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

SOL IP, LLC,	)	
	)	
Plaintiff,	)	
	)	Case No. 2:22-cv-00097
v.	)	
	)	
FORD MOTOR COMPANY,	)	
	)	**JURY TRIAL DEMANDED**
Defendant.	)	
	)	

AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Sol IP, LLC ("Sol IP") files this Amended Complaint for Patent Infringement under 35 U.S.C. § 271 against Defendant Ford Motor Company ("Ford" or "Defendant").

Plaintiff states on information and belief as follows:

BACKGROUND

1. This action arises under the patent laws of the United States, namely 35 U.S.C. §§ 271, 281, and 284-285, among others. Defendant infringes and has infringed Sol IP's patents referenced in Counts One through Twenty-One, including U.S. Patent No. 10,938,534 ("the '534 patent"), U.S. Patent No. 10,231,211 ("the '211 patent"), U.S. Patent No. 10,932,298 ("the '298 patent"), U.S. Patent No. 8,320,571 ("the '571 patent"), U.S. Patent No. 10,148,477 ("the '477 patent"), U.S. Patent No. 10,206,207 ("the '207 patent"), U.S. Patent No. 10,244,559 ("the '559 patent"), U.S. Patent No. 8,311,031 ("the '031 patent"), U.S. Patent No. 9,496,976 ("the '976 patent"), U.S. Patent No. 10,080,204 ("the '204 patent"), U.S. Patent No. 8,320,565 ("the '565 patent"), U.S. Patent No. 10,749,722 ("the '722 patent"), U.S. Patent No. 10,271,349 ("the '349 patent"), U.S. Patent No. 10,687,351 ("the '351 patent"), U.S. Patent No. 8,593,936 ("the '936 patent"), U.S. Patent No. RE48,101 ("the '101 patent"), U.S. Patent No. 10,405,277 ("the '277

patent"), U.S. Patent No. 10,863,439 ("the '439 patent"), U.S. Patent No. 10,462,776 ("the '776 patent"), U.S. Patent No. 10,009,896 ("the '896 patent"), and U.S. Patent No. 10,893,525 ("the '525 patent") (collectively, "the Asserted Patents").

2. Sol IP holds an exclusive license to more than 600 patents and patent applications that are fundamental to a variety of core technologies relating to wireless telecommunications.

3. The Asserted Patents were invented by researchers at the Electronics and Telecommunications Research Institute ("ETRI").

4. ETRI is a South Korean government-funded research institution based in Daejeon, South Korea. ETRI is the national leader in South Korea in the research and development of information technologies.

5. Since its inception in 1976, ETRI has developed new technologies in 4M DRAM (dynamic random access memory), LCDs (liquid crystal displays), large-scale computer storage, CDMA (code-division multiple access) communications, 3G CDMA2000, 3G WCDMA (wideband CDMA), 4G WiBro (wireless broadband), 4G LTE (Long-Term Evolution) cellular communications, 5G NR (New Radio) cellular communications, and WLAN (wireless local area networking, or Wi-Fi).

6. ETRI employs over 2,200 research and technical staff, of whom 91% hold post-graduate degrees and 49% have earned technological doctorate degrees. Over the last five years, ETRI has applied for nearly 14,000 patents, contributed more than 5,300 proposals adopted by various international and domestic standards organizations, and published over 1,300 articles in peer-reviewed technology publications. ETRI actively contributed to the development of advanced telecommunications platforms including 3G CDMA2000, 3G WCDMA, LTE, and 5G NR. ETRI has invested heavily into inventing standardized telecommunications technologies, supporting its

thousands of research engineers and spending around $600 million annually on research and development. As a result, ETRI has developed one of the industry's strongest intellectual-property portfolios, which includes more than 21,000 patents and patent applications worldwide.

7. ETRI has a long history of innovative technical contributions, including its patents relating to LTE, LTE-Advanced, 5G NR, and Wi-Fi technology. Some of ETRI's other accomplishments include: introducing the first domestic all-digital telephone exchange in 1986,[1] introducing one of the world's first commercial CDMA networks in 1996,[2] developing the IMT 2000 (CDMA2000) STP system in 1999,[3] introducing the world's first 4G WiBro network in 2004,[4] establishing core technology for the LTE system in 2007,[5] and developing core LTE-Advanced technology in 2010.[6]

8. Sol IP holds an exclusive license to the Asserted Patents from ETRI, which transferred to Sol IP all substantial rights in those patents.

9. Prior to filing this Complaint, Sol IP provided Ford with notice of the Asserted Patents. For example, Sol IP sent Ford a written communication identifying the Asserted Patents

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[1] *First Domestic Switchboard TDX*, ETRI 40TH ANNIVERSARY, https://www.etri.re.kr/40th/eng/sub04_3.html (last visited Mar. 31, 2022).
[2] *World's First Commercialization of CDMA*, ETRI 40TH ANNIVERSARY, https://www.etri.re.kr/40th/eng/sub04_8.html (last visited Mar. 31, 2022).
[3] *Wideband CDMA Communication System*, ETRI 40TH ANNIVERSARY, https://www.etri.re.kr/40th/eng/sub04_11.html (last visited Mar. 31, 2022); *Overview*, ETRI, https://www.etri.re.kr/engcon/sub1/sub1_02.etri (last visited Mar. 31, 2022).
[4] *Mobile Internet System and Standard WiBro*, ETRI 40TH ANNIVERSARY, https://www.etri.re.kr/40th/eng/sub04_20.html (last visited Mar. 31, 2022).
[5] *LTE-Advanced Mobile Telecommunication System*, ETRI 40TH ANNIVERSARY, https://www.etri.re.kr/40th/eng/sub04_31.html (last visited Mar. 31, 2022); *Overview*, ETRI, https://www.etri.re.kr/engcon/sub1/sub1_02.etri (last visited Mar. 31, 2022).
[6] *LTE-Advanced Mobile Telecommunication System*, ETRI 40TH ANNIVERSARY, https://www.etri.re.kr/40th/eng/sub04_31.html (last visited Mar. 31, 2022); *Overview*, ETRI, https://www.etri.re.kr/engcon/sub1/sub1_02.etri (last visited Mar. 31, 2022).

by their patent number and/or the application number that resulted in the Asserted Patents. The communication also included details of Ford's infringement of the Asserted Patents.

10. Sol IP is a licensor in Avanci, LLC's ("Avanci") essential patent licensing platform, and the patents-in-suit are licensable nonexclusively through Avanci's essential patent licensing platform.

11. Sol IP, through its agent Avanci, has offered to license the patents-in-suit to Ford on FRAND terms and conditions as part of the joint license offered by the 2G/3G/4G connected vehicles licensing program administered by the Avanci essential patent licensing platform, which includes almost 50 licensors. Other automakers have taken licenses from Avanci on the same terms per connected vehicle that has been offered to Ford, including but not limited to Volkswagen, Seat, Skoda, BMW, Audi, Porsche, Volvo, Jaguar Land Rover, Mercedes Benz, Daimler Truck, Aston Martin, Scania, MAN, and Volvo Group. In all, more than thirty automotive brands are Avanci licensees.

12. Sol IP brings this lawsuit against Ford seeking this Court's protection of its valuable intellectual property rights.

PARTIES

13. Sol IP realleges and incorporates each of preceding paragraphs 1–12.

14. Sol IP is an intellectual-property licensing company organized and existing as a limited liability company under the laws of Virginia with a principal place of business at 8287 Spring Leaf Court, Vienna, Virginia 22182.

15. Defendant Ford Motor Company is a corporation organized and existing under the laws of the State of Delaware. Ford Motor Company may be served with process through its registered agent, CT Corporation System, 1999 Bryan St., Ste. 900, Dallas, TX 75201-3136.

16. Upon information and belief, Ford conducts business, either directly or through one or more of its subsidiaries, agents, affiliates, and/or intermediaries, in this judicial district and elsewhere in the United States, including, without limitation, making, using, offering to sell, selling, and/or importing products containing integrated wireless communications devices that embody the patented technology, and enabling end-user purchasers to use such connected vehicles throughout the United States, including this judicial district.

JURISDICTION AND VENUE

17. Sol IP realleges and incorporates each of preceding paragraphs 1–16.

18. This patent infringement action arises under the United States Patent Laws, Title 35 U.S.C. §§ 1, et seq. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

19. This Court has personal jurisdiction over Ford because Ford has minimum contacts with Texas and this district such that this venue is a fair and reasonable one. Ford conducts substantial business in this forum, including (i) engaging in the infringing conduct alleged herein and (ii) regularly doing or soliciting business, engaging in other persistent courses of conduct, and/or deriving substantial revenue from goods and services in Texas and this district, as described below.

20. Venue is proper in this district under 28 U.S.C. §§ 1391(b) and (c) and 1400(b).

21. On information and belief, Ford has committed infringing acts in this district by using, offering for sale, and/or selling products that infringe the Asserted Patents in this district. In addition, Ford has induced infringement by others in this district. For example, Ford has induced end users to use products that infringe the Asserted Patents in this district. In addition, Ford has induced car dealerships (to the extent they are not agents of Ford) in this district to sell and offer to sell infringing products.

22. Ford maintains a regular and established place of business in this district. For example, Ford maintains its Central Market Area Office at 5700 Granite Parkway, Suite 1000, Plano, Texas 75024, which is in this district. Ford is listed in the online directory for the Granite Park development at this address.[7] Ford has previously described this office as "the principal office of Ford in the State of Texas." *See Ford Motor Co. v. Johnson*, 473 S.W.3d 925, 927 (Tex. Ct. App. 2015). Collin County property records confirm that Ford maintains significant amounts of commercial personal property at this office. *See* Ex. A. On information and belief, Ford has a number of employees that work at this location. Moreover, Ford has a number of employees that are located in this district. For example, on information and belief, Tim Witt is the General Manager of Ford's Central Market Area Office and resides in Frisco, Texas, which is in this district. Mr. Witt explains that his job includes "Sales, Marketing, Fixed Operations responsibility for 750 Ford and Lincoln Dealers." Ex. B.

23. In addition, Ford maintains regular and established places of business in this district through its authorized dealerships, which act as agents for Ford for the purposes of conducting Ford's business, including, at least, selling cars (including infringing cars) to consumers and performing warranty services. On information and belief, one such dealership is Marshall Ford, located at 4200 East End Blvd. S., Marshall, Texas 75672.

24. On information and belief, every Ford dealership must be authorized by Ford. Once authorized, Ford controls the way in which the dealership performs Ford's business.

25. For example, Ford establishes the geographic location in which each dealership is required to operate and requires that each dealership sell cars and parts and offer warranty services in that location. Moreover, each Ford dealership is an agent of Ford tasked with, among other

[7] https://www.granitepark.com/directory/ (last visited Mar. 31, 2022).

things, assessing warranty claims and performing work on behalf of Ford pursuant to the warranties. Ford directs and controls the guidelines with which each Ford dealership evaluates warranty claims. Throughout the warranty process, Ford has control over the evaluation of the warranty claims. On information and belief, Ford has final control over whether a warranty claim is honored or refused. Ford consents to the dealers acting as its agents by requiring that warranty repair work be completed by an authorized Ford dealer.[8] The Ford dealerships consent to their role in administering the vehicle warranties by, among other things, holding themselves out as authorized Ford dealers and by operating repair facilities that honor and process the vehicle warranties and submit claims to Ford.

26. Ford requires its dealerships to maintain specific levels of inventory of Ford vehicles and parts, and requires the use of Ford advertising and sales materials. Ford also requires dealerships to distribute Ford publications with the sale of each vehicle and to perform any dealer responsibilities listed in such publications.

27. Each dealer must maintain a service department for Ford vehicles that operates in accordance with standards and procedures established by Ford (known as customer service bulletins) and uses tools, equipment, and machinery in accordance with guidelines established by Ford. In addition, each dealer must perform warranty services in accordance with Ford's warranty and procedures promulgated by Ford (in, at least, the Warranty and Policy Manual and any customer service bulletins). When performing warranty services, Ford requires that each dealership use specific parts that are provided by Ford and that the dealership prioritize warranty

[8] *Where can I get warranty work done for my Ford?*, FORD.COM, https://www.ford.com/support/how-tos/warranty/warranties-and-coverage/where-do-i-get-warranty-work-performed/ (last visited Mar. 31, 2022).

services over other service work. Ford reimburses the dealership for the parts and labor used in performing warranty services.

28. Ford also requires its dealerships to maintain facilities in accordance with guidelines promulgated by Ford, and Ford provides its own personnel to advise dealerships regarding dealership facilities. Each dealership must maintain signs consistent with Ford guidelines. Ford prohibits dealerships from moving or substantially modifying dealership facilities without Ford's prior written consent.

29. Ford requires each dealership to employ and train personnel, and provides assistance to each dealership in determining personnel requirements. Ford requires each dealership to cause its personnel to attend training schools or courses conducted by Ford.

30. Ford requires that each dealership use an accounting system that complies with Ford's accounting procedures.

31. Ford holds out Ford authorized dealerships as its own. For example, Ford maintains a dealership locator on its Ford-branded website that allows a user to locate Ford dealerships at https://www.ford.com/dealerships/.

32. In light of the significant control that Ford exercises over its authorized dealerships, Ford authorized dealerships act as agents of Ford and are properly deemed places of business of Ford.

ACCUSED STANDARDS AND INSTRUMENTALITIES

33. Sol IP realleges and incorporates each of preceding paragraphs 1–32.

34. The 3rd Generation Partnership Project ("3GPP") is a consortium of seven telecommunications-standard-development organizations, also known as organizational partners, from around the world. These 3GPP organizational partners include, among others, the Alliance for Telecommunications Industry Solutions ("ATIS"), which represents North America; the

European Telecommunications Standards Institute ("ETSI"), which represents Europe; and the Telecommunications Technology Association ("TTA"), which represents Korea.[9]

35. 3GPP maintains and develops globally applicable technical specifications for mobile systems, including the specifications for implementation and use of wireless communications for high-speed data referred to as the LTE standards.

