Instrumentalities since at least November 11, 2021. Alternatively, Samsung has received notice and has had actual or constructive knowledge of the '006 Patent and the infringing nature of the '006 Accused Instrumentalities since at least the service of this Complaint.

50. Since having notice of the '006 Patent, through its actions, Samsung has indirectly infringed and continues to indirectly infringe the '006 Patent in violation of 35 U.S.C. § 271(b). Samsung has actively induced product makers, distributors, partners, agents, affiliates, service providers, importers, resellers, customers, retailers, and/or end users of the '006 Accused

[17] https://developer.android.com/reference/android/net/ConnectivityManager.NetworkCallback.
[18] https://source.android.com/docs/core/connect/network-selection.

Instrumentalities to directly infringe the ’006 Patent by, among other things, disseminating, manufacturing, distributing, importing, and maintaining the ’006 Accused Instrumentalities, and creating, disseminating, advertising, and promoting the use of the ’006 Accused Instrumentalities through software updates, promotional and marketing materials, product descriptions, supporting materials, operating manuals, technical information, and other instructions on how to implement and configure the ’006 Accused Instrumentalities with knowledge and the specific intent that its efforts will result in the direct infringement of the ’006 Patent.

51. Samsung engages in the aforementioned actions knowing and intending that its customers and end users will commit these infringing acts. Samsung also continues to make, use, offer for sale, sell, and/or import the ’006 Accused Instrumentalities, despite its knowledge of the ’006 Patent, thereby specifically intending for and inducing its customers to infringe the ’006 Patent through the customers’ normal and customary use of the ’006 Accused Instrumentalities.

52. In addition, Samsung has indirectly infringed and continues to indirectly infringe the ’006 Patent in violation of 35 U.S.C. § 271(c) by selling or offering to sell in the United States, or importing into the United States, the ’006 Accused Instrumentalities, and advertising and/or pushing software updates for the ‘006 Accused Instrumentalities, with knowledge that the Accused Instrumentalities and software updates thereto are especially designed or adapted to operate in a manner that infringes that patent and despite the fact that the infringing technology or aspects of the products are not a staple article of commerce suitable for substantial non-infringing use.

53. For example, Samsung is aware that the technology described above included in the ’006 Accused Instrumentalities enables the product to operate as described above and that such functionality infringes the ’006 Patent, including claim 1. Samsung continues to sell and offer to

sell these products in the United States after receiving notice of the ’006 Patent and how the products’ functionality infringe that patent.

54. The infringing aspects of the ’006 Accused Instrumentalities can be used only in a manner that infringes the ’006 Patent and thus have no substantial non-infringing uses. The infringing aspects of those instrumentalities otherwise have no meaningful use, let alone any meaningful non-infringing use.

55. On information and belief, Samsung’s infringement of the ’006 Patent is and has been willful and deliberate.

56. Four Batons has suffered damages as a result of Samsung’s direct and/or indirect infringement of the ’006 Patent in an amount adequate to compensate for Samsung’ infringement, but in no event less than a reasonable royalty for the use made of the invention by Samsung, together with interest and costs as fixed by the Court.

COUNT 2
(Infringement of the ’671 Patent)

57. Four Batons repeats and re-alleges the allegations in the preceding paragraphs as if fully set forth herein.

58. On August 7, 2012, the United States Patent and Trademark Office duly and legally issued the ’671 Patent entitled “Channel binding mechanism based on parameter binding in key derivation.”

59. On October 16, 2006, Yoshihiro Oba, the inventor of the ’671 Patent, assigned all title, rights, and interest in and to U.S. Patent Application No. 11/379,568, including all divisionals, renewals, and continuations thereof, jointly to Toshiba America Research, Inc. and Telcordia Technologies, Inc. The ’671 Patent issued from U.S. Patent Application No. 11/379,568. The assignment was recorded with the United States Patent and Trademark Office on January 31, 2007.

60. On October 14, 2020, Telcordia Legacy Inc., formerly known as Telcordia Technologies Inc., assigned all title, rights, and interest in and to the '671 Patent to Toshiba America Research, Inc. The assignment was recorded with the United States Patent and Trademark Office on December 11, 2020.

61. On June 11, 2021, Toshiba America Research, Inc., assigned all title, rights, and interest in and to the '671 Patent to Four Batons. The assignment was recorded with the United States Patent and Trademark Office on June 17, 2021.

62. Four Batons is the owner of all rights, title, and interest in and to the '671 Patent, including the right to assert all causes of action arising under the '671 Patent and the right to any remedies for the past, current, and future infringement of the '671 Patent.

63. Samsung is not licensed under the '671 Patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '671 Patent whatsoever.

64. Claim 1 of the '671 Patent recites:

> 1. A channel binding method based on parameter binding in a key derivation procedure for authentication of a mobile supplicant to an access network, comprising:
>
> cryptographically binding access network parameters to a key without needing to carry the parameters in authentication methods;
>
> further including deriving a channel binding key from a channel binding master key bound to a key binding blob using a key derivation function; and
>
> wherein said key binding blob is a string that is constructed from static parameters advertised from an authenticator.

Samsung has directly infringed and continues to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including at least claim 1, of the '671 Patent in violation of 35 U.S.C. § 271(a) because Samsung makes, uses, offers for sale, sells, and/or imports certain products, including within this District, that perform the above method, including all Samsung products that support WPA3 (the "'671 Accused Instrumentalities"). Samsung markets

its products as supporting WPA3, and its devices in fact support WPA3. For example, Samsung Galaxy Z Flip 5 smartphones report support for WPA3. Moreover, the Wi-Fi Alliance website indicates that WPA3 certification has been obtained for Samsung products, including smartphones, since as early as 2018.[19] Samsung's infringing use of the '671 Accused Instrumentalities includes its internal use and testing of the '671 Accused Instrumentalities.

65. The '671 Accused Instrumentalities satisfy all claim limitations of one or more of the claims of the '671 Patent, including at least claim 1.

66. For example, the '671 Accused Instrumentalities implement a channel binding method (*e.g.*, WPA3 authentication and key generation procedure) based on parameter binding (*e.g.*, binding of certain parameters associated with a Wi-Fi access point to the authenticated communications channel) in a key derivation procedure for authentication (*e.g.*, WPA3 authentication procedure which derives keys including the Pairwise Master Key ("PMK") and Key Confirmation Key ("KCK")) of a mobile supplicant (*e.g.*, WPA3 supplicant running on smartphone) to an access network (*e.g.*, Wi-Fi access point(s)).