36. Implementation and use of the LTE standards, including but not limited to wireless communications for high-speed data compliant with the LTE specifications as detailed in the 3GPP specification series TS 36.101–36.978, have increased in recent years and continue to increase at a rapid pace.

37. 3GPP uses a system of parallel "releases" to provide developers with a stable platform for the implementation of features at a given point, which then allows for the addition of new functionality in subsequent releases.[10] In 2008, 3GPP Release 8 was finalized and formed the basis for the deployment of the LTE standards.[11] Subsequent enhancements to the LTE standards were incorporated into later releases. Release 10 was the basis for the deployment of an advanced form of LTE called LTE-Advanced ("LTE-A"), which maintained backwards compatibility with the earlier releases.[12] The "main new functionalities" introduced in Release 10 are "Carrier Aggregation (CA)," "enhanced use of multi-antenna [MIMO] techniques," and "support for Relay

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[9] *See, e.g.*, *About 3GPP Home*, 3GPP, https://www.3gpp.org/about-3gpp/about-3gpp (last visited Mar. 31, 2022); *Partners*, 3GPP, https://www.3gpp.org/about-3gpp/partners (last visited Mar. 31, 2022).

[10] *Releases*, 3GPP, https://www.3gpp.org/specifications/releases (last visited Mar. 31, 2022).

[11] *LTE*, 3GPP, https://www.3gpp.org/technologies/keywords-acronyms/98-lte (last visited Mar. 31, 2022); *see also Overview of LTE 3GPP releases*, CABLEFREE (Dec. 2015), https://www.cablefree.net/wirelesstechnology/4glte/overview-of-lte-3gpp-releases/ (last visited Mar.31, 2022).

[12] *LTE-Advanced*, 3GPP, https://www.3gpp.org/technologies/keywords-acronyms/97-lte-advanced (last visited Mar. 31, 2022).

Nodes (RN)."[13] Release 11 further provided enhancements to LTE Advanced features, including enhanced downlink control channel (ePDCCH), coordinated multipoint (CoMP) transmission and reception, and user equipment (UE) signaling for discontinuous reception (DRX) to optimize battery consumption.[14]

38. These 3GPP technical specifications, including 3GPP Release 8, Release 10, Release 11, and others, are officially transposed and published by the respective organizational partners, as a part of their standards series.[15] For North America, the 3GPP technical specifications for LTE are officially published by ATIS.[16] Accordingly, references to 3GPP TS ("technical specifications") in this Complaint should be understood to include the corresponding ATIS documents.

39. Ford makes, uses, sells, offers for sale and/or imports into the United States connected vehicles and devices that comply with the LTE standards. Ford states that its Sync Connect service "allows Ford owners to stay connected to their vehicles in a way they've never been able to before. This available built-in technology—powered by a 4G LTE modem and the

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[13] *LTE-Advanced*, 3GPP, https://www.3gpp.org/technologies/keywords-acronyms/97-lte-advanced (last visited Mar. 31, 2022); *see also Overview of LTE 3GPP releases*, CABLEFREE (Dec. 2015), https://www.cablefree.net/wirelesstechnology/4glte/overview-of-lte-3gpp-releases/ (last visited Mar. 31, 2022).

[14] Takehiro Nakamura, *LTE Release 12 and Beyond* 5-6 (3GPP TSG-RAN 2013) https://www.3gpp.org/IMG/pdf/lte_africa_2013_3gpp_lte_release_12.pdf (last visited Mar. 31, 2022); *see also Overview of LTE 3GPP releases*, CABLEFREE (Dec. 2015), https://www.cablefree.net/wirelesstechnology/4glte/overview-of-lte-3gpp-releases/ (last visited Mar. 31, 2022).

[15] *Official Publications*, 3GPP, https://www.3gpp.org/specifications/63-official-publications (last visited Mar. 31, 2022).

[16] *Official Publications*, 3GPP, https://www.3gpp.org/specifications/63-official-publications (last visited Mar. 31, 2022).

AT&T network—connects owners to their vehicles through FordPass™ on their smartphones."[17] On information and belief, Sync Connect is now known as FordPass Connect.[18]

40. By way of example, on information and belief, Ford's products with LTE and/or LTE-Advanced (collectively, "4G" or "LTE") connectivity (the "Ford LTE Products") are believed to include, but are not limited to, all products with Sync Connect, FordPass Connect, or Lincoln Connect. On information and belief, such products include, but are not limited to, the Ford Bronco, Ford Edge, Ford Mustang Mach-E, Ford Expedition, Ford F-150, Ford F-150 Lightning, Ford Super Duty, Ford Transit, Ford Transit CC-CA, Ford E-Transit, Ford EcoSport, Ford Escape, Ford Bronco Sport, Ford Explorer, Ford Maverick, Ford Ranger, Ford Transit Connect, Ford Mustang, Ford Fusion, Ford Fusion Hybrid, Lincoln Aviator, Lincoln Continental, Lincoln Corsair, Lincoln MKZ, Lincoln Nautilus, and Lincoln Navigator.[19] [20]

41. On information and belief, each of the Ford LTE Products includes a 4G LTE modem that enables Ford LTE Products and their users to transmit and receive data over cellular networks including LTE and LTE-A.

42. On information and belief, the Ford LTE Products include a factory-installed integrated in-vehicle communications system referred to as FordPass Connect™, SYNC® Connect, and/or Lincoln Connect™. Ford's webpage demonstrates that vehicles equipped with

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[17] *https://www.ford.com/support/how-tos/sync/getting-started-with-sync/sync-connect-overview/* (last visited Mar. 31, 2022)

[18] *FordPass*, FORD.COM, https://www.ford.com/support/category/fordpass/ (last visited Mar. 31, 2022).

[19] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

[20] *How does Lincoln Connect work?*, LINCOLN.COM, https://www.lincoln.com/support/how-tos/lincoln-way-app/lincoln-connect/how-does-lincoln-connect-work/ (last visited Mar. 31, 2022).

FordPass Connect™, SYNC® Connect, and/or Lincoln Connect™ include a touchscreen that indicates when the vehicle is connected to a cellular network.[21] Ford's website further states that software updates to the system with FordPass Connect™, SYNC® Connect, and/or Lincoln Connect™ are automatically delivered to the vehicle wirelessly (or over-the-air). These wireless software updates are made over the cellular network, including LTE and LTE-A.[22]

43. On information and belief, the Ford LTE Products are operable with Ford's FordPass or Lincoln Way mobile application (collectively, "Ford's Mobile App"). Ford's Mobile App works in conjunction with the FordPass Connect™, SYNC© Connect, and/or Lincoln Connect™ system to provide users the ability to remotely control their vehicles, for example, to remotely start their vehicle, locate their vehicle, and lock or unlock their vehicle. On information and belief, such remote functionality of Ford's Mobile App is enabled in part by the wireless modem included in each of the Ford's LTE Products.[23] [24]

44. "Accused LTE Products" refer to any products, including Ford LTE Products, equipped with an embedded LTE modem, that are made, used, offered for sale, sold, or imported by Ford and support LTE features in accordance with at least 3GPP Release 8 and Release 10, excluding any devices subject to a license, covenant not to sue, or standstill for the applicable Asserted Patents.

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[21] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022).

[22] *The Future of Vehicle Technology with Ford Power-Up Software Updates*, FORD.COM, https://www.ford.com/support/how-tos/sync/sync-updates/the-future-of-vehicle-technology-with-ford-power-up-software-updates/ (last visited Mar. 31, 2022).

[23] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022).

[24] *How does Lincoln Connect work?*, LINCOLN.COM, https://www.lincoln.com/support/how-tos/lincoln-way-app/lincoln-connect/how-does-lincoln-connect-work/ (last visited Mar. 31, 2022)

NOTICE OF THE ASSERTED PATENTS

45. Sol IP realleges and incorporates each of preceding paragraphs 1–44.

46. At least as early as June 7, 2021, Ford was on notice of Sol IP's patent portfolio, including the Asserted Patents, when Sol IP sent Ford a letter (the "Notice Letter"). The Notice Letter provided a list of Sol IP's LTE Patents.

47. The Notice Letter stated: "We believe that all LTE-capable Products - including any products equipped with an embedded LTE modem - made, used, offered for sale, sold, or imported by your company infringe at least one or more of the claims of each of Sol IP's LTE Patents listed in the Attachment." An attachment to the Notice Letter lists, among others, the patents referenced in this Complaint by patent number and/or the application number resulting in such patent or from which such patent was later derived. The Notice Letter further stated that Sol IP "hereby offer[s] a license under Sol IP's LTE Patents … on fair, reasonable, and non-discriminatory terms, and are willing to negotiate the details with your company." Ford did not respond to the Notice Letter.

48. To date, Ford has not agreed to license Sol IP's LTE Patents on fair, reasonable, and non-discriminatory terms.

49. As a member of TTA, ETRI declared that the intellectual property rights reflected in the Asserted Patents or their applications or patent families may be or may become standard-essential.

50. Sol IP and its predecessors in interest to the Asserted Patents complied with the requirements of 35 U.S.C. § 287.

COUNT ONE
INFRINGEMENT OF U.S. PATENT NO. 10,938,534

51. Sol IP realleges and incorporates each of preceding paragraphs 1–50.

52. On March 2, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,938,534 ("the '534 patent"), titled "Carrier Aggregation in Wireless Communication Systems." A true and correct copy of the '534 patent is attached as Exhibit C.

53. Sol IP is the exclusive licensee of the '534 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

54. The '534 patent is valid and enforceable.

55. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '534 patent, including at least claim 17, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '534 patent without authority, either literally and/or under the doctrine of equivalents.

56. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 10, thereby infringing at least claim 17 of the '534 patent.

57. The preamble of claim 17 of the '534 patent recites "[a] device for a terminal." To the extent the preamble limits the claim, each Accused LTE Product is a device for a terminal.

58. Claim 17 of the '534 patent recites "a circuitry." Each Accused LTE Product includes one or more circuitries, wherein the one or more circuitries are configured to implement at least the features of 3GPP Release 10. For example, the Accused LTE Products include a 4G embedded processor comprising such circuitry.[25]

[25] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

59. Claim 17 of the '534 patent recites that the circuitry is configured to "cause the terminal to generate a first set of bits based on first data." As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.212 Section 5.2.3, each Accused LTE Product includes one or more circuitries configured to cause the terminal to generate a first set of bits $b(0),...,b(M_{\text{bit}}-1)$ based on first data for transmitting uplink control information on a physical uplink control channel (PUCCH). *See, e.g.*, 3GPP TS 36.212 V10.0.0 § 5.2.3.

60. Claim 17 of the '534 patent recites that the circuitry is configured to "cause the terminal to generate a first set of complex-valued symbols based on the first set of bits." As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, each Accused LTE Product includes one or more circuitries configured to cause the terminal to generate a first block of complex-valued modulation symbols $d(0),...,d(M_{\text{symb}}-1)$ based on the first set of bits $b(0),...,b(M_{\text{bit}}-1)$. *See, e.g.*, 3GPP TS 36.211 V10.1.0 § 5.4.2A.

61. Claim 17 of the '534 patent recites that the circuitry is configured to "determine a first sequence index." As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, each Accused LTE Product includes one or more circuitries configured to determine a first sequence index $n_{\text{oc},0}^{(\tilde{p})}$. *See, e.g.*, 3GPP TS 36.211 V10.1.0 § 5.4.2A.

62. Claim 17 of the '534 patent recites that the circuitry is configured to "cause the terminal to obtain one of a first set of orthogonal sequences based on the first sequence index." As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, each Accused LTE Product includes one or more circuitries configured to cause the terminal to obtain one of a first set of orthogonal sequences $w_{n_{oc},0}^{(\tilde{p})}(i)$ based on the first sequence index $n_{\text{oc},0}^{(\tilde{p})}$. *See, e.g.*, 3GPP TS 36.211 V10.1.0 (2011-03) § 5.4.2A.

63. Claim 17 of the '534 patent recites that the circuitry is configured to "multiply each of the first set of complex-valued symbols by the one of the first set of orthogonal sequences and a first set of complex numbers to generate a first set of symbols." As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, each Accused LTE Product includes one or more circuitries configured to multiply each of the first block of complex-valued modulation symbols d(0),...,d(M_{symb} −1) by one of the first set of orthogonal sequences $w_{n_{oc,0}}^{(\tilde{p})}(i)$ and a first set of complex numbers $e^{j\pi\lfloor n_{cs}^{cell}(n_s,l)/64\rfloor/2}$, to generate a first set of symbols. *See, e.g.*, 3GPP TS 36.211 V10.1.0 (2011-03) § 5.4.2A.

64. Claim 17 of the '534 patent recites that the circuitry is configured to "cause the terminal to generate a subframe comprising the first set of symbols." As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.211 Sections 4, 4.1 and 5.4.3, each Accused LTE Product includes one or more circuitries configured to cause the terminal to map $z^{(\tilde{P})}(i)$ to resource elements for transmission of PUCCH, which uses one resource block in each of the two slots in a subframe. *See, e.g.*, 3GPP TS 36.211 V10.1.0 (2011-03) §§ 4, 4.1, 5.4.3.

65. Claim 17 of the '534 patent recites that the circuitry is configured to "cause the terminal to transmit the subframe to a base station, wherein: the subframe comprises a first slot; the first slot comprises the first set of symbols; each of the first set of complex numbers has a same amplitude; and each of the first set of complex numbers is generated based on a cell identifier (cell ID)." As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.211 Sections 5.4.2A, 5.4.3, and 5.4, each Accused LTE Product includes one or more circuitries configured to cause the terminal to transmit the PUCCH format 3 to a base station. *See, e.g.*, 3GPP TS 36.211 V10.1.0 §§ 5.4.2A, 5.4.3, 5.4. As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.211 Sections 4, 4.1, and 5.4.2A, the subframe

comprises a first slot, and the first slot comprises the first set of symbols when $n < N_{SF,0}^{PUCCH}$. *See, e.g.*, 3GPP TS 36.211 V10.1.0 §§ 4-4.1, 5.4.2A. As recited in claim 17 of the '534 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4, each of the first set of complex numbers $e^{j\pi\lfloor n_{cs}^{cell}(n_s,l)/64\rfloor/2}$ has the same amplitude, and each of the first set of complex numbers $e^{j\pi\lfloor n_{cs}^{cell}(n_s,l)/64\rfloor/2}$ uses a cell-specific cyclic shift $n_{cs}^{cell}(n_s,l)$, which is generated based on a pseudorandom sequence $c(i)$ initialized with a cell identifier (N_{ID}^{cell}). *See, e.g.*, 3GPP TS 36.211 V10.1.0 § 5.4.

66. Ford has indirectly infringed and continues to indirectly infringe at least claim 17 of the '534 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '534 patent.

67. Ford indirectly infringes by inducing third parties (e.g., end users) to infringe at least claim 17 of the '534 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 17 of the '534 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships (to the extent not agents of Ford) that sell and offer to sell the Accused LTE Products, to infringe the '534 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents)

with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Product over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '534 patent.

68. Ford encourages end-users and dealerships to infringe at least claim 17 of the '534 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '534 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '534 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and

that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 17 of the ’534 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the ’534 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the ’534 patent via such offers for sale and sales.

69. Ford has also indirectly infringed and continues to indirectly infringe at least claim 17 of the ’534 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the ’534 patent by others.

70. Despite having knowledge of the ’534 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the ’534 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 57-65.

71. Ford has been on notice of the ’534 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’534 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for

sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '534 patent, knowledge of infringement of the '534 patent, intent to encourage others to infringe the '534 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '534 patent by others in the United States, and knowledge that Ford's actions contribute to the direct infringement of the '534 patent by others in the United States.

72. Ford's infringement of the '534 patent has been and continues to be deliberate and with willful disregard of the '534 patent.

COUNT TWO
INFRINGEMENT OF U.S. PATENT NO. 10,231,211

73. Sol IP realleges and incorporates each of preceding paragraphs 1–72.

74. On March 12, 2019, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,231,211 ("the '211 patent"), titled "Method for Paging Information in Cellular System." A true and correct copy of the '211 patent is attached as Exhibit D.

75. Sol IP is the exclusive licensee of the '211 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

76. The '211 patent is valid and enforceable.

77. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '211 patent, including at least claim 29, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '211 patent without authority, either literally and/or under the doctrine of equivalents.

78. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 29 of the '211 patent.

79. The preamble of claim 29 of the '211 patent recites "[a] communication apparatus." To the extent the preamble limits the claim, each Accused LTE Product is a communication apparatus.

80. Claim 29 of the '211 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[26]

81. Claim 29 of the '211 patent recites "at least one processor coupled to the memory." Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least the features of 3GPP Release 8. For example, the Accused LTE Products include a 4G embedded processor that is coupled to the memory.[27] The 4G embedded processor implements the features of 3GPP Release 8, as evidenced by its ability to connect to the LTE network.

82. Claim 29 of the '211 patent recites that the processor is configured to "cause the apparatus to receive first information through a control channel in a subframe, wherein the subframe comprises the control channel and a shared channel and at least a portion of the first

[26] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

[27] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

information indicates physical layer radio resources." As recited in claim 29 of the '211 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 7.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive a processed downlink control information (DCI) through a physical downlink control channel (PDCCH). *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 7.1. As recited in claim 29 of the '211 patent and in accordance with at least 3GPP Release 8, TS 36.300 Section 5, a subframe of a physical layer downlink comprises a PDCCH and a physical downlink shared channel (PDSCH). *See, e.g.*, 3GPP TS 36.300 V8.12.0 § 5. As recited in claim 29 of the '211 patent and in accordance with at least 3GPP Release 8, TS 36.212 Sections 5.3.3, 5.3.3.1, and 5.3.3.2, and TS 36.321 Section 5.5, at least a portion of the fields within the processed DCI indicates PDSCH resources for paging messages. *See, e.g.*, 3GPP TS 36.321 V8.10.0 § 5.5, 3GPP TS 36.212 V8.8.0 §§ 5.3.3, 5.3.3.1, 5.3.3.2.

83. Claim 29 of the '211 patent recites that the processor is configured to "determine that an identifier is used in the first signal, wherein the identifier indicates that paging information is transmitted through the shared channel in the subframe." As recited in claim 29 of the '211 patent and in accordance with at least 3GPP Release 8, TS 36.321 Section 7.1, each Accused LTE Product includes one or more processors configured to determine that a paging radio network temporary identifier (P-RNTI) is used in the processed DCI, wherein the P-RNTI indicates that the paging message is transmitted through PDSCH. *See, e.g.*, 3GPP TS 36.321 V8.10.0 § 7.1.

84. Claim 29 of the '211 patent recites that the processor is configured to "cause the apparatus to obtain, without determining whether or not the paging information is intended for the apparatus, the paging information transmitted through the shared channel in the subframe in response to the identifier being used in the first information, wherein the paging information is obtained based on the physical layer radio resources indicated by the portion of the first

information." As recited in claim 29 of the '211 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 7.1 and TS 36.321 Section 7.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to obtain, without determining whether or not the paging message is intended for the apparatus, a paging message on the PDSCH in response to the P-RNTI being used in the processed DCI. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 7.1; 3GPP TS 36.321 V8.10.0 § 7.1; *see also* 3GPP TS 36.331 V8.16.0 § 6.2.2 (The paging message is used for the notification of one or more UEs.). As recited in claim 29 of the '211 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 7.1 and TS 36.212 Section 5.3.3.1.3, the paging message is obtained based on the PDSCH resources for paging messages indicated within the processed DCI with cyclic redundancy check (CRC) scrambled by the P-RNTI. *See, e.g.*, 3GPP TS 36.212 V8.8.0 § 5.3.3.1.3; 3GPP TS 36.213 V8.8.0 § 7.1.

85. Ford has indirectly infringed and continues to indirectly infringe at least claim 29 of the '211 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '211 patent.

86. Ford indirectly infringes by inducing third parties (e.g., end users) to infringe at least claim 29 of the '211 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 29 of the '211 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-

users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '211 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '211 patent.

87. Ford encourages end-users and dealerships to infringe at least claim 29 of the '211 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '211 patent at

least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '211 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 29 of the '211 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '211 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '211 patent via such offers for sale and sales.

88. Ford has also indirectly infringed and continues to indirectly infringe at least claim 29 of the '211 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '211 patent by others.

89. Despite having knowledge of the '211 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '211 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver

that are specifically programmed and/or configured to implement the functionality described in paragraphs 79-84.

90. Ford has been on notice of the ’211 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’211 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’211 patent, knowledge of infringement of the ’211 patent, intent to encourage others to infringe the ’211 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’211 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’211 patent by others in the United States.

91. Ford’s infringement of the ’211 patent has been and continues to be deliberate and with willful disregard of the ’211 patent.

COUNT THREE
INFRINGEMENT OF U.S. PATENT NO. 10,932,298

92. Sol IP realleges and incorporates each of preceding paragraphs 1–91.

93. On February 23, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,932,298 (“the ’298 patent”), titled “Method for Transmitting Up Link Control Signal in Mobile Communication System.” A true and correct copy of the ’298 patent is attached as Exhibit E.

94. Sol IP is the exclusive licensee of the ’298 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

95. The ’298 patent is valid and enforceable.

96. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '298 patent, including at least claim 7, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '298 patent without authority, either literally and/or under the doctrine of equivalents.

97. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 7 of the '298 patent.

98. The preamble of claim 7 of the '298 patent recites "[a] communication apparatus." To the extent the preamble limits the claim, each Accused LTE Product is a communication apparatus.

99. Claim 7 of the '298 patent recites "a circuitry." Each Accused LTE Product includes one or more circuitries that are configured to implement at least the features of 3GPP Release 8. For example, the Accused LTE Products include a 4G embedded processor comprising such circuitry.[28]

100. Claim 7 of the '298 patent recites that the circuitry is configured to "cause the communication apparatus to transmit a random access preamble." As recited in claim 7 of the '298 patent and in accordance with at least 3GPP Release 8, TS 36.300 Section 10.1.5 and TS 36.321 Section 5.1.3, each Accused LTE Product includes one or more circuitries configured to cause the

[28] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

communication apparatus to transmit a random access preamble. *See, e.g.*, 3GPP TS 36.300 V8.12.0 § 10.1.5; 3GPP TS 36.321 V8.12.0 § 5.1.3.

101. Claim 7 of the '298 patent recites that the circuitry is configured to "cause the communication apparatus to receive first information, wherein the first information comprises radio resource information." As recited in claim 7 of the '298 patent and in accordance with at least 3GPP Release 8, TS 36.300 Section 10.1.5, TS 36.321 Section 5.1.4, TS 36.213 Section 7.1, and TS 36.212 Section 5.3.3.1, each Accused LTE Product includes one or more circuitries configured to cause the communication apparatus to receive a downlink control information (DCI) for a random access response, wherein the DCI comprises radio resource information. *See, e.g.*, 3GPP TS 36.300 V8.12.0 § 10.1.5; 3GPP TS 36.321 V8.12.0 § 5.1.4; 3GPP TS 36.213 V8.8.0 § 7.1; 3GPP TS 36.212 V8.8.0 § 5.3.3.1.

102. Claim 7 of the '298 patent recites that the circuitry is configured to "cause the communication apparatus to obtain second information at least based on the radio resource information, wherein: the second information comprises a first random access response for the communication apparatus; and the second information comprises an indicator which indicates whether the second information comprises a second random access response for another communication apparatus." As recited in claim 7 of the '298 patent and in accordance with at least 3GPP Release 8, TS 36.321 Section 5.1.4 and TS 36.213 Sections 7.1 and 7.1.6, each Accused LTE Product includes one or more circuitries configured to cause the communication apparatus to obtain a random access response based on the radio resource information. *See, e.g.*, 3GPP TS 36.321 V8.12.0 § 5.1.4; 3GPP TS 36.213 V8.8.0 §§ 7.1, 7.1.6. As recited in claim 7 of the '298 patent and in accordance with at least 3GPP Release 8, TS 36.321 Sections 6.1.5, 6.2.2, and 6.2.3, the random access response comprises a first medium access control (MAC) random access

response for the communication apparatus. *See, e.g.*, 3GPP TS 36.321 V8.12.0 §§ 6.1.5, 6.2.2, 6.2.3. As recited in claim 7 of the '298 patent and in accordance with at least 3GPP Release 8, TS 36.321 Sections 5.1.4, 6.1.5, and 6.2.2, the random access response comprises an extension field which indicates whether the random access response comprises a second MAC random access response for another communication apparatus. *See, e.g.*, 3GPP TS 36.321 V8.12.0 §§ 5.1.4, 6.1.5, 6.2.2.

103. Ford has indirectly infringed and continues to indirectly infringe at least claim 7 of the '298 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '298 patent.

104. Ford indirectly infringes by inducing third parties (e.g., end users) to infringe at least claim 7 of the '298 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 7 of the '298 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '298 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and

manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '298 patent.

105. Ford encourages end-users and dealerships to infringe at least claim 7 of the '298 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '298 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '298 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United

States would result in direct infringement of at least claim 7 of the '298 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '298 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '298 patent via such offers for sale and sales.

106. Ford has also indirectly infringed and continues to indirectly infringe at least claim 7 of the '298 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '298 patent by others.

107. Despite having knowledge of the '298 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '298 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 98-102.

108. Ford has been on notice of the '298 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '298 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the

Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '298 patent, knowledge of infringement of the '298 patent, intent to encourage others to infringe the '298 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '298 patent by others in the United States, and knowledge that Ford's actions contribute to the direct infringement of the '298 patent by others in the United States.

109. Ford's infringement of the '298 patent has been and continues to be deliberate and with willful disregard of the '298 patent.

COUNT FOUR
INFRINGEMENT OF U.S. PATENT NO. 8,320,571

110. Sol IP realleges and incorporates each of preceding paragraphs 1–109.

111. On November 27, 2012, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,320,571 ("the '571 patent"), titled "Method for Generating Downlink Frame, and Method for Searching Cell." A true and correct copy of the '571 patent is attached as Exhibit F.

112. Sol IP is the exclusive licensee of the '571 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

113. The '571 patent is valid and enforceable.

114. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '571 patent, including at least claim 5, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '571 patent without authority, either literally and/or under the doctrine of equivalents.

115. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 5 of the '571 patent.

116. The preamble of claim 5 of the '571 patent recites "[a]n apparatus for searching a cell by a mobile station, comprising a hardware processor." To the extent the preamble limits the claim, each Accused LTE Product comprises a mobile station further comprising an apparatus for searching network cells (e.g., an LTE cell). The apparatus comprises a hardware processor. Each Accused LTE Product includes one or more processors, wherein the one or more processors are configured to implement at least the features of 3GPP Release 8. For example, the Accused LTE Products include a 4G embedded processor.[29]

117. Claim 5 of the '571 patent recites "a hardware processor configured to execute … receiving a downlink frame including a primary synchronization signal and two secondary synchronization signals which are different from each other; and." The hardware processor in each Accused LTE Product is configured to receive a downlink frame (e.g., an LTE type 1 downlink radio frame). As detailed in relevant LTE standards (including: 3GPP TS 36.213 V8.8.0 (2009-09) §§ 4.1, 6.11.1; 3GPP TS 36.211 V8.9.0 (2009-12) §§ 4, 4.1, 6.1.2), a downlink frame, such as an LTE type 1 downlink radio frame, will include a primary synchronization signal (PSS) and two secondary synchronization signals (the SSS in subframe 0 and the SSS in subframe 5). The SSS in subframe 0 is different from the SSS in subframe 5.