67. WPA3 is based on the IEEE 802.11 standard.[20] The IEEE 802.11-2020 standard describes Simultaneous Authentication of Equals ("SAE") in § 12.4, titled "Authentication using a password." The SAE procedure required by the IEEE 802.11-2020 standard is an authentication procedure that results in the sharing of keys (*e.g.*, the PMK). Further, the method is resistant to offline dictionary attacks, compromise of the PMK, and compromise of the password.[21]

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[19] *See* https://www.wi-fi.org/product-finder-results.

[20] IEEE 802.11s-2011 defined the infringing functionality. Such functionality was incorporated into 802.11-2012, -2016, and -2020, as well as amendments of the IEEE 802.11 standards, including 802.11ac-2013 (Wi-Fi 5), 802.11ax-2021 (Wi-Fi 6), and 802.11be/D5.0 (Wi-Fi 7).

[21] IEEE 802.11-2020 Standard § 12.4.

68. The SAE protocol, mandatory for implementation of WPA3 in the '671 Accused Instrumentalities, uses two message exchanges: a Commit exchange and a Confirm exchange. The access point ("AP") and station ("STA") both send Commit messages and subsequently both send Confirm messages.

69. In implementations of WPA3, the Commit message is based on certain access network parameters (*e.g.*, *rand* and *mask*) that are bound to the keys without the need to transmit them through the network. The parameters *rand* and *mask* are generated by the access point (and non-AP STA) but are not transmitted in the Commit message. Rather, the sum of the two is used to form a *commit-scalar* that is placed in the Commit message, and the *mask* is multiplied by the secret element, the Password Element ("*PWE*"), that was constructed from the password. Thus, the *mask* and *rand* access network parameters are placed in the Commit message that is transmitted to the peer.[22]

70. Thus, the '671 Accused Instrumentalities, in accordance with the WPA3 mechanisms as defined in the IEEE 802.11-2020 standard, implement a "channel binding method" (*i.e.*, parameters of the channel are bound to the keys) based on parameter binding (*e.g.*, *mask* and *rand* parameters generated by the access point) in a key derivation procedure (*e.g.*, generation of PMK and KCK) for authentication of a mobile supplicant to an access network (*i.e.*, the non-AP station is authenticated to the access point as being in possession of the network password that was required to form the *PWE*).

71. On information and belief, the '671 Accused Instrumentalities implement a method that cryptographically binds (*e.g.,* using hash, finite field operations, and/or key derivation functions) access network parameters (*e.g.*, *rand* and *mask* parameters generated by an access

[22] *Id.* § 12.4.5.3 at p. 2462.

point) to a key (*e.g.*, KCK) without needing to carry the parameters in authentication methods (*e.g.*, *rand* and *mask* access network parameters of the WPA3 access point are not carried in WPA3 authentication methods, *i.e.*, are not carried in Commit nor Confirm messages).

72. In implementations of WPA3, including in the '671 Accused Instrumentalities, the *rand* and *mask* access network parameters are generated by the access point when it generates a Commit message. The Commit message is formed by first generating a *PWE*. The *PWE* is generated by first hashing the MAC addresses of the AP and STA that are involved in the authentication. That hashed value is then reduced modulo the order of the group over which calculations are being performed. The reduced hash of the MAC addresses is then multiplied by the network password, *PT*, to form the secret element, *PWE*.[23]

73. In implementations of WPA3, including in the '671 Accused Instrumentalities, the *PWE* is then used along with the *rand* and *mask* access network parameters to form the *commit-scalar* and *COMMIT-ELEMENT* that are placed in the Commit message.[24]

74. Thus, in implementations of WPA3, including in the '671 Accused Instrumentalities, the *rand* and *mask* values are access network parameters that are not carried in the Commit message. Further, the *rand* and *mask* values are not carried in the responsive Confirm message from the AP.

75. In implementations of WPA3, including in the '671 Accused Instrumentalities, the Confirm message comprises a *confirm* value that is formed from the KCK, *send-confirm* counter value, *commit-scalar* and *COMMIT-ELEMENT* of the non-AP device, and *peer-commit-scalar* and *PEER-COMMIT-ELEMENT* of the AP. None of these values are the *rand* and *mask* access

[23] *Id.* § 12.4.5.2 at p. 2462.
[24] *Id.*

network parameters of the AP. Thus, the *confirm* value transmitted as an authentication message does not include the access network parameters.[25]

76. Nonetheless, the '671 Accused Instrumentalities cryptographically bind the access network parameters (*e.g.*, *rand* and *mask* corresponding to the specific channel formed between the AP and the authenticating non-AP station) to a key (*e.g.*, a KCK) without needing to carry the parameters in authentication messages.

77. IEEE 802.11-2020 § 12.4.5.5, titled "Processing of a peer's SAE Commit message," which is required in implementations of WPA3, including in the '671 Accused Instrumentalities, requires certain keys to be generated. First a secret shared element, *K*, is generated from the *rand* value, *peer-commit-scalar*, *PWE*, and *PEER-COMMIT-ELEMENT*. The *peer-commit-scalar* and *PEER-COMMIT-ELEMENT* are cryptographically bound to the *rand* and *mask* values of the AP; thus *K* is as well.[26]

78. As described in IEEE 802.11-2020, the value *K* is then processed by the function F() which extracts the x-coordinate.[27] The result is the secret value, *k*, which is cryptographically bound to the access network parameters via *K*.

79. As described in IEEE 802.11-2020, the secret value, *k*, is then processed by a hash function, H(), to produced *keyseed*. Thus, the *keyseed* is also cryptographically bound to the access network parameters, *rand* and *mask*.