[29] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

118. Claim 5 of the '571 patent recites "a hardware processor configured to execute … identifying a cell by using the primary synchronization signal and at least one of the two secondary synchronization signals, wherein." The hardware processor in each Accused LTE Product is configured to identify a cell by using the primary synchronization signal (PSS) and at least one of the two secondary synchronization signals (the SSS in subframes 0 and 5). For example, in an LTE cell search, the UE (the Accused LTE Product) uses the PSS to determine $N_{\mathrm{ID}}^{(2)}$, at least one of the SSS to determine $N_{\mathrm{ID}}^{(1)}$, and then uses $N_{\mathrm{ID}}^{(2)}$ and $N_{\mathrm{ID}}^{(1)}$, to determine the physical layer cell identity of the cell N_{ID}^{cell}. *See*, 3GPP TS 36.213 V8.8.0 (2009-09) §§ 4.1, 6.11.1; 3GPP TS 36.211 V8.9.0 (2009-12) §§ 3.1, 6.11.

119. Claim 5 of the '571 patent recites "in one secondary synchronization signal of the two secondary synchronization signal, a first short sequence scrambled with a first scrambling sequence and a second short sequence scrambled with a second scrambling sequence and a third scrambling sequence are alternately disposed on a plurality of sub-carriers; and." The Accused LTE Products are configured such that in one secondary synchronization signal of the two secondary synchronization signals (e.g., the SSS in subframe 0), a first short sequence ($s_0^{(m_0)}(n)$) scrambled with a first scrambling sequence ($c_0(n)$) and a second short sequence ($s_1^{(m_1)}(n)$) scrambled with a second scrambling sequence ($c_1(n)$) and a third scrambling sequence ($z_1^{(m_0)}(n)$) are alternatively disposed on a plurality of sub-carriers. *See* 3GPP TS 36.211 V8.9.0 (2009-12) §§ 6.2, 6.11.

120. Claim 5 of the '571 patent recites "in the other secondary synchronization signal of the two secondary synchronization signal, the second short sequence scrambled with a first scrambling sequence and the first short sequence scrambled with the second scrambling sequence and a fourth scrambling sequence are alternately disposed on a plurality of sub-carriers, and." In

the other secondary synchronization signal of the two secondary synchronization signal (the SSS in subframe 5), the second short sequence scrambled with the first scrambling sequence and the first short sequence scrambled with the second scrambling sequence and a fourth scrambling sequence are alternately disposed on a plurality of sub-carriers. In subframe 5, the sequence *d(2n)* comprising the second short sequence ($s_1^{(m_1)}(n)$) is altered by applying the first scrambling sequence ($c_0(n)$). The sequence *d(2n+1)* comprising the first short sequence ($s_0^{(m_0)}(n)$) is altered by applying the second scrambling sequence ($c_1(n)$) and a fourth scrambling sequence ($z_1^{(m_1)}(n)$). The *d(2n)* and *d(2n+1)* sequences are interleaved together for transmission on 62 sub-carriers, and are therefore alternately disposed on a plurality of sub-carriers.

121. Claim 5 of the '571 patent recites "the first short sequence and the second short sequence indicate cell group information." The first short sequence ($s_0^{(m_0)}(n)$) and the second short sequence ($s_1^{(m_1)}(n)$) indicate the cell group information ($N_{\mathrm{ID}}^{(1)}$). The first short sequence ($s_0^{(m_0)}(n)$) and the second short sequence ($s_1^{(m_1)}(n)$) are based upon indices m_0 and m_1, which are derived from the physical-layer cell-identity group. *See*, 3GPP TS 36.211 V8.9.0 (2009-12) §§ 6.2, 6.11.

122. Claim 5 of the '571 patent recites "the first scrambling sequence and the second scrambling sequence are determined based on the primary synchronization signal." As detailed in relevant LTE standards (including 3GPP TS 36.211 V8.9.0 (2009-12) §§ 6.11.1, 6.11.2), the first scrambling sequence ($c_0(n)$) and the second scrambling sequence ($c_1(n)$) are determined based on the primary synchronization signal (PSS).

123. Claim 5 of the '571 patent recites "the third scrambling sequence is determined based on the first short sequence, and the fourth scrambling sequence is determined based on the

second short sequence." As detailed in relevant LTE standards (including 3GPP TS 36.211 V8.9.0 (2009-12) § 6.11.2), the third scrambling sequence ($z_1^{(m_0)}(n)$) is determined based on the first short sequence ($s_0^{(m_0)}(n)$). The fourth scrambling sequence ($z_1^{(m_1)}(n)$) is determined based on the second short sequence ($s_1^{(m_1)}(n)$). The first short sequence ($s_0^{(m_0)}(n)$) is used to determine the index m_0, which is then used to determine the third scrambling sequence ($z_1^{(m_0)}(n)$). The second short sequence ($s_1^{(m_1)}(n)$) is used to determine the index m_1, which is then used to determine the fourth scrambling sequence ($z_1^{(m_1)}(n)$).

124. Ford has indirectly infringed and continues to indirectly infringe at least claim 5 of the '571 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '571 patent.

125. Ford indirectly infringes by inducing third parties (e.g., end users) to infringe at least claim 5 of the '571 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 5 of the '571 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '571 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third

parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '571 patent.

126. Ford encourages end-users and dealerships to infringe at least claim 5 of the '571 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '571 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '571 patent. Ford is

aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 5 of the '571 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '571 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '571 patent via such offers for sale and sales.

127. Ford has also indirectly infringed and continues to indirectly infringe at least claim 5 of the '571 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '571 patent by others.

128. Despite having knowledge of the '571 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '571 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 116-123.

129. Ford has been on notice of the '571 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '571 patent since at least as early

as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '571 patent, knowledge of infringement of the '571 patent, intent to encourage others to infringe the '571 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '571 patent by others in the United States, and knowledge that Ford's actions contribute to the direct infringement of the '571 patent by others in the United States.

130. Ford's infringement of the '571 patent has been and continues to be deliberate and with willful disregard of the '571 patent.

COUNT FIVE
INFRINGEMENT OF U.S. PATENT NO. 10,148,477

131. Sol IP realleges and incorporates each of preceding paragraphs 1–130.

132. On December 4, 2018, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,148,477 ("the '477 patent"), titled "Method and Apparatus for Transmitting ACK/NACK." A true and correct copy of the '477 patent is attached as Exhibit G.

133. Sol IP is the exclusive licensee of the '477 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

134. The '477 patent is valid and enforceable.

135. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '477 patent, including at least claim 25, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '477 patent without authority, either literally and/or under the doctrine of equivalents.

136. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 25 of the '477 patent.

137. The preamble of claim 25 of the '477 patent recites "[a] communication apparatus." To the extent the preamble limits the claim, each Accused LTE Product is a communication apparatus.

138. Claim 25 of the '477 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[30]

139. Claim 25 of the '477 patent recites "a processor coupled to the memory." Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least the features of 3GPP Release 8. For example, the Accused LTE Products include a 4G embedded processor that is coupled to the memory.[31]

140. Claim 25 of the '477 patent recites that the processor is configured to "cause the apparatus to receive cyclic shift information for reference signal." As recited in claim 25 of the '477 patent and in accordance with at least 3GPP Release 8, TS 36.212 Section 5.3.3.1.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive

[30] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

[31] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

cyclic shift information for a demodulation reference signal (DMRS) field in a downlink control information (DCI) format 0. *See, e.g.*, 3GPP TS 36.212 V8.8.0 § 5.3.3.1.1.

141. Claim 25 of the '477 patent recites that the processor is configured to "determine a dynamic cyclic shift value based on the cyclic shift information for reference signal." As recited in claim 25 of the '477 patent and in accordance with at least 3GPP Release 8, TS 36.212 Section 5.3.3.1.1, each Accused LTE Product includes one or more processors configured to determine a dynamic cyclic shift value $n_{\mathrm{DMRS}}^{(2)}$ based on the cyclic shift for DMRS field in DCI format 0. *See, e.g.*, 3GPP TS 36.212 V8.8.0 § 5.3.3.1.1; 3GPP TS 36.211 V8.9.0 § 5.5.2.1.1.

142. Claim 25 of the '477 patent recites that the processor is configured to "generate a reference signal by cyclically shifting a sequence at least based on the dynamic cyclic shift value." As recited in claim 25 of the '477 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 5.5, 5.5.1 and 5.5.2.1.1, each Accused LTE Product includes one or more processors configured to generate a demodulation reference signal sequence $r^{\mathrm{PUSCH}}(\cdot)$ for physical uplink shared channel (PUSCH) by cyclically shifting a base sequence $\bar{r}_{u,v}(n)$ at least based on the dynamic cyclic shift value $n_{\mathrm{DMRS}}^{(2)}$. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 5.5, 5.5.1, 5.5.2.1.1.

143. Claim 25 of the '477 patent recites that the processor is configured to "cause the apparatus to transmit data and the reference signal using one or more uplink radio resources." As recited in claim 25 of the '477 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 5.1.1, 5.1.2, 5.3, and 5.5.2-5.5.2.1.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to transmit data and the reference signal using one or more uplink radio resources, such as PUSCH. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 5.1.1, 5.1.2, 5.3, 5.5.2-5.5.2.1.1.

144. Claim 25 of the '477 patent recites that the processor is configured to "cause the apparatus to receive ACK/NACK (Acknowledgement/Negative Acknowledgement) for the transmitted data using a Physical Hybrid ARQ Indicator Channel (PHICH) resource, wherein the dynamic cyclic shift value is determined based on the cyclic shift information for reference signal according to Table 9 and the PHICH resource is determined at least based on the cyclic shift information for reference signal

TABLE 9

cyclic shift information for reference signal	dynamic cyclic shift value
000	0
001	6
010	3
011	4
100	2
101	8
110	10
111	9.

."

As recited in claim 25 of the '477 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 6.1.1 and TS 36.213 Section 9.1.2, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive hybrid automatic repeat request (ARQ) acknowledgement/negative acknowledgement (ACK/NACK) using a physical hybrid ARQ indicator channel (PHICH) resource. *See, e.g.*, 3GPP TS 36.211 V8.9.0 § 6.1.1; 3GPP TS 36.213 V8.8.0 § 9.1.2. As recited in claim 25 of the '477 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 5.5.2.1.1, the dynamic cyclic shift value $n_{\mathrm{DMRS}}^{(2)}$ is determined based on the cyclic shift for DMRS field in DCI format 0 as given in Table 5.5.2.1.1-1:

Table 5.5.2.1.1-1: Mapping of Cyclic Shift Field in DCI format 0 to $n_{\mathrm{DMRS}}^{(2)}$ Values.

Cyclic Shift Field in DCI format 0 [3]	$n_{\mathrm{DMRS}}^{(2)}$
000	0
001	6
010	3
011	4
100	2
101	8
110	10
111	9

See, e.g., 3GPP TS 36.211 V8.9.0 § 5.5.2.1.1. As recited in claim 25 of the '477 patent and in accordance with at least 3GPP Release 8, TS 36.213 V8.8.0 Section 9.1.2, the PHICH resource is determined based on the cyclic shift for DMRS field in DCI format 0. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 9.1.2.

145. Ford has indirectly infringed and continues to indirectly infringe at least claim 1 of the '477 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '477 patent.

146. Ford indirectly infringes by inducing third parties to infringe at least claim 1 of the '477 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at

least claim 1 of the '477 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '477 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '477 patent.

147. Ford encourages end-users to infringe at least claim 1 of the '477 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '477 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '477 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 1 of the '477 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '477 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '477 patent via such offers for sale and sales.

148. Ford has also indirectly infringed and continues to indirectly infringe at least claim 1 of the '477 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '477 patent by others.

149. Despite having knowledge of the '477 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '477 patent and

are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 137-144.

150. Ford has been on notice of the ’477 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’477 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’477 patent, knowledge of infringement of the ’477 patent, intent to encourage others to infringe the ’477 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’477 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’477 patent by others in the United States.

151. Ford’s infringement of the ’477 patent has been and continues to be deliberate and with willful disregard of the ’477 patent.

COUNT SIX
INFRINGEMENT OF U.S. PATENT NO. 10,206,207

152. Sol IP realleges and incorporates each of preceding paragraphs 1–151.

153. On February 12, 2019, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,206,207 (“the ’207 patent”), titled “Error Control Method, Medium Access Control (MAC) Frame Designing Method, and Terminal Registration Method in Wireless Communication System, and Recording Medium.” A true and correct copy of the ’207 patent is attached as Exhibit H.

154. Sol IP is the exclusive licensee of the '207 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

155. The '207 patent is valid and enforceable.

156. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '207 patent, including at least claim 7, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '207 patent without authority, either literally and/or under the doctrine of equivalents.

157. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 7 of the '207 patent.

158. The preamble of claim 7 of the '207 patent recites "[a] communication apparatus." To the extent the preamble limits the claim, each Accused LTE Product is a communication apparatus.

159. Claim 7 of the '207 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[32]

160. Claim 7 of the '207 patent recites "a processor operably coupled to the memory." Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least the features of

[32] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

3GPP Release 8. For example, the Accused LTE Products include a 4G embedded processor that is coupled to the memory.[33] The 4G embedded processor implements the features of 3GPP Release 8, as evidenced by its ability to connect to the LTE network.

161. Claim 7 of the '207 patent recites that the processor is configured to "cause the apparatus to receive a first signal in a subframe from a transmitter, the first signal comprising first information and second information." As recited in claim 7 of the '207 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 6.7, 6.8, and 6.8.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive a physical downlink control channel (PDCCH) in a subframe from a base station. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 6.7, 6.8, 6.8.1. As recited in claim 7 of the '207 patent and in accordance with at least 3GPP Release 8, TS 36.212 Section 5.3.3.1.2, the PDCCH includes information about resource block assignment and information about modulation and coding scheme. *See, e.g.*, 3GPP TS 36.212 V8.8.0 § 5.3.3.1.2.

162. Claim 7 of the '207 patent recites that the processor is configured to "determine that an identifier is used to generate the first signal." As recited in claim 7 of the '207 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 7.1, each Accused LTE Product includes one or more processors configured to determine that a cell radio network temporary identifier (C-RNTI) is used to generate the PDCCH. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 7.1.