80. As described in IEEE 802.11-2020, the generation of *keyseed* also includes the use of a salt formed from rejected groups. A context is formed from the *peer-commit-scalar*, which also cryptographically binds *rand* and *mask* of the access point to the *context*. A key derivation

[25] *Id.* § 12.4.5.5 at p. 2464.
[26] *Id.* at p. 2463.
[27] *See id.* at p. 2454.

function, KDF-Hash-Length(), is then used to form *kck_and_pmk*. Thus, *kck_and_pmk* is cryptographically bound to the access network parameters, *rand* and *mask*, of the AP. Finally, *kck_and_pmk* is separated into two keys, *KCK* and *PMK*, which are both cryptographically bound to the access network parameters without those network access parameters ever having been transmitted in an authentication message.[28]

81. Further, on information and belief, the '671 Accused Instrumentalities perform a method that further includes deriving a channel binding key (*e.g.*, Pairwise Master Key ("PMK")) from a channel binding master key (*e.g.*, *keyseed*) bound to a key binding blob (*e.g.*, *PEER-COMMIT-ELEMENT*) using a key derivation function (*e.g.*, KDF-Hash-*Length* function).

82. When the '671 Accused Instrumentalities receive a Commit message, keys are calculated. This includes the Key Confirmation Key ("KCK") and the Pairwise Master Key ("PMK").[29]

83. The KCK and PMK are derived "using a key derivation function." The KDF-Hash-*Length* function is the key derivation function. It is used to obtain *kck_and_pmk*, which is split into two portions, the *KCK* and the *PMK*.

84. The *keyseed* is input into the key derivation function as the "channel binding master key." The other inputs are a string, "SAE KCK and PMK," as well as *context*.

85. The channel binding master key is bound to a key binding blob, *e.g.*, the *PEER-COMMIT-ELEMENT*, that was sent by the access point in its Commit message. The term "blob" means binary large object. The *PEER-COMMIT-ELEMENT* is such a binary large object. It is 64 bytes, which is 512 bits.

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[28] *Id.* at p. 2464.
[29] *Id.*

86. The specification of the '671 Patent says that a Key Binding Blob ("KBB") is "[a]n octet-string that is constructed from static parameters advertised from an authenticator using an Authenticator-Supplicant Protocol (ASP)." The *PEER-COMMIT-ELEMENT* is a 64-byte string. Byte is a synonym for octet; they both mean a group of eight bits. The access point acts as an authenticator and the '671 Accused Instrumentality is a supplicant. Thus, they both implement an ASP.

87. The commit-elements are constructed from static parameters advertised from the authenticator, including (a) the MAC address of the AP, which is also known as the BSSID; and (b) parameters advertised in beacons related to the Authentication Key Management ("AKM") suite. Beacons from an AP include the BSSID and the AKM parameters.

88. On information and belief, the '671 Accused Instrumentalities implement a method in which the key binding blob is a string (*e.g.*, *PEER-COMMIT-ELEMENT* is expressed as an octet string) that is constructed from static parameters (*e.g.*, MAC address of the AP and AKM information) advertised from an authenticator (*e.g.*, from a Wi-Fi access point in its beacons).

89. The COMMIT-ELEMENT, including the *PEER-COMMIT-ELEMENT* from the AP, are binary large objects (*e.g.*, 512 bits) expressed as a string. The IEEE 802.11-2020 standard requires the COMMIT-ELEMENT to be expressed as an octet string.[30]

90. Samsung has received notice and has had actual or constructive knowledge of the '671 Patent and the infringing nature of the '671 Accused Instrumentalities since at least November 11, 2021. Alternatively, Samsung has received notice and has had actual or constructive knowledge of the '671 Patent and the infringing nature of the '671 Accused Instrumentalities since at least the service of this Complaint.

[30] *Id.* at p. 2467.

91. Since having notice of the ’671 Patent, through its actions, Samsung has indirectly infringed and continues to indirectly infringe the ’671 Patent in violation of 35 U.S.C. § 271(b). Samsung has actively induced product makers, distributors, partners, agents, affiliates, service providers, importers, resellers, customers, retailers, and/or end users of the ’671 Accused Instrumentalities to directly infringe the ’671 Patent by, among other things, disseminating, manufacturing, distributing, importing, and maintaining the ’671 Accused Instrumentalities, and creating, disseminating, advertising, and promoting the use of the ’671 Accused Instrumentalities through software updates, promotional and marketing materials, product descriptions, supporting materials, operating manuals, technical information, and other instructions on how to implement and configure the ’671 Accused Instrumentalities with knowledge and the specific intent that its efforts will result in the direct infringement of the ’671 Patent.

92. Samsung engages in the aforementioned actions knowing and intending that its customers and end users will commit these infringing acts. Samsung also continues to make, use, offer for sale, sell, and/or import the ’671 Accused Instrumentalities, despite its knowledge of the ’671 Patent, thereby specifically intending for and inducing its customers to infringe the ’671 Patent through the customers’ normal and customary use of the ’671 Accused Instrumentalities.

93. In addition, Samsung has indirectly infringed and continues to indirectly infringe the ’671 Patent in violation of 35 U.S.C. § 271(c) by selling or offering to sell in the United States, or importing into the United States, the ’671 Accused Instrumentalities, and advertising and/or pushing software updates for the ’671 Accused Instrumentalities, with knowledge that the Accused Instrumentalities and software updates thereto are especially designed or adapted to operate in a manner that infringes that patent and despite the fact that the infringing technology or aspects of the products are not a staple article of commerce suitable for substantial non-infringing use.

94. For example, Samsung is aware that the technology described above included in the '671 Accused Instrumentalities enables the product to operate as described above and that such functionality infringes the '671 Patent, including claim 1. Samsung continues to sell and offer to sell these products in the United States after receiving notice of the '671 Patent and how the products' functionality infringe that patent.

95. The infringing aspects of the '671 Accused Instrumentalities can be used only in a manner that infringes the '671 Patent and thus have no substantial non-infringing uses. The infringing aspects of those instrumentalities otherwise have no meaningful use, let alone any meaningful non-infringing use.

96. On information and belief, Samsung's infringement of the '671 Patent is and has been willful and deliberate.

97. Four Batons has suffered damages as a result of Samsung's direct and indirect infringement of the '671 Patent in an amount adequate to compensate for Samsung' infringement, but in no event less than a reasonable royalty for the use made of the invention by Samsung, together with interest and costs as fixed by the Court.

COUNT 3
(Infringement of the '348 Patent)

98. Four Batons repeats and re-alleges the allegations in the preceding paragraphs as if fully set forth herein.

99. On March 10, 2009, the United States Patent and Trademark Office duly and legally issued the '348 Patent entitled "Silent proactive handoff."