163. Claim 7 of the '207 patent recites that the processor is configured to, "after determining that the identifier is used to generate the first signal, cause the apparatus to obtain data

[33] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

in the subframe at least based on the first information and the second information, wherein the first information indicates radio resources in the subframe allocated to the data, and the second information indicates a number of bits allocated to the radio resources." As recited in claim 7 of the '207 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 7.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to obtain data on a physical downlink shared channel (PDSCH) in the subframe at least based on the information about resource block assignment and the information about modulation and coding scheme (e.g., modulation and coding scheme (MCS) index). *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 7.1. As recited in claim 7 of the '207 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 7.1.6.1, the information about resource block assignment indicates physical resource blocks allocated to the data. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 7.1.6.1. As recited in claim 7 of the '207 patent and in accordance with at least 3GPP Release 8, TS 36.213 Sections 7.1.7-7.1.7.2.1, the information about modulation and coding scheme indicates the transport block size allocated to the physical resource blocks. *See, e.g.*, 3GPP TS 36.213 V8.8.0 §§ 7.1.7-7.1.7.2.1.

164. Ford has indirectly infringed and continues to indirectly infringe at least claim 7 of the '207 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '207 patent.

165. Ford indirectly infringes by inducing third parties to infringe at least claim 7 of the '207 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing

third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 7 of the '207 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '207 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '207 patent.

166. Ford encourages end-users to infringe at least claim 7 of the '207 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '207 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '207 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 7 of the '207 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '207 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '207 patent via such offers for sale and sales.

167. Ford has also indirectly infringed and continues to indirectly infringe at least claim 7 of the '207 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '207 patent by others.

168. Despite having knowledge of the '207 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '207 patent and

are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 158-163.

169. Ford has been on notice of the ’207 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’207 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’207 patent, knowledge of infringement of the ’207 patent, intent to encourage others to infringe the ’207 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’207 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’207 patent by others in the United States.

170. Ford’s infringement of the ’207 patent has been and continues to be deliberate and with willful disregard of the ’207 patent.

COUNT SEVEN
INFRINGEMENT OF U.S. PATENT NO. 10,244,559

171. Sol IP realleges and incorporates each of preceding paragraphs 1–170.

172. On March 26, 2019, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,244,559 (“the ’559 patent”), titled “Method for Transmitting Up Link Control Signal in Mobile Communication System.” A true and correct copy of the ’559 patent is attached as Exhibit I.

173. Sol IP is the exclusive licensee of the '559 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

174. The '559 patent is valid and enforceable.

175. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '559 patent, including at least claim 30, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '559 patent without authority, either literally and/or under the doctrine of equivalents.

176. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 30 of the '559 patent.

177. The preamble of claim 30 of the '559 patent recites "[a]n apparatus for a user equipment (UE)." To the extent the preamble limits the claim, each Accused LTE Product is an apparatus for a user equipment (UE).

178. Claim 30 of the '559 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[34]

179. Claim 30 of the '559 patent recites "at least one processor operably coupled to the memory." Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least

[34] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

the features of 3GPP Release 8. For example, the Accused LTE Products include a 4G embedded processor that is coupled to the memory.[35] The 4G embedded processor implements the features of 3GPP Release 8, as evidenced by its ability to connect to the LTE network.

180. Claim 30 of the '559 patent recites that the processor is configured to "cause the UE to transmit a random access preamble." As recited in claim 30 of the '559 patent and in accordance with at least 3GPP Release 8, TS 36.300 Section 10.1.5 and TS 36.321 Section 5.1.3, each Accused LTE Product includes one or more processors configured to cause the UE to transmit a random access preamble. *See, e.g.*, 3GPP TS 36.300 V8.12.0 § 10.1.5; 3GPP TS 36.321 V8.12.0 § 5.1.3.

181. Claim 30 of the '559 patent recites that the processor is configured to "cause the UE to receive first information, wherein the first information comprises information on resource block location assignment." As recited in claim 30 of the '559 patent and in accordance with at least 3GPP Release 8, TS 36.300 Section 10.1.5, each Accused LTE Product includes one or more processors configured to cause the UE to receive a physical downlink control channel (PDCCH). *See, e.g.*, 3GPP TS 36.300 V8.12.0 § 10.1.5. As recited in claim 30 of the '559 patent and in accordance with at least 3GPP Release 8, TS 36.212 Section 5.3.3.1.3, the PDCCH includes resource block assignment. *See, e.g.*, 3GPP TS 36.212 V8.8.0 § 5.3.3.1.3.

182. Claim 30 of the '559 patent recites that the processor is configured to "determine that a first identifier is used to generate at least a part of the first information." As recited in claim 30 of the '559 patent and in accordance with at least 3GPP Release 8, TS 36.321 Section 5.1.4 and

[35] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

TS 36.213 Section 7.1, each Accused LTE Product includes one or more processors configured to determine that a random access radio network temporary identifier (RA-RNTI) is used to generate at least a part of the PDCCH. *See, e.g.*, 3GPP TS 36.321 V8.12.0 § 5.1.4; 3GPP TS 36.213 V8.8.0 § 7.1.

183. Claim 30 of the '559 patent recites that the processor is configured to "cause the UE to obtain data at least based on the information on resource block assignment in response to the first identifier being used to generate at least the part of the first information, wherein: the data comprises a first bit and a first random access response, and the first bit indicates whether the data further comprises a second bit and a second random access response." As recited in claim 30 of the '559 patent and in accordance with at least 3GPP Release 8, TS 36.213 Sections 7.1 and 7.1.6, each Accused LTE Product includes one or more processors configured to cause the UE to obtain data based on the resource block assignment in response to the RA-RNTI being used to generate at least a part of the PDCCH. *See, e.g.*, 3GPP TS 36.213 V8.8.0 §§ 7.1, 7.1.6. As recited in claim 30 of the '559 patent and in accordance with at least 3GPP Release 8, TS 36.321 Sections 6.1.5, 6.2.2, and 6.2.3, the data comprises a first extension field and a first medium access control (MAC) random access response. *See, e.g.*, 3GPP TS 36.321 V8.12.0 §§ 6.1.5, 6.2.2, 6.2.3. As recited in claim 30 of the '559 patent and in accordance with at least 3GPP Release 8, TS 36.321 Sections 6.1.5 and 6.2.2, the first extension field indicates whether the data further comprises a second extension field and a second MAC random access response. 3GPP TS 36.321 V8.12.0 §§ 6.1.5, 6.2.2.

184. Ford has indirectly infringed and continues to indirectly infringe at least claim 30 of the '559 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners,

software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '559 patent.

185. Ford indirectly infringes by inducing third parties to infringe at least claim 30 of the '559 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 30 of the '559 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '559 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising

compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '559 patent.

186. Ford encourages end-users to infringe at least claim 30 of the '559 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '559 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '559 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 30 of the '559 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '559 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '559 patent via such offers for sale and sales.

187. Ford has also indirectly infringed and continues to indirectly infringe at least claim 30 of the '559 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '559 patent by others.

188. Despite having knowledge of the '559 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '559 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 177-183.

189. Ford has been on notice of the '559 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '559 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '559 patent, knowledge of infringement of the '559 patent, intent to encourage others to infringe the '559 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '559 patent by others in the United States, and knowledge that Ford's actions contribute to the direct infringement of the '559 patent by others in the United States.

190. Ford's infringement of the '559 patent has been and continues to be deliberate and with willful disregard of the '559 patent.

COUNT EIGHT
INFRINGEMENT OF U.S. PATENT NO. 8,311,031

191. Sol IP realleges and incorporates each of preceding paragraphs 1–190.

192. On November 13, 2012, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,311,031 ("the '031 patent"), titled "Cell Search Method, Forward Link Frame Transmission Method, Apparatus Using the Same and Forward Link Frame Structure." A true and correct copy of the '031 patent is attached as Exhibit J.

193. Sol IP is the exclusive licensee of the '031 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

194. The '031 patent is valid and enforceable.

195. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '031 patent, including at least claim 8, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '031 patent without authority, either literally and/or under the doctrine of equivalents.

196. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 8 of the '031 patent.

197. The preamble of claim 8 of the '031 patent recites "[an] apparatus for performing cell search in a wireless communication system." To the extent the preamble limits the claim, each Accused LTE Product is an apparatus for performing cell search in a wireless communication system.

198. Claim 8 of the '031 patent recites "a controller configured to identify a cell ID using a primary synchronization sequence (PSS) carrying partial information of a cell identification and at least one secondary synchronization sequence (SSS) carrying remaining information of the cell identification." As recited in claim 8 of the '031 patent and in accordance with at least 3GPP Release 8, Section 4.1, each Accused LTE Product includes a controller configured to identify a cell ID (N_{ID}^{cell}) using a sequence $d(n)$ used for the primary synchronization signal and at least one sequence $d(0),\ldots, d(61)$ used for the secondary synchronization signal. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1. As recited in claim 8 of the '031 patent and in accordance with at least 3GPP Release 8, Sections 6.11, 6.11.1, and 6.11.2, the sequence $d(n)$ used for the primary synchronization signal carries partial information ($N_{ID}^{(2)}$) for identifying a cell and the sequence $d(0),\ldots, d(61)$ used for the secondary synchronization signal carries the remaining information ($N_{ID}^{(1)}$) for identifying a cell. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 6.11, 6.11.1.

199. Claim 8 of the '031 patent recites that "the PSS is one of a plurality of different PSSs that the wireless communication system employs, and the PSS is repeatedly disposed in at least two symbols in a frame, and different SSSs are disposed in at least two symbols in the frame." As recited in claim 8 of the '031 patent and in accordance with at least 3GPP Release 8, Section 6.11.1.2, the sequence $d(n)$ used for the primary synchronization signal is one of a plurality of different sequences that the wireless communication system employs and the sequence $d(n)$ used for the primary synchronization signal is repeatedly disposed in at least two OFDM symbols in a frame. See e.g., 3GPP TS 36.211 V8.9.0 § 6.11.1. As recited in claim 8 of the '031 patent and in accordance with at least 3GPP Release 8, Section 6.11.2.2, different sequences $d(0),\ldots, d(61)$ used for the secondary synchronization signal are disposed in at least two OFDM symbols in the frame. *See, e.g.*, 3GPP TS 36.211 V8.9.0 § 6.11.2.

200. Ford has indirectly infringed and continues to indirectly infringe at least claim 8 of the '031 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '031 patent.

201. Ford indirectly infringes by inducing third parties to infringe at least claim 8 of the '031 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 8 of the '031 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '031 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE

Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '031 patent.

202. Ford encourages end-users to infringe at least claim 8 of the '031 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '031 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '031 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 8 of the '031 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '031 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE

standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '031 patent via such offers for sale and sales.

203. Ford has also indirectly infringed and continues to indirectly infringe at least claim 8 of the '031 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '031 patent by others.

204. Despite having knowledge of the '031 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '031 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 197-199.

205. Ford has been on notice of the '031 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '031 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '031 patent, knowledge of infringement of the '031 patent, intent to encourage others to infringe the '031 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '031 patent by others in the United

States, and knowledge that Ford's actions contribute to the direct infringement of the '031 patent by others in the United States.

206. Ford's infringement of the '031 patent has been and continues to be deliberate and with willful disregard of the '031 patent.

COUNT NINE
INFRINGEMENT OF U.S. PATENT NO. 9,496,976

207. Sol IP realleges and incorporates each of preceding paragraphs 1–206.

208. On November 15, 2016, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,496,976 ("the '976 patent"), titled "Cell Search Method, Forward Link Frame Transmission Method, Apparatus Using the Same and Forward Link Frame Structure." A true and correct copy of the '976 patent is attached as Exhibit K.

209. Sol IP is the exclusive licensee of the '976 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

210. The '976 patent is valid and enforceable.

211. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '976 patent, including at least claim 1, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '976 patent without authority, either literally and/or under the doctrine of equivalents.

212. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 1 of the '976 patent.

213. The preamble of claim 1 of the '976 patent recites "[a] method of performing cell search by a mobile station in a wireless communication system." To the extent the preamble limits

the claim, each Accused LTE Product performs a method of performing cell search in a wireless communication system.

214. Claim 1 of the '976 patent recites "receiving a downlink transmission from a base station." As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, Section 4.1, each Accused LTE Product receives a downlink radio frame from an LTE-compliant eNodeB. *See, e.g.*, 3GPP TS 36.211 V8.9.0 § 4.1.

215. Claim 1 of the '976 patent recites "detecting a first primary synchronization sequence contained in the downlink transmission, wherein the downlink transmission comprises a plurality of subframes sequentially arranged in time domain, each of the plurality of subframes containing a plurality of symbols sequentially arranged in time domain, wherein a first subframe in the downlink transmission includes a first symbol representing the first primary synchronization sequence." As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 4.1 and TS 36.211 Section 6.11.1, each Accused LTE Product detects a sequence $d(n)$ used for the primary synchronization signal contained in the downlink radio frame. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1; 3GPP TS 36.211 V8.9.0 § 6.1.2, 6.11.1. As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 4, 4.1, 6.2.1, 6.2.3, the downlink radio frame comprises a plurality of subframes sequentially arranged in time domain, each of the subframes containing a plurality of OFDM symbols sequentially arranged in time domain. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 4, 4.1, 6.2.1, 6.2.3. As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 4.1 and 6.11.1.2, subframe 0 in the downlink radio frame includes slot 0, wherein the last OFDM symbol in slot 0 represents the sequence $d(n)$ used for the primary synchronization signal. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 4.1, 6.11.1.2.

216. Claim 1 of the '976 patent recites "detecting a first secondary synchronization sequence contained in the downlink transmission, wherein a second subframe in the downlink transmission includes a second symbol representing the first secondary synchronization sequence." As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 4.1 and TS 36.211 Section 6.11.2.1, each Accused LTE Product detects a sequence $d(0),\ldots, d(61)$ used for the second synchronization signal contained in the downlink radio frame. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1; 3GPP TS 36.211 V8.9.0 § 6.11.2.1. As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 6.11.2.1 and 6.11.2.2, subframe 5 in the downlink radio frame includes slot 10, wherein a second-to-last OFDM symbol in slot 10 represents the sequence $d(0),\ldots, d(61)$ used for the second synchronization signal. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 6.11.2.1, 6.11.2.2.