100. On April 5, 2005, Tao Zhang and Raziq Yaqub, the inventors of the '348 Patent, assigned all title, rights, and interest in and to U.S. Patent Application No. 11/096,721, including all divisionals, renewals, and continuations thereof, jointly to Toshiba America Research, Inc. and

Telcordia Inc. The '348 Patent issued from U.S. Patent Application No. 11/096,721. The assignment was recorded with the United States Patent and Trademark Office on July 21, 2005.

101. On October 14, 2020, Telcordia Legacy Inc., formerly known as Telcordia Inc., assigned all title, rights, and interest in and to the '348 Patent to Toshiba America Research, Inc. The assignment was recorded with the United States Patent and Trademark Office on December 11, 2020.

102. On June 11, 2021, Toshiba America Research, Inc., assigned all title, rights, and interest in and to the '348 Patent to Four Batons. The assignment was recorded with the United States Patent and Trademark Office on June 17, 2021.

103. Four Batons is the owner of all rights, title, and interest in and to the '348 Patent, including the right to assert all causes of action arising under the '348 Patent and the right to any remedies for the past, current, and future infringement of the '348 Patent.

104. Samsung is not licensed under the '348 Patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '348 Patent whatsoever.

105. Claim 1 of the '348 Patent recites:

> 1. A method for performing silent proactive handoff of a mobile device to a target network while the mobile device is using a current network, comprising:
>
> while the mobile device is using the current network to transport application traffic and the current network satisfies the mobile device's requirements,
>
> having the mobile device use at least one silent period of an application to temporarily connect to at least one target network to proactively perform at least one handoff action for potential later handoff to the target network.

Samsung has directly infringed and continues to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including at least claim 1, of the '348 Patent in violation of 35 U.S.C. § 271(a) because Samsung makes, uses, offers for sale, sells, and/or imports certain products, including within this District, that perform the above method, including all

Samsung products that support dual concurrent Wi-Fi (the "'348 Accused Instrumentalities").[31] For example, Android open-source-code documentation advertises that devices running Android 13 or later versions support concurrent multiple networks with internet connection.[32] Moreover, for example, Samsung Galaxy Z Flip 5 smartphones report support for dual band simultaneous Wi-Fi. Samsung's infringing use of the '348 Accused Instrumentalities includes its internal use and testing of the '348 Accused Instrumentalities.

106. The '348 Accused Instrumentalities satisfy all claim limitations of one or more of the claims of the '348 Patent, including at least claim 1.

107. For example, the '348 Accused Instrumentalities practice a method for performing silent proactive handoff of a mobile device to a target network while the mobile device is using a current network.

108. The '348 Accused Instrumentalities implement a method for performing a silent proactive handoff of a mobile device to a target network (*e.g.*, changing the primary interface used for Internet connectivity during a period when there is no application traffic, such as when the phone screen is off) while the mobile device is using a current network (*e.g.*, when connected to and using a current primary interface, such as LTE or a current Wi-Fi network).

109. The '348 Accused Instrumentalities perform a method that includes the mobile device using the current network to transport application traffic. For example, a Samsung Galaxy Z Flip 5 uses the current network (e.g., LTE or a specific Wi-Fi network) to transport its application traffic. Using a Samsung Galaxy Z Flip 5 (MAC address d2:e1:b8:72:62:ec) (the "Flip") with a TP-Link AX3000 access point (MAC address 14:eb:b6:2b:8a:86) ("TP-Link AP"), where the Flip

[31] This feature may also be referred to by other names, such as "dual band simultaneous" Wi-Fi.
[32] https://source.android.com/docs/core/connect/wifi-sta-sta-concurrency.

was connected to the TP-Link AP, the Wi-Fi screen displayed that the TP-Link AP was the "Current network."

110. Furthermore, the Flip was using the current network (i.e., network provided by TP-Link AP) to transport application traffic. For example, apps such as Google Chrome and Google Maps were using the TP-Link AP to transport their respective application traffic.

111. The '348 Accused Instrumentalities perform a method that further includes the current network satisfying the mobile device's requirements. For example, when connected to the TP-Link AP, the Flip's requirements are satisfied. Apps such as Google Chrome and Google Maps use the "Current network" to transport their respective application traffic and would not do so if the current network did not satisfy the mobile device's requirements. Moreover, Android documentation explains that the operating system uses a ConnectivityManager to ensure that a current network is satisfying the needs of the mobile device.[33]

112. The '348 Accused Instrumentalities perform a method that further includes the mobile device using at least one silent period of an application (*e.g.*, a period when the device's screen is off). Using a Samsung Galaxy Z Flip 5 as one example, when a Flip is placed in proximity to two access points ("APs"), it does not switch between APs when the screen is on. That is, when the Flip is connected to a first AP and then moves closer to a second AP, the Flip will remain connected to the first AP as long as the screen is on. But if the screen is off on the Flip, the Flip will quickly—within seconds—switch to the closer AP. This confirms that the Accused Instrumentalities perform a method that uses at least one silent period of an application.

113. Furthermore, Android documentation explains that the Android operating system running on the '348 Accused Instrumentalities calls the onPause() and onStop() methods for an

[33] https://developer.android.com/reference/android/net/ConnectivityManager.

application when the application is no longer in the foreground, which would happen when the screen goes off.[34] Android documentation explains that the onPause() method is "most common[ly]" called when an event "interrupts app execution, as described in the section about the onResume() callback."[35] The onResume() callback includes as an example the device's screen turning off.[36] Android documentation further explains that there is a broadcast to all applications when the screen goes off.[37]

114. The '348 Accused Instrumentalities perform a method that further includes the mobile device temporarily connecting to at least one target network (*e.g.*, another available and potentially preferable network, whether LTE or a different Wi-Fi network). For example, operating in a "screen off" closed mode and while connected to a Wi-Fi network (*i.e.*, a current network), a Flip sends an association request to another, second network (*i.e.*, a target network).

115. The Flip then sends many data packets, which indicates that the device is performing Internet connectivity checks. Further, when the Flip connects to an AP, the device tests the AP's Internet connectivity. This is displayed to the user on the Flip's screen.

116. When the Flip sends an association request and data packets to the second AP (*i.e.*, the target network) but, for example, the second AP does not have Internet connectivity, the Flip disconnects from the second AP, does not switch over, and instead remains connected to the current network. This indicates that the connection to the second AP (*i.e.*, the target network) was temporary.

117. The '348 Accused Instrumentalities perform a method that further includes using the temporary connection (*e.g.*, the connection to a second, target network, as described above) to

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[34] https://developer.android.com/guide/components/activities/activity-lifecycle.
[35] *Id.*
[36] *Id.*
[37] https://developer.android.com/reference/android/content/Intent#ACTION_SCREEN_OFF

perform at least one handoff action (*e.g.*, to check for Internet connectivity). For example, the Flip displays to users of the device that Internet connectivity tests are being performed. And when the Flip connects to a target network that is connected to the Internet, the Flip's screen will first show that an Internet quality test is being performed and then, after that, show that the Flip is connected to the target network. This is an upper-layer (layer 3, at least) action.

118. The '348 Accused Instrumentalities perform a method that further includes the mobile device performing a proactive handoff action (*e.g.*, checking for Internet connectivity) for potential later handoff to the target network (*e.g.*, switching the primary network connection to LTE or a different Wi-Fi network). For example, if the Internet connectivity check succeeds, the Flip switches its primary network connection to the second AP, *i.e.*, the Flip performs a handoff to the target network.

119. Samsung has received notice and has had actual or constructive knowledge of the '348 Patent and the infringing nature of the '348 Accused Instrumentalities since at least November 11, 2021. Alternatively, Samsung has received notice and has had actual or constructive knowledge of the '348 Patent and the infringing nature of the '348 Accused Instrumentalities since at least the service of this Complaint.

120. Since having notice of the '348 Patent, through its actions, Samsung has indirectly infringed and continues to indirectly infringe the '348 Patent in violation of 35 U.S.C. § 271(b). Samsung has actively induced product makers, distributors, partners, agents, affiliates, service providers, importers, resellers, customers, retailers, and/or end users of the '348 Accused Instrumentalities to directly infringe the '348 Patent by, among other things, disseminating, manufacturing, distributing, importing, and maintaining the '348 Accused Instrumentalities, and creating, disseminating, advertising, and promoting the use of the '348 Accused Instrumentalities

through software updates, promotional and marketing materials, product descriptions, supporting materials, operating manuals, technical information, and other instructions on how to implement and configure the '348 Accused Instrumentalities with knowledge and the specific intent that its efforts will result in the direct infringement of the '348 Patent.

121. Samsung engages in the aforementioned actions knowing and intending that its customers and end users will commit these infringing acts. Samsung also continues to make, use, offer for sale, sell, and/or import the '348 Accused Instrumentalities, despite its knowledge of the '348 Patent, thereby specifically intending for and inducing its customers to infringe the '348 Patent through the customers' normal and customary use of the '348 Accused Instrumentalities.

122. In addition, Samsung has indirectly infringed and continues to indirectly infringe the '348 Patent in violation of 35 U.S.C. § 271(c) by selling or offering to sell in the United States, or importing into the United States, the '348 Accused Instrumentalities, and advertising and/or pushing software updates for the '348 Accused Instrumentalities, with knowledge that the Accused Instrumentalities and software updates thereto are especially designed or adapted to operate in a manner that infringes that patent and despite the fact that the infringing technology or aspects of the products are not a staple article of commerce suitable for substantial non-infringing use.

123. For example, Samsung is aware that the technology described above included in the '348 Accused Instrumentalities enables the product to operate as described above and that such functionality infringes the '348 Patent, including claim 1. Samsung continues to sell and offer to sell these products in the United States after receiving notice of the '348 Patent and how the products' functionality infringes that patent.

124. The infringing aspects of the '348 Accused Instrumentalities can be used only in a manner that infringes the '348 Patent and thus have no substantial non-infringing uses. The

infringing aspects of those instrumentalities otherwise have no meaningful use, let alone any meaningful non-infringing use.

125. On information and belief, Samsung's infringement of the '348 Patent is and has been willful and deliberate.

126. Four Batons has suffered damages as a result of Samsung's direct and indirect infringement of the '348 Patent in an amount adequate to compensate for Samsung' infringement, but in no event less than a reasonable royalty for the use made of the invention by Samsung, together with interest and costs as fixed by the Court.

COUNT 4
(Infringement of the '436 Patent)

127. Four Batons repeats and re-alleges the allegations in the preceding paragraphs as if fully set forth herein.

128. On December 6, 2011, the United States Patent and Trademark Office duly and legally issued the '436 Patent entitled "Applications and/or situation responsive utilization of silent periods."

129. On August 24, 2011, Raziq Yaqub, and on September 9, 2011, Tao Zhang, the inventors of the '436 Patent, assigned all title, rights, and interest in and to U.S. Patent Application No. 11/558,273, including all divisionals, renewals, and continuations thereof, jointly to Toshiba America Research, Inc. and Telcordia Technologies, Inc. The '436 Patent issued from U.S. Patent Application No. 11/558,273. The assignment was recorded with the United States Patent and Trademark Office on September 28, 2011.

130. On October 14, 2020, Telcordia Legacy Inc., formerly known as Telcordia Technologies, Inc., assigned all title, rights, and interest in and to the '436 Patent to Toshiba

America Research, Inc. The assignment was recorded with the United States Patent and Trademark Office on December 11, 2020.

131. On June 11, 2021, Toshiba America Research, Inc., assigned all title, rights, and interest in and to the '436 Patent to Four Batons. The assignment was recorded with the United States Patent and Trademark Office on June 17, 2021.

132. Four Batons is the owner of all rights, title, and interest in and to the '436 Patent, including the right to assert all causes of action arising under the '436 Patent and the right to any remedies for the past, current, and future infringement of the '436 Patent.

133. Samsung is not licensed under the '436 Patent, either expressly or implicitly, nor do they enjoy or benefit from any rights in or to the '436 Patent whatsoever.