217. Claim 1 of the '976 patent recites "determining a first indicator based on the first primary synchronization sequence." As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 6.11.1, each Accused LTE Product determines a first indicator ($N_{ID}^{(2)}$) based on the sequence $d(n)$ used for the primary synchronization signal. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1; 3GPP TS 36.211 V8.9.0 §§ 6.11, 6.11.1.

218. Claim 1 of the '976 patent recites "determining a second indicator based on the first secondary synchronization sequence." As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 6.11.2, each Accused LTE Product determines a second indicator ($N_{ID}^{(1)}$) based on the sequence $d(0),\ldots, d(61)$ used for the second synchronization signal. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1; 3GPP TS 36.211 V8.9.0 §§ 6.11, 6.11.2.

219. Claim 1 of the '976 patent recites "determining a cell identifier based on the first indicator and the second indicator." As recited in claim 1 of the '976 patent and in accordance with

at least 3GPP Release 8, TS 36.211 Section 6.11, each Accused LTE Product determines a cell identifier (N_{ID}^{cell}) based on the first indicator ($N_{ID}^{(2)}$) and the second indicator ($N_{ID}^{(1)}$). *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1; 3GPP TS 36.211 V8.9.0 §§ 3.1, 6.11, 6.11.1, 6.11.2.

220. Claim 1 of the '976 patent recites "communicating with the base station, wherein the cell identifier identifies a cell of the base station, wherein the first subframe includes a third symbol representing a second secondary synchronization sequence, the third symbol being directly adjacent to the first symbol, and wherein the second subframe includes a fourth symbol representing a second primary synchronization sequence, the fourth symbol being directly adjacent to the second symbol." As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 4.1, each Accused LTE Product, after cell search by which the time and frequency synchronization with a cell are acquired and the physical layer cell ID of that cell is determined, communicates with the eNodeB. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1. As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TR 21.905 Section 3, TS 36.213 Section 4.1, and TS 36.211 Section 3.1, identifier (N_{ID}^{cell}) identifies a cell of the eNodeB. *See, e.g.*, 3GPP TR 21.905 V8.0.0 § 3; 3GPP TS 36.213 V8.8.0 § 4.1; 3GPP TS 36.211 V8.9.0 § 3.1. As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS TS 36.211 Sections 6.11.1, 6.11.1.2, 6.11.2.1, and 6.11.2.2, subframe 0 includes slot 0, wherein the second-to-last OFDM symbol in slot 0 represents a sequence $d(0),\ldots, d(61)$ used for the secondary synchronization signal; the second-to-last OFDM symbol in slot 0 is directly adjacent to the last OFDM symbol in slot 0. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 6.11.1, 6.11.1.2, 6.11.2.1, 6.11.2.2. As recited in claim 1 of the '976 patent and in accordance with at least 3GPP Release 8, TS TS 36.211 Sections 6.11.1, 6.11.1.2, 6.11.2.1, and 6.11.2.2, subframe 5 includes slot 10, wherein the last OFDM symbol in slot 10 represents sequence d(n) used for the primary

synchronization signal; the last OFDM symbol in slot 10 is directly adjacent to the second-to-last OFDM symbol in slot 10. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 6.11.1, 6.11.1.2, 6.11.2.1, 6.11.2.2.

221. Ford has indirectly infringed and continues to indirectly infringe at least claim 1 of the '976 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '976 patent.

222. Ford indirectly infringes by inducing third parties to infringe at least claim 1 of the '976 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 1 of the '976 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '976 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary

way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '976 patent.

223. Ford encourages end-users to infringe at least claim 1 of the '976 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '976 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '976 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 1 of the '976 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '976 patent by using the LTE

capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '976 patent via such offers for sale and sales.

224. Ford has also indirectly infringed and continues to indirectly infringe at least claim 1 of the '976 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '976 patent by others.

225. Despite having knowledge of the '976 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '976 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 213-220.

226. Ford has been on notice of the '976 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '976 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '976 patent, knowledge of infringement of the '976 patent, intent to encourage others to infringe the '976 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '976 patent by others in the United

States, and knowledge that Ford's actions contribute to the direct infringement of the '976 patent by others in the United States.

227. Ford's infringement of the '976 patent has been and continues to be deliberate and with willful disregard of the '976 patent.

COUNT TEN
INFRINGEMENT OF U.S. PATENT NO. 10,080,204

228. Sol IP realleges and incorporates each of preceding paragraphs 1–227.

229. On September 18, 2018, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,080,204 ("the '204 patent"), titled "Cell Search Method, Forward Link Frame Transmission Method, Apparatus Using the Same and Forward Link Frame Structure." A true and correct copy of the '204 patent is attached as Exhibit L.

230. Sol IP is the exclusive licensee of the '204 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

231. The '204 patent is valid and enforceable.

232. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '204 patent, including at least claim 7, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '204 patent without authority, either literally and/or under the doctrine of equivalents.

233. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 7 of the '204 patent.

234. The preamble of claim 7 of the '204 patent recites "[a]n apparatus for a terminal." To the extent the preamble limits the claim, each Accused LTE Product is an apparatus for a terminal.

235. Claim 7 of the '204 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[36]

236. Claim 7 of the '204 patent recites "at least one processor coupled to the memory." Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least the features of 3GPP Release 8. For example, the Accused LTE Products include a 4G embedded processor that is coupled to the memory.[37] The 4G embedded processor implements the features of 3GPP Release 8, as evidenced by its ability to connect to the LTE network.

237. Claim 7 of the '204 patent recites that the at least one processor is configured to cause the terminal to "receive at least a part of a frame, wherein the frame consists of twenty units including a first unit and a second unit, wherein the first unit comprises a first set of Orthogonal Frequency Division Multiplexing (OFDM) symbols including a first OFDM symbol and a second OFDM symbol, the second unit comprises a second set of OFDM symbols including a third OFDM symbol and a fourth OFDM symbol, the first OFDM symbol comprises a first primary

[36] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

[37] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

synchronization signal, the second OFDM symbol comprises a first secondary synchronization signal, the third OFDM symbol comprises the first primary synchronization signal and the fourth OFDM symbol comprises a second secondary synchronization signal." As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 4 and 4.1, each Accused LTE Product includes one or more processors configured to cause the terminal to receive at least a part of a downlink radio frame, wherein the frame consists of twenty slots including slot 0 and slot 10. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 4, 4.1. As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 4.1 and TS 36.211 Sections 6.2.1 and 6.2.3, slot 0 comprises a first set of OFDM symbols that make up slot 0 including the last OFDM symbol of slot 0 and the second-to-last OFDM symbol of slot 0. *See, e.g.*, 3GPP TS 36.211 V8.9.0 § 4.1; 3GPP TS 36.211 V8.9.0 §§ 6.2.1, 6.2.3. As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 4.1 and TS 36.211 Sections 6.2.1 and 6.2.3, slot 10 comprises a second set of OFDM symbols that make up slot 10 including the last OFDM symbol of slot 10 and the second-to-last OFDM symbol of slot 10. *See, e.g.*, 3GPP TS 36.211 V8.9.0 § 4.1; 3GPP TS 36.211 V8.9.0 §§ 6.2.1, 6.2.3. As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 6.11.1.1, 6.11.1.2, 6.11.2.1, and 6.11.2.2, the last OFDM symbol of slot 0 comprises a first primary synchronization signal, the second-to-last OFDM symbols of slot 0 comprises a first secondary synchronization signal, the last OFDM symbol of slot 10 comprises the first primary synchronization signal, and the second-to-last OFDM symbol of slot 10 comprises a second secondary synchronization signal. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 6.11.1.1, 6.11.1.2, 6.11.2.1, 6.11.2.2.

238. Claim 7 of the ’204 patent recites that the at least one processor is configured to cause the terminal to “determine a first identifier based on the first primary synchronization signal.” As recited in claim 7 of the ’204 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 4.1 and TS 36.211 Section 6.11 and 6.11.1.1, each Accused LTE Product includes one or more processors configured to cause the terminal to determine a first identifier ($N_{ID}^{(2)}$) based on the first primary synchronization signal. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1, 3GPP TS 36.211 V8.9.0 §§ 6.11, 6.11.1.1.

239. Claim 7 of the ’204 patent recites that the at least one processor is configured to cause the terminal to “determine a second identifier based on one of the first secondary synchronization signal and the second secondary synchronization signal.” As recited in claim 7 of the ’204 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 4.1 and TS 36.211 Sections 6.11 and 6.11.2.1, each Accused LTE Product includes one or more processors configured to cause the terminal to determine a second identifier ($N_{ID}^{(1)}$) based on one of the first secondary synchronization signal in slots 0 and the second secondary synchronization signal is slot 10. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1, 3GPP TS 36.211 V8.9.0 §§ 6.11, 6.11.2.1.

240. Claim 7 of the ’204 patent recites that the at least one processor is configured to cause the terminal to “determine a cell identifier based on the first identifier and the second identifier, wherein: the first secondary synchronization signal and the second secondary synchronization signal are different, the first OFDM symbol and the second OFDM symbol are contiguous, the third OFDM symbol and the fourth OFDM symbol are contiguous, the first OFDM symbol and the second OFDM symbol are last two OFDM symbols of the first unit, the third OFDM symbol and the fourth OFDM symbol are last two OFDM symbols of the second unit, and the second identifier indicates one group of cells among a plurality of groups of cells, and the first

identifier indicates a cell within the one group of cells." As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.213 Section 4.1 and TS 36.211 Sections 3.1 and 6.11, each Accused LTE Product includes one or more processors configured to cause the terminal to determines a cell identifier (N_{ID}^{cell}) based on the first identifier ($N_{ID}^{(2)}$) and the second identifier ($N_{ID}^{(1)}$). *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 4.1; 3GPP TS 36.211 V8.9.0 §§ 3.1, 6.11. As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 6.11.2.1, first secondary synchronization signal in slot 0 and the second secondary synchronization signal in slot 10 are different. *See, e.g.*, 3GPP TS 36.211 V8.9.0 § 6.11.2.1. As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 4.1, 6.11.1.2, and 6.11.2.2, in slot 0 the last OFDM symbol and the second-to-last OFDM symbols are contiguous and are the last two OFDM symbols of slot 0. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 4.1, 6.11.1.2, 6.11.2.2. As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 4.1, 6.11.1.2, and 6.11.2.2, in slot 10 the last OFDM symbol and the second-to-last OFDM symbols are contiguous and are the last two OFDM symbols of slot 10. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 4.1, 6.11.1.2, 6.11.2.2. As recited in claim 7 of the '204 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 6.11, the second identifier ($N_{ID}^{(1)}$) indicates one group of cells among a plurality of groups of cells (one of 168 groups of cells), and the first identifier ($N_{ID}^{(2)}$) indicates a cell within the one group of cells (one of three cells with the group of cells). *See, e.g.*, 3GPP TS 36.211 V8.9.0 § 6.11.

241. Ford has indirectly infringed and continues to indirectly infringe at least claim 7 of the '204 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers,

customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '204 patent.

242. Ford indirectly infringes by inducing third parties to infringe at least claim 7 of the '204 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 7 of the '204 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '204 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to

third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '204 patent.

243. Ford encourages end-users to infringe at least claim 7 of the '204 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '204 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '204 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 7 of the '204 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '204 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '204 patent via such offers for sale and sales.

244. Ford has also indirectly infringed and continues to indirectly infringe at least claim 7 of the '204 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '204 patent by others.

245. Despite having knowledge of the ’204 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the ’204 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 234-240.

246. Ford has been on notice of the ’204 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’204 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’204 patent, knowledge of infringement of the ’204 patent, intent to encourage others to infringe the ’204 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’204 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’204 patent by others in the United States.

247. Ford’s infringement of the ’204 patent has been and continues to be deliberate and with willful disregard of the ’204 patent.

COUNT ELEVEN
INFRINGEMENT OF U.S. PATENT NO. 8,320,565

248. Sol IP realleges and incorporates each of preceding paragraphs 1–247.

249. On June 19, 2009, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,320,565 ("the '565 patent"), titled "Method for Generating Downlink Frame, and Method for Searching Cell." A true and correct copy of the '565 patent is attached as Exhibit M.

250. Sol IP is the exclusive licensee of the '565 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

251. The '565 patent is valid and enforceable.

252. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '565 patent, including at least claim 1, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '565 patent without authority, either literally and/or under the doctrine of equivalents.

253. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which implement at least the features of 3GPP Release 8, thereby infringing at least claim 1 of the '565 patent.

254. The preamble of claim 1 of the '565 patent recites "[a] method of searching a cell by a mobile station." To the extent the preamble limits the claim, each Accused LTE Product performs a method of searching a cell by a mobile station. Moreover, each Accused LTE Product is a mobile station.

255. Claim 1 of the '565 patent recites "receiving a downlink frame including a primary synchronization signal and a secondary synchronization signal." As recited in claim 1 of the '565 patent and in accordance with at least 3GPP Release 8, TS 36.213 §§ 4.1, 6.11.1 and TS 36.211§§ 4, 4.1, 6.1.2, each Accused LTE Product receives a downlink frame, such as an LTE type 1

downlink radio frame, that includes a primary synchronization signal (PSS) and a secondary synchronization signal (SSS), such as the SSS in subframe 0.

256. Claim 1 of the '565 patent recites "identifying a cell by using the primary synchronization signal and the secondary synchronization signal." Each Accused LTE Product identifies a cell by using the primary synchronization signal (PSS) and a secondary synchronization signals. For example, in an LTE cell search, the UE (the Accused LTE Product) uses the PSS to determine $N_{\mathrm{ID}}^{(2)}$, the SSS to determine $N_{\mathrm{ID}}^{(1)}$, and then uses $N_{\mathrm{ID}}^{(2)}$ and $N_{\mathrm{ID}}^{(1)}$, to determine the physical layer cell identity of the cell N_{ID}^{cell}. *See*, 3GPP TS 36.213 V8.8.0 (2009-09) §§ 4.1, 6.11.1; 3GPP TS 36.211 V8.9.0 (2009-12) §§ 3.1, 6.11.