134. Claim 1 of the '436 Patent recites:

> 1. A method of controlling a wireless mobile having multiple interfaces, comprising:
>
> having said mobile be aware of its applications running on it;
>
> having said mobile be aware of its operating situation;
>
> said multiple interfaces including heterogeneous radio interfaces, and having said mobile control processes, including use of said heterogeneous radio interfaces, of said mobile during silent periods based on one or more of its application awareness and its operating situation awareness, said silent periods being brief intervals during which an application running on said mobile has no application traffic to send or receive;
>
> further including having said mobile control use of said interfaces by using a second interface, during a silent period of a second application running on said mobile and using said second interface, to support a first application running on said mobile and using a first interface that is heterogeneous to said second interface such as to use both said first and second heterogeneous interfaces concurrently during said silent period to support said first application.

Samsung has directly infringed and continues to directly infringe, literally and/or under the doctrine of equivalents, one or more claims, including at least claim 1, of the '436 Patent in violation of 35 U.S.C. § 271(a) because Samsung makes, uses, offers for sale, sells, and/or imports

certain products, including within this District, that perform the above method, including all Samsung products that (i) provide operation of simultaneous wireless interfaces, including (a) both Wi-Fi and cellular interfaces and/or (b) multiple Wi-Fi interfaces on different bands; and (ii) support Android 5.0 or later (the "'436 Accused Instrumentalities"). Samsung's infringing use of the '436 Accused Instrumentalities includes its internal use and testing of the '436 Accused Instrumentalities.

135. The '436 Accused Instrumentalities satisfy all claim limitations of one or more of the claims of the '436 Patent, including at least claim 1.

136. For example, the '436 Accused Instrumentalities implement a method of controlling a wireless mobile having multiple interfaces (*e.g.*, LTE, 2.4 GHz Wi-Fi, 5 GHz Wi-Fi).

137. The '436 Accused Instrumentalities are mobile devices that have multiple interfaces. For example, Samsung advertises that its Galaxy Z Flip 5 supports multiple heterogeneous radio interfaces (*e.g.*, LTE, 2.4 GHz Wi-Fi, 5 GHz Wi-Fi). On its specification page for the Galaxy Z Flip 5, Samsung reports support for multiple cellular standards, including LTE and 5G, and multiple Wi-Fi standards, including 2.4 GHz Wi-Fi and 5 GHz Wi-Fi.[38] Similarly, on its specification pages for the Samsung Galaxy S24 and S24+, Samsung reports support for multiple cellular standards, including LTE and 5G, and multiple Wi-Fi standards, including 2.4 GHz Wi-Fi and 5 GHz Wi-Fi.[39]

138. Furthermore, the '436 Accused Instrumentalities run the Android operating system, which includes ConnectivityManager. The ConnectivityManager monitors different

[38] https://www.samsung.com/ph/smartphones/galaxy-z-flip5/specs.
[39] https://www.samsung.com/latin_en/smartphones/galaxy-s24/specs.

heterogeneous interfaces and selects between them, enabling varying applications to be supported.[40]

139. On information and belief, the '436 Accused Instrumentalities perform a method that includes the mobile device being aware of applications running on it (*e.g.*, the device's operating system monitoring its application activity). For example, the Android operating system running on the '436 Accused Instrumentalities has a lifecycle for each running application that the mobile device monitors and controls.[41]

140. Pressing the bottom left icon on a Samsung Galaxy Z Flip 5 prompts the device to display the applications currently running on the device.

141. Moreover, the Android operating system running on the '436 Accused Instrumentalities is aware of whether an application is running in the foreground or background of the device. Android documentation states that "[b]ackground work is a more flexible option when you need to do work that should continue even if the user leaves the app," including, for example, when the application needs to periodically fetch data from a server or get periodic location data.[42]

142. On information and belief, the '436 Accused Instrumentalities perform a method that further includes the mobile device being aware of its operating situation (*e.g.*, the device being aware of its screen state). When the screen of a '436 Accused Instrumentality is on and a user waits a certain period of time without interacting with the device or pushes the device's power/lock button (or, in the case of a Samsung Galaxy Flip device, when the user flips the device "closed"), the device's screen turns off, and applications are notified that the operating situation has changed. For example, when closed and connected to a Wi-Fi network, a Flip sends an association request

[40] https://developer.android.com/reference/android/net/ConnectivityManager.
[41] https://developer.android.com/guide/components/activities/activity-lifecycle.
[42] https://developer.android.com/develop/background-work/background-tasks.

to another, second network. When the Flip is open, connected to a Wi-Fi network, and the screen is on, a Flip does not send an association request to a second network.

143. Furthermore, the Android operating system running on the '436 Accused Instrumentalities calls the onPause() and onStop() methods for an application when the screen goes off.[43] Android documentation explains that the onPause() method is "most common[ly]" called when an event "interrupts app execution, as described in the section about the onResume() callback." The onResume() callback includes as an example the device's screen turning off.[44] Android documentation further explains that there is a broadcast to all applications when the screen goes off.[45]

144. On information and belief, the '436 Accused Instrumentalities perform a method that further includes the mobile device supporting multiple interfaces, including heterogeneous radio interfaces (*e.g.*, LTE, 2.4 GHz Wi-Fi, 5 GHz Wi-Fi). For example, Samsung advertises that its Galaxy Z Flip 5 supports multiple heterogeneous radio interfaces (*e.g.*, LTE, 2.4 GHz Wi-Fi, 5 GHz Wi-Fi). On its specification page for the Galaxy Z Flip 5, Samsung reports support for multiple cellular standards, including LTE and 5G, and multiple Wi-Fi standards, including 2.4 GHz Wi-Fi and 5 GHz Wi-Fi.[46] Similarly, on its specification pages for the Samsung Galaxy S24 and S24+, Samsung reports support for multiple cellular standards, including LTE and 5G, and support for multiple Wi-Fi standards, including 2.4 GHz Wi-Fi and 5 GHz Wi-Fi.[47]

145. On information and belief, the '436 Accused Instrumentalities perform a method that further includes the mobile device controlling processes, including use of said heterogeneous

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43 https://developer.android.com/guide/components/activities/activity-lifecycle.
44 *Id.*
45 https://developer.android.com/reference/android/content/Intent#ACTION_SCREEN_OFF.
46 https://www.samsung.com/ph/smartphones/galaxy-z-flip5/specs.
47 https://www.samsung.com/latin_en/smartphones/galaxy-s24/specs.

radio interfaces (*e.g.*, LTE, 2.4 GHz Wi-Fi, 5 GHz Wi-Fi) of the mobile device (*e.g.*, monitoring and selecting between those interfaces) during silent periods. For example, the Android operating system running on the '436 Accused Instrumentalities includes the ConnectivityManager, which monitors different interfaces and selects between them.[48]

146. On information and belief, the '436 Accused Instrumentalities perform a method that further includes controlling its processes during silent periods (*e.g.*, periods when there is no application traffic) based on one or more of its application awareness (*e.g.*, the device's awareness of whether an application is running in the foreground or background) and its operating situation awareness (*e.g.*, the device's awareness of whether its screen is off).

147. The '436 Accused Instrumentalities perform the claimed method during silent periods (*e.g.*, periods when there is no application traffic) based on the device's application awareness (*e.g.*, the device's awareness of an application's being in the background rather than foreground). Android documentation regarding "[b]ackground work" indicates that the '436 Accused Instrumentalities are aware of whether an application is running in the foreground or background of the device.[49] As contemplated by the documentation of "background work," some applications do not perform background work when, *e.g.*, the applications leave the foreground and enter the background. The Android operating system running on the '436 Accused Instrumentalities further calls the onPause() and onStop() methods for an application when the application is no longer in the foreground.[50]

148. Moreover, the '436 Accused Instrumentalities perform the claimed method during silent periods (*e.g.*, periods when there is no application traffic) based on the device's operating

[48] https://developer.android.com/reference/android/net/ConnectivityManager.
[49] https://developer.android.com/develop/background-work/background-tasks.
[50] https://developer.android.com/guide/components/activities/activity-lifecycle.

situation awareness (*e.g.*, as reflected by the device's screen being off). To illustrate, the Samsung Galaxy Z Flip 5 monitors and selects networks, *i.e.*, controls its use of heterogeneous radio interfaces based on operating situation awareness. When a Flip is moved away from one AP and closer to a second AP, the Flip will not connect to the second AP until either the Flip is "closed" or the screen is turned off—that is, based on the Flip's awareness of its operating situation. Furthermore, the Android operating system running on the '436 Accused Instrumentalities calls the onPause() and onStop() methods for an application when the screen goes off.[51] Android documentation explains that the onPause() method is "most common[ly]" called when an event "interrupts app execution, as described in the section about the onResume() callback." The onResume() callback includes as an example the device's screen turning off.[52] Android documentation further explains that there is a broadcast to all applications when the screen goes off.[53]

149. On information and belief, the '436 Accused Instrumentalities perform a method that further includes the silent periods being brief intervals during which an application running on said mobile has no application traffic to send or receive (*e.g.*, three seconds after the screen turns off or when the device is otherwise aware that the application has no traffic to send or receive). To illustrate, when the Samsung Galaxy Z Flip 5 is moved away from one AP and closer to a second AP, the Flip will not connect to the second AP until the screen is turned off. Specifically, precisely three seconds after the screen turns off (*i.e.*, a brief interval), the Flip connects to the second AP.

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[51] *Id.*
[52] *Id.*
[53] https://developer.android.com/reference/android/content/Intent#ACTION_SCREEN_OFF.

150. On information and belief, the '436 Accused Instrumentalities perform a method that further includes having said mobile control use of said interfaces (*e.g.*, via the Android ConnectivityManager). The Android operating system running on the '436 Accused Instrumentalities includes the ConnectivityManager, which is aware of multiple interfaces and communicates to applications running on the device that those interfaces are available to support those applications. For example, using the registerNetworkCallback method, an application running on the device notifies the ConnectivityManager of the types of networks it is interested in, using a NetworkRequest object.[54] Using a NetworkRequest object, the application communicates to the device that it is interested in a network with particular features. An application can communicate that it is interested in a network with Internet capability by using the NET_CAPABILITY_INTERNET flag.[55] The application provides a NetworkCallback object to be used by the ConnectivityManager to notify the application of the heterogeneous interfaces that are available to support the first application, using a variety of public methods.[56]

151. On information and belief, the '436 Accused Instrumentalities perform a method that further includes using a second interface (*e.g.*, 5 GHz Wi-Fi), during a silent period of a second application running on said mobile (*e.g.*, Samsung Internet or Google Chrome, running on the mobile device when, *e.g.*, the application is in the background and/or the device's screen goes off) and using said second interface (*e.g.*, 5 GHz Wi-Fi), to support (*e.g.*, via the ConnectivityManager) a first application (*e.g.*, Google Maps or Spotify) running on said mobile using and using a first interface (*e.g.*, LTE) that is heterogeneous to said second interface (*e.g.*, heterogeneous to 5 GHz Wi-Fi).

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[54] https://developer.android.com/reference/android/net/ConnectivityManager.
[55] https://developer.android.com/reference/android/net/NetworkRequest.
[56] https://developer.android.com/reference/android/net/ConnectivityManager; https://developer.android.com/reference/android/net/ConnectivityManager.NetworkCallback.

152. Applications including Samsung Internet or Google Chrome have no application traffic to send or receive when the application is not running in the foreground and/or when the device's screen is off. Either or both of these events cause these applications to go into silent periods. For example, when a Samsung Galaxy Z Flip 5 is running Google Chrome in the foreground, and the user either exits the app or turns the device's screen off, Google Chrome has no application traffic to send or receive and is therefore in a silent period. For example, when Google Chrome is the only application open the Flip, and when the user clicks on an item on Amazon.com within Chrome, there is a burst of application traffic. When the Flip is closed, the application traffic stops.

153. By contrast, applications including Google Maps or Spotify continue to send and receive application traffic even when the application is not running in the foreground and/or when the device's screen is off. For example, on a Samsung Galaxy Z Flip 5, when a route is initiated in Google Maps and the device is closed and its screen turned off, the device will continue to send notifications to the user with instructions on following the route, including audio instructions from the application.

154. The Android operating system running on the '436 Accused Instrumentalities offers a variety of means by which applications can continue to perform "background work," when not running in the foreground and/or when the device's screen is off, including, for example, when such applications need to receive "periodic location data,"[57] as with navigation apps like Google Maps.