257. Claim 1 of the '565 patent recites "wherein a first short sequence scrambled with a first scrambling sequence and a second short sequence scrambled with a second scrambling sequence and a third scrambling sequence are included in the secondary synchronization signal and are alternately disposed on a plurality of sub-carriers." Each of the Accused Products operate such that a first short sequence ($s_0^{(m_0)}(n)$) scrambled with a first scrambling sequence ($c_0(n)$) and a second short sequence ($s_1^{(m_1)}(n)$) scrambled with a second scrambling sequence ($c_1(n)$) and a third scrambling sequence ($z_1^{(m_0)}(n)$) are included in the secondary synchronization signal and alternatively disposed on a plurality of sub-carriers. *See* 3GPP TS 36.211 V8.9.0 (2009-12) §§ 6.2, 6.11.

258. Claim 1 of the '565 patent recites "the first short sequence and the second short sequence indicate cell group information, the first scrambling sequence and the second scrambling sequence are determined based on the primary synchronization signal, and the third scrambling sequence is determined based on the first short sequence." The first short sequence ($s_0^{(m_0)}(n)$) and

the second short sequence ($s_1^{(m_1)}(n)$) indicate the cell group information ($N_{ID}^{(1)}$). The first short sequence ($s_0^{(m_0)}(n)$) and the second short sequence ($s_1^{(m_1)}(n)$) are based upon indices m_0 and m_1, which are derived from the physical-layer cell-identity group. *See*, 3GPP TS 36.211 V8.9.0 (2009-12) §§ 6.2, 6.11. As detailed in relevant LTE standards (including 3GPP TS 36.211 V8.9.0 (2009-12) §§ 6.11.1, 6.11.2), the first scrambling sequence ($c_0(n)$) and the second scrambling sequence ($c_1(n)$) are determined based on the primary synchronization signal (PSS). As detailed in relevant LTE standards (including 3GPP TS 36.211 V8.9.0 (2009-12) § 6.11.2), the third scrambling sequence ($z_1^{(m_0)}(n)$) is determined based on the first short sequence ($s_0^{(m_0)}(n)$). The first short sequence ($s_0^{(m_0)}(n)$) is used to determine the index m_0, which is then used to determine the third scrambling sequence ($z_1^{(m_0)}(n)$)..

259. Ford has indirectly infringed and continues to indirectly infringe at least claim 1 of the '565 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '565 patent.

260. Ford indirectly infringes by inducing third parties to infringe at least claim 1 of the '565 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 1 of the '565 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused

LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '565 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '565 patent.

261. Ford encourages end-users to infringe at least claim 1 of the '565 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '565 patent at least as early as

the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '565 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 1 of the '565 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '565 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '565 patent via such offers for sale and sales.

262. Ford has also indirectly infringed and continues to indirectly infringe at least claim 1 of the '565 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '565 patent by others.

263. Despite having knowledge of the '565 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '565 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver

that are specifically programmed and/or configured to implement the functionality described in paragraphs 254-258.

264. Ford has been on notice of the ’565 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’565 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’565 patent, knowledge of infringement of the ’565 patent, intent to encourage others to infringe the ’565 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’565 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’565 patent by others in the United States.

265. Ford’s infringement of the ’565 patent has been and continues to be deliberate and with willful disregard of the ’565 patent.

COUNT TWELVE
INFRINGEMENT OF U.S. PATENT NO. 10,749,722

266. Sol IP realleges and incorporates each of preceding paragraphs 1–265.

267. On August 18, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,749,722 (“the ’722 patent”), titled “Method and Apparatus for Transmitting ACK/NACK.” A true and correct copy of the ’722 patent is attached as Exhibit N.

268. Sol IP is the exclusive licensee of the ’722 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

269. The ’722 patent is valid and enforceable.

270. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '722 patent, including at least claim 7, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '722 patent without authority, either literally and/or under the doctrine of equivalents.

271. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 7 of the '722 patent.

272. The preamble of claim 7 of the '722 patent recites "[a] communication device for a user equipment (UE)." To the extent the preamble limits the claim, each Accused LTE Product is a communication device for a user equipment.

273. Claim 7 of the '722 patent recites "a circuitry." Each Accused LTE Product includes one or more circuitries configured to implement at least the features of 3GPP Release 8. For example, the Accused LTE Products include a 4G embedded processor comprising such circuitry.[38]

274. Claim 7 of the '722 patent recites that the circuitry is configured to "cause the UE to receive cyclic shift information for reference signal." As recited in claim 7 of the '722 patent and in accordance with at least 3GPP Release 8, TS 36.212 Section 5.3.3.1.1, each Accused LTE Product includes one or more circuitries configured to cause the UE to receive a cyclic shift for

[38] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

demodulation reference signal (DMRS) field in downlink control information (DCI) format 0. *See, e.g.*, 3GPP TS 36.212 V8.8.0 § 5.3.3.1.1.

275. Claim 7 of the '722 patent recites that the circuitry is configured to "determine a dynamic cyclic shift value based on the cyclic shift information for reference signal." As recited in claim 7 of the '722 patent and in accordance with at least 3GPP Release 8, TS 36.212 Section 5.3.3.1.1, each Accused LTE Product includes one or more circuitries configured to determine a dynamic cyclic shift value n_{DMRS}^{2} based on the cyclic shift for DMRS field in DCI format 0. *See, e.g.*, 3GPP TS 36.212 V8.8.0 § 5.3.3.1.1; 3GPP TS 36.211 V8.9.0 § 5.5.2.1.1.

276. Claim 7 of the '722 patent recites that the circuitry is configured to "generate a reference signal by cyclically shifting a sequence at least based on the dynamic cyclic shift value." As recited in claim 7 of the '722 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 5.5, 5.5.1 and 5.5.2.1.1, each Accused LTE Product includes one or more circuitries configured to generate a demodulation reference signal sequence $r^{PUSCH}(.)$ for physical uplink shared channel (PUSCH) by cyclically shifting a base sequence $\bar{r}_{u,v}(n)$ at least based on the dynamic cyclic shift value n_{DMRS}^{2}. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 5.5, 5.5.1, 5.5.2.1.1.

277. Claim 7 of the '722 patent recites that the circuitry is configured to "cause the UE to transmit data and the reference signal using one or more uplink radio resources." As recited in claim 7 of the '722 patent and in accordance with at least 3GPP Release 8, TS 36.211 Sections 5.1.1, 5.1.2, 5.3, and 5.5.2-5.5.2.1.1, each Accused LTE Product includes one or more circuitries configured to cause the UE to transmit data and the reference signal using one or more uplink radio resources, such as PUSCH. *See, e.g.*, 3GPP TS 36.211 V8.9.0 §§ 5.1.1, 5.1.2, 5.3, 5.5.2-5.5.2.1.1.

278. Claim 7 of the '722 patent recites that the circuitry is configured to "cause the UE to receive an acknowledgement for the transmitted data using a Physical Hybrid ARQ Indicator

Channel (PHICH) resource, wherein the dynamic cyclic shift value is determined based on the cyclic shift information for reference signal according to Table 3 and the PHICH resource is determined at least based on the cyclic shift information for reference signal

TABLE 3

cyclic shift information for reference signal	dynamic cyclic shift value
000	0
001	6
010	3
011	4
100	2
101	8
110	10
111	9.

."

As recited in claim 7 of the '722 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 6.1.1 and TS 36.213 Section 9.1.2, each Accused LTE Product includes one or more circuitries configured to cause the UE to receive hybrid automatic repeat request (ARQ) acknowledgement/negative acknowledgement (ACK/NACK) using a physical hybrid ARQ indicator channel (PHICH) resource. *See, e.g.*, 3GPP TS 36.211 V8.9.0 § 6.1.1; 3GPP TS 36.213 V8.8.0 § 9.1.2. As recited in claim 7 of the '722 patent and in accordance with at least 3GPP Release 8, TS 36.211 Section 5.5.2.1.1, the dynamic cyclic shift value n_{DMRS}^{2} is determined based on the cyclic shift for DMRS field in DCI format 0 as given in Table 5.5.2.1.1-1:

Table 5.5.2.1.1-1: Mapping of Cyclic Shift Field in DCI format 0 to $n_{DMRS}^{(2)}$ Values.

Cyclic Shift Field in DCI format 0 [3]	$n_{DMRS}^{(2)}$
000	0
001	6
010	3
011	4
100	2
101	8
110	10
111	9

See, e.g., 3GPP TS 36.211 V8.9.0 § 5.5.2.1.1. As recited in claim 7 of the '722 patent and in accordance with at least 3GPP Release 8, TS 36.213 V8.8.0 Section 9.1.2, the PHICH resource is determined based on the cyclic shift information cyclic shift for DMRS field in DCI format 0. *See, e.g.*, 3GPP TS 36.213 V8.8.0 § 9.1.2.

279. Ford has indirectly infringed and continues to indirectly infringe at least claim 7 of the '722 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '722 patent.

280. Ford indirectly infringes by inducing third parties to infringe at least claim 7 of the '722 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 7 of the '722 patent by offering for sale and selling the Accused LTE Products. For

example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '722 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '722 patent.

281. Ford encourages end-users to infringe at least claim 7 of the '722 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third

parties. On information and belief, despite having knowledge of the '722 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '722 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 7 of the '722 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '722 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '722 patent via such offers for sale and sales.

282. Ford has also indirectly infringed and continues to indirectly infringe at least claim 7 of the '722 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '722 patent by others.

283. Despite having knowledge of the '722 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '722 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver

that are specifically programmed and/or configured to implement the functionality described in paragraphs 272-278.

284. Ford has been on notice of the ’722 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’722 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’722 patent, knowledge of infringement of the ’722 patent, intent to encourage others to infringe the ’722 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’722 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’722 patent by others in the United States.

285. Ford’s infringement of the ’722 patent has been and continues to be deliberate and with willful disregard of the ’722 patent.

COUNT THIRTEEN
INFRINGEMENT OF U.S. PATENT NO. 10,271,349

286. Sol IP realleges and incorporates each of preceding paragraphs 1–.

287. On April 23, 2019, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,271,349 (“the ’349 patent”), titled “Scheduling Apparatus and Method for Multicast Broadcast Service.” A true and correct copy of the ’349 patent is attached as Exhibit O.

288. Sol IP is the exclusive licensee of the ’349 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

289. The ’349 patent is valid and enforceable.

290. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '349 patent, including at least claim 21, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '349 patent without authority, either literally and/or under the doctrine of equivalents.

291. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 21 of the '349 patent.

292. The preamble of claim 21 of the '349 patent recites "[a] communication device for a user equipment (UE)." To the extent the preamble limits the claim, each Accused LTE Product is a communication device for a user equipment.

293. Claim 21 of the '349 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[39]

294. Claim 21 of the '349 patent recites "a processor operably coupled to the memory." Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least the features of 3GPP Release 10. For example, the Accused LTE Products include a 4G embedded processor that is coupled to the memory.[40] The 4G embedded processor implements the features of 3GPP Release

[39] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

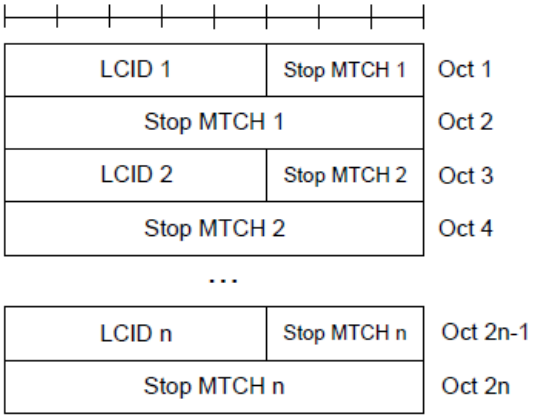
[40] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide,

10, as evidenced by its ability to connect to the LTE network using Release 10 features, including carrier aggregation.

295. Claim 21 of the '349 patent recites that the processor is configured to "cause the UE to receive a plurality of subframes including a first subframe during a first period." As recited in claim 21 of the '349 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.12 and TS 36.300 Section 15.3.3, each Accused LTE Product includes one or more processors configured to cause the UE to receive a plurality of subframes including a first subframe allocated to a multicast channel (MCH) within a MCH scheduling period. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 5.12; 3GPP TS 36.300 V10.4.0 § 15.3.3.

296. Claim 21 of the '349 patent recites that the processor is configured to "cause the UE to obtain a first message from the first subframe, wherein the first message comprises a first identifier, a first value, a second identifier and a second value." As recited in claim 21 of the '349 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.12., each Accused LTE Product includes one or more processors configured to cause the UE to obtain an MCH scheduling information medium access control (MAC) control element from the first subframe. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 5.12. As recited in claim 21 of the '349 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 6.1.3.7, the MCH scheduling information MAC control element comprises a first logical channel ID (LCID) in LCID 1 field, a first value in Stop Multicast Traffic Channel (MTCH) 1 field, a second logical channel ID in LCID 2 field, and a second value in Stop MTCH 2 field:

https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).



See, e.g., 3GPP TS 36.321 V10.4.0 § 6.1.3.7.

297. Claim 21 of the '349 patent recites that the processor is configured to "cause the UE to obtain a first multimedia service during the first period based on the first identifier and the first value." As recited in claim 21 of the '349 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.12, each Accused LTE Product includes one or more processors configured to cause the UE to obtain a first scheduled MTCH based on the first LCID and the first value. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 5.12.

298. Claim 21 of the '349 patent recites that the processor is configured to "determine that a second multimedia service is not provided during the first period based on the second identifier and the second value, wherein: the first subframe comprises the first message, the first subframe is received before other subframes of the plurality of subframes are received, and the second value is equal to a predetermined value indicating that the second service is not provided during the first period." As recited in claim 21 of the '349 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 6.1.3.7, each Accused LTE Product includes one or more processors configured to determine that an MTCH is not scheduled based on the logical channel ID and Stop MTCH value. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 6.1.3.7. As recited in claim 21 of the '349 patent and in accordance with at least 3GPP Release 10, TS 36.300 Section 15.3.3 and

TS 36.321 Section 5.12, the MCH Scheduling Information MAC control element is included in the first subframe allocated to the MCH within the MCH scheduling period and is provided at the beginning of the MCH scheduling period before other subframes of the plurality of subframes are received. *See, e.g.*, 3GPP TS 36.300 V10.4.0 § 15.3.3; 3GPP TS 36.321 V10.4.0 § 5.12. As recited in claim 21 of the '349 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 6.1.3.7, the Stop MTCH value being equal to a predetermined special Stop MTCH value 2047 indicates that the corresponding MTCH is not scheduled. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 6.1.3.7.