155. On information and belief, the '436 Accused Instrumentalities implement a method in which, during a silent period (*e.g.*, when the application leaves the foreground and/or when the

[57] https://developer.android.com/develop/background-work/background-tasks.

screen is turned off) of a second application (*e.g.*, Google Chrome) running on the mobile device and using the second interface (*e.g.*, 5 GHz Wi-Fi), applications including Google Maps, which continue to send and receive application traffic during such a period, communicate with the ConnectivityManager. The ConnectivityManager supports those applications by providing access to the second interface (*e.g.*, 5 GHz Wi-Fi), which satisfies the application's requirements.

156. To illustrate, on a Samsung Galaxy Z Flip 5, Google Maps can be supported by both Wi-Fi and LTE, *i.e.*, heterogeneous interfaces, when the Flip's screen is off. And if the Flip is moved back and forth in and out of Wi-Fi range with Google Maps actively navigating, the Flip will alternate between Wi-Fi and LTE connections, and Google Maps will continue to provide audible directions throughout.

157. On information and belief, the '436 Accused Instrumentalities perform a method that further includes using both said first (*e.g.*, LTE) and second (*e.g.*, 5 GHz Wi-Fi) heterogeneous interfaces concurrently (*e.g.*, the ConnectivityManager's providing simultaneous access to interfaces that satisfy the application's requirements) during said silent period (*e.g.*, time during which applications such as Samsung Internet or Google Chrome have no user traffic) to support said first application (*e.g.*, Google Maps or Spotify). Android's ConnectivityManager provides simultaneous access to interfaces that satisfy the application's requirements. The ConnectivityManager uses the application's NetworkCallback object to notify the application of the heterogeneous interfaces that are available to support the first application, using a variety of public methods (e.g., onAvailable, onCapabilitiesChanged, onBlockedStatusChanged).[58]

158. Samsung has received notice and has had actual or constructive knowledge of the '436 Patent and the infringing nature of the '436 Accused Instrumentalities since at least

[58] https://developer.android.com/reference/android/net/ConnectivityManager; https://developer.android.com/reference/android/net/ConnectivityManager.NetworkCallback.

November 11, 2021. Alternatively, Samsung has received notice and has had actual or constructive knowledge of the '436 Patent and the infringing nature of the '436 Accused Instrumentalities since at least the service of this Complaint.

159. Since having notice of the '436 Patent, through its actions, Samsung has indirectly infringed and continues to indirectly infringe the '436 Patent in violation of 35 U.S.C. § 271(b). Samsung has actively induced product makers, distributors, partners, agents, affiliates, service providers, importers, resellers, customers, retailers, and/or end users of the '436 Accused Instrumentalities to directly infringe the '436 Patent by, among other things, disseminating, manufacturing, distributing, importing, and maintaining the '436 Accused Instrumentalities, and creating, disseminating, advertising, and promoting the use of the '436 Accused Instrumentalities through software updates, promotional and marketing materials, product descriptions, supporting materials, operating manuals, technical information, and other instructions on how to implement and configure the '436 Accused Instrumentalities with knowledge and the specific intent that its efforts will result in the direct infringement of the '436 Patent.

160. Samsung engages in the aforementioned actions knowing and intending that its customers and end users will commit these infringing acts. Samsung also continues to make, use, offer for sale, sell, and/or import the '436 Accused Instrumentalities, despite its knowledge of the '436 Patent, thereby specifically intending for and inducing its customers to infringe the '436 Patent through the customers' normal and customary use of the '436 Accused Instrumentalities.

161. In addition, Samsung has indirectly infringed and continues to indirectly infringe the '436 Patent in violation of 35 U.S.C. § 271(c) by selling or offering to sell in the United States, or importing into the United States, the '436 Accused Instrumentalities, and advertising and/or pushing software updates for the '436 Accused Instrumentalities, with knowledge that the Accused

Instrumentalities and software updates thereto are especially designed or adapted to operate in a manner that infringes that patent and despite the fact that the infringing technology or aspects of the products are not a staple article of commerce suitable for substantial non-infringing use.

162. For example, Samsung is aware that the technology described above included in the '436 Accused Instrumentalities enables the product to operate as described above and that such functionality infringes the '436 Patent, including claim 1. Samsung continues to sell and offer to sell these products in the United States after receiving notice of the '436 Patent and how the products' functionality infringe that patent.

163. The infringing aspects of the '436 Accused Instrumentalities can be used only in a manner that infringes the '436 Patent and thus have no substantial non-infringing uses. The infringing aspects of those instrumentalities otherwise have no meaningful use, let alone any meaningful non-infringing use.

164. On information and belief, Samsung's infringement of the '436 patent is and has been willful and deliberate.

165. Four Batons has suffered damages as a result of Samsung's direct and indirect infringement of the '436 Patent in an amount adequate to compensate for Samsung' infringement, but in no event less than a reasonable royalty for the use made of the invention by Samsung, together with interest and costs as fixed by the Court.

DEMAND FOR JURY TRIAL

166. Plaintiff demands a trial by jury on all issues.

FEES AND COSTS

167. To the extent that Defendants' willful and deliberate infringement or litigation conduct supports a finding that this is an "exceptional case," an award of attorney's fees and costs to Four Batons is justified pursuant to 35 U.S.C. § 285.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Four Batons requests entry of judgment in its favor and against Defendants Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc., as follows:

a) Declaring that Samsung has directly infringed the Patents-in-Suit, and/or induced the infringement of the Patents-in-Suit;

b) Declaring that Samsung has willfully infringed and continues to infringe the Patents-in-Suit;

c) Awarding Four Batons damages, in an amount no less than a reasonable royalty, arising out of Samsung's infringement of the Patents-in-Suit, including damages for any continuing post-verdict infringement through entry of final judgment, in an amount according to proof;

d) Awarding Four Batons the trebling of any and all damages awarded to Four Batons by reason of Samsung's willful infringement of the Patents-in-Suit, pursuant to 35 U.S.C. § 284;

e) Awarding Four Batons pre-judgment and post-judgment interest, in an amount according to proof;

f) Awarding Four Batons a compulsory ongoing royalty, in an amount according to proof;

g) Awarding attorney's fees pursuant to 35 U.S.C. § 285 or as otherwise permitted by law; and

h) Awarding such other costs and further relief as the Court may deem just and proper.

DATED: April 26, 2024

Respectfully submitted,

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