299. Ford has indirectly infringed and continues to indirectly infringe at least claim 21 of the '349 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '349 patent.

300. Ford indirectly infringes by inducing third parties to infringe at least claim 21 of the '349 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 21 of the '349 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '349 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third

parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '349 patent.

301. Ford encourages end-users to infringe at least claim 21 of the '349 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '349 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '349 patent. Ford is aware that

the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 21 of the '349 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '349 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '349 patent via such offers for sale and sales.

302. Ford has also indirectly infringed and continues to indirectly infringe at least claim 21 of the '349 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '349 patent by others.

303. Despite having knowledge of the '349 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '349 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 292-298.

304. Ford has been on notice of the '349 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '349 patent since at least as early

as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '349 patent, knowledge of infringement of the '349 patent, intent to encourage others to infringe the '349 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '349 patent by others in the United States, and knowledge that Ford's actions contribute to the direct infringement of the '349 patent by others in the United States.

305. Ford's infringement of the '349 patent has been and continues to be deliberate and with willful disregard of the '349 patent.

COUNT FOURTEEN
INFRINGEMENT OF U.S. PATENT NO. 10,687,351

306. Sol IP realleges and incorporates each of preceding paragraphs 1–305.

307. On June 16, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,687,351 ("the '351 patent"), titled "Scheduling Apparatus and Method for Multicast Broadcast Service." A true and correct copy of the '351 patent is attached as Exhibit P.

308. Sol IP is the exclusive licensee of the '351 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

309. The '351 patent is valid and enforceable.

310. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '351 patent, including at least claim 7, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject

matter claimed in the '351 patent without authority, either literally and/or under the doctrine of equivalents.

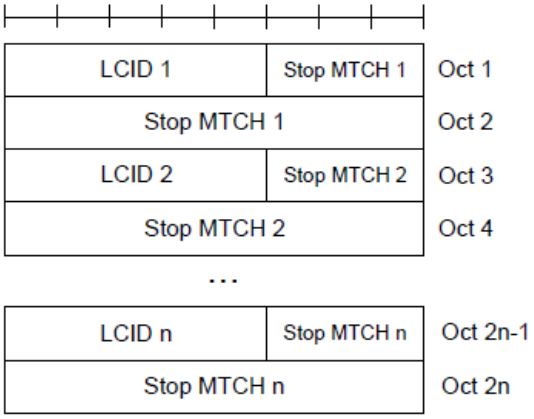
311. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 7 of the '351 patent.

312. The preamble of claim 7 of the '351 patent recites "[a] method for receiving a service." To the extent the preamble limits the claim, each Accused LTE Product performs a method for receiving a service.

313. Claim 7 of the '351 patent recites "receiving a first subframe during a first period, wherein the first subframe comprises a first message." As recited in claim 7 of the '351 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.12 and TS 36.300 Section 15.3.3, each Accused LTE Product receives a first subframe allocated to a multicast channel (MCH) within a MCH scheduling period. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 5.12; 3GPP TS 36.300 V10.4.0 § 15.3.3. As recited in claim 7 of the '351 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.12, the first subframe includes an MCH scheduling information medium access control (MAC) control element. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 5.12.

314. Claim 7 of the '351 patent recites "obtaining a first information unit and a second information unit from the first message, wherein the first information unit comprises a first field comprising a first identifier and a second field comprising a first value, the second information unit comprises a third field comprising a second identifier and a fourth field comprising a second value, wherein the first identifier indicates a first service and the second identifier indicates a second service, and wherein the first value indicates an end point where the first service ends in

the first period and the second value is a predetermined value which indicates that the second service is not provided during the first period." As recited in claim 7 of the '351 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 6.1.3.7, each Accused LTE Product obtains a first information unit (Oct 1 and Oct 2) and a second information unit (Oct 3 and Oct 4) from the MCH Scheduling Information MAC control element:



See, e.g., 3GPP TS 36.321 V10.4.0 § 6.1.3.7. As recited in claim 7 of the '351 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 6.1.3.7, the first information unit comprises a first field (logical channel ID (LCID) 1) comprising a first identifier and a second field (Stop Multicast Traffic Channel (MTCH) 1) comprising a first value, the second information unit comprises a third field (LCID 2) comprising a second identifier and a fourth field (Stop MTCH 2) comprising a second value, wherein the first identifier indicates a first service (first MTCH), and the second identifier indicates a second service (second MTCH), and wherein the first value indicates an end point where the corresponding MTCH stops in the first period and the second value is a predetermined special Stop MTCH value 2047 that indicates that the second service is not scheduled during the first period. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 6.1.3.7.

315. Claim 7 of the '351 patent recites "determining that the second service is not to be provided during the first period based on the second value." As recited in claim 7 of the '351 patent

and in accordance with at least 3GPP Release 10, TS 36.321 Section 6.1.3.7 and TS 36.300 Section 15.3.3, each Accused LTE Product determines that the second service is not to be provided during the first period based on the special Stop MTCH value when multiple services are multiplexed onto the MCH. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 6.1.3.7; 3GPP TS 36.300 V10.4.0 § 15.3.3.

316. Claim 7 of the ’351 patent recites “receiving the first service based on the first value.” As recited in claim 7 of the ’351 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.12 and TS 36.321 Section 6.1.3.7, each Accused LTE Product receives the first scheduled MTCH based on the first Stop MTCH value. *See, e.g.*, 3GPP TS 36.321 V10.4.0 § 5.12; 3GPP TS 36.321 V10.4.0 § 6.1.3.7.

317. Ford has indirectly infringed and continues to indirectly infringe at least claim 7 of the ’351 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the ’351 patent.

318. Ford indirectly infringes by inducing third parties to infringe at least claim 7 of the ’351 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford’s agents) to infringe at least claim 7 of the ’351 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the ’351 patent by, among other things, (i) designing,

manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '351 patent.

319. Ford encourages end-users to infringe at least claim 7 of the '351 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '351 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness

thereto, that the activities it induces result in infringement of the ’351 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 7 of the ’351 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the ’351 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the ’351 patent via such offers for sale and sales.

320. Ford has also indirectly infringed and continues to indirectly infringe at least claim 7 of the ’351 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the ’351 patent by others.

321. Despite having knowledge of the ’351 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the ’351 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 312-316.

322. Ford has been on notice of the ’351 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’351 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’351 patent, knowledge of infringement of the ’351 patent, intent to encourage others to infringe the ’351 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’351 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’351 patent by others in the United States.

323. Ford’s infringement of the ’351 patent has been and continues to be deliberate and with willful disregard of the ’351 patent.

COUNT FIFTEEN
INFRINGEMENT OF U.S. PATENT NO. 8,593,936

324. Sol IP realleges and incorporates each of preceding paragraphs 1–323.

325. On November 26, 2013, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,593,936 (“the ’936 patent”), titled “Carrier Aggregation in Wireless Communication Systems.” A true and correct copy of the ’936 patent is attached as Exhibit Q.

326. Sol IP is the exclusive licensee of the ’936 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

327. The ’936 patent is valid and enforceable.

328. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the ’936 patent, including at least claim 1, by making, using, selling, offering

for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '936 patent without authority, either literally and/or under the doctrine of equivalents.

329. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 1 of the '936 patent.

330. The preamble of claim 1 of the '936 patent recites "[a] method of transmitting data at a first terminal in a wireless communication system." To the extent the preamble limits the claim and in accordance with at least 3GPP Release 10, TS 36.211 §§ 4-4.1, each Accused LTE Product is configured to transmit uplink control information in physical uplink control channel (PUCCH) format 3 in one radio subframe that comprises two time slots.

331. Claim 1 of the '936 patent recites "multiplying a plurality of data symbols, included in a first slot, with a first orthogonal sequence." As recited in claim 1 of the '936 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, each Accused LTE Product multiplies a plurality of data symbols ($d(i)$) with a first orthogonal sequence ($w_{n_{oc},0}^{(\tilde{p})}(\bar{n})$). *See, e.g.*, 3GPP TS 36.211 V10.1.0 § 5.4.2A. As recited in claim 1 of the '936 patent and in accordance with at least 3GPP Release 10, TS 36.211 Sections 4-4.1 and TS 36.211 Section 5.4.2A, the plurality of data symbols ($d(i)$) multiplied with a first orthogonal sequence ($w_{n_{oc},0}^{(\tilde{p})}(\bar{n})$) are sent in the first slot (when $n < N_{SF,0}^{PUCCH}$). *See, e.g.*, 3GPP Release 10, TS 36.211 §§ 4-4.1; 3GPP TS 36.211 V10.1.0 § 5.4.2A.

332. Claim 1 of the '936 patent recites "multiplying a plurality of data symbols, included in a second slot, with a second orthogonal sequence." As recited in claim 1 of the '936 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, each Accused LTE

Product multiplies a plurality of data symbols ($d(N_{sc}^{RB}+i)$) with a second orthogonal sequence ($w_{n_{oc,1}}^{(\tilde{p})}(\bar{n})$). *See, e.g.*, 3GPP TS 36.211 V10.1.0 § 5.4.2A. As recited in claim 1 of the '936 patent and in accordance with at least 3GPP Release 10, TS 36.211 Sections 4-4.1 and TS 36.211 Section 5.4.2A, the plurality of data symbols ($d(N_{sc}^{RB}+i)$) multiplied with a second orthogonal sequence ($w_{n_{oc,1}}^{(\tilde{p})}(\bar{n})$) are sent in the second slot (when $n \geq N_{SF,0}^{PUCCH}$). *See, e.g.*, 3GPP Release 10, TS 36.211 §§ 4-4.1; 3GPP TS 36.211 V10.1.0 § 5.4.2A.

333. Claim 1 of the '936 patent recites "transmitting, to a base station, the data symbols included in the first slot and the data symbols included in the second slot, wherein the first orthogonal sequence and the second orthogonal sequence are selected from orthogonal sequences of Table 1,

TABLE 1

Sequence index	orthogonal sequence
0	[1 1 1 1 1]
1	[1 $e^{j2\pi/5}$ $e^{j4\pi/5}$ $e^{j6\pi/5}$ $e^{j8\pi/5}$]
2	[1 $e^{j4\pi/5}$ $e^{j8\pi/5}$ $e^{j12\pi/5}$ $e^{j16\pi/5}$]
3	[1 $e^{j6\pi/5}$ $e^{j12\pi/5}$ $e^{j18\pi/5}$ $e^{j24\pi/5}$]
4	[1 $e^{j8\pi/5}$ $e^{j16\pi/5}$ $e^{j24\pi/5}$ $e^{j32\pi/5}$]

and the index of the second orthogonal sequence is determined based on the index of the first orthogonal sequence according to Table 2

TABLE 2

Index of first orthogonal sequence	Index of second orthogonal sequence
0	0
1	3
2	1
3	4
4	2

."

As recited in claim 1 of the '936 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, each Accused LTE Product transmits the data symbols in the normal

PUCCH format 3. *See, e.g.*, 3GPP TS 36.211 V10.1.0 § 5.4.2A. As recited in claim 1 of the '936 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, for the normal PUCCH format 3, $N_{SF,0}^{PUCCH} = N_{SF,1}^{PUCCH} = 5$ for both slots in a subframe and, as such, the first and second orthogonal sequences, $(w_{n_{oc},0}^{(\tilde{p})}(\bar{n}))$ and $(w_{n_{oc},1}^{(\tilde{p})}(\bar{n}))$ respectively, are selected from the orthogonal sequences of the $N_{SF}^{PUCCH} = 5$ column of Table 5.4.2A-1 of 3GPP TS 36.211:

Table 5.4.2A-1: The orthogonal sequence $w_{n_{oc}}(i)$.

Sequence index n_{oc}	Orthogonal sequence $\left[w_{n_{oc}}(0) \quad \cdots \quad w_{n_{oc}}(N_{SF}^{PUCCH}-1)\right]$	
	$N_{SF}^{PUCCH} = 5$	$N_{SF}^{PUCCH} = 4$
0	$[1 \quad 1 \quad 1 \quad 1 \quad 1]$	$[+1 \quad +1 \quad +1 \quad +1]$
1	$[1 \quad e^{j2\pi/5} \quad e^{j4\pi/5} \quad e^{j6\pi/5} \quad e^{j8\pi/5}]$	$[+1 \quad -1 \quad +1 \quad -1]$
2	$[1 \quad e^{j4\pi/5} \quad e^{j8\pi/5} \quad e^{j2\pi/5} \quad e^{j6\pi/5}]$	$[+1 \quad +1 \quad -1 \quad -1]$
3	$[1 \quad e^{j6\pi/5} \quad e^{j2\pi/5} \quad e^{j8\pi/5} \quad e^{j4\pi/5}]$	$[+1 \quad -1 \quad -1 \quad +1]$
4	$[1 \quad e^{j8\pi/5} \quad e^{j6\pi/5} \quad e^{j4\pi/5} \quad e^{j2\pi/5}]$	-

See, e.g., 3GPP TS 36.211 V10.1.0 § 5.4.2A. As recited in claim 1 of the '936 patent and in accordance with at least 3GPP Release 10, TS 36.211 Section 5.4.2A, in the normal PUCCH format 3 (where $N_{SF,0}^{PUCCH} = N_{SF,1}^{PUCCH} = 5$ for both slots in a subframe), the sequence index of the first orthogonal sequence $(n_{oc,0}^{(\tilde{p})})$ is given by the equation $n_{oc,0}^{(\tilde{p})} = n_{\text{PUCCH}}^{(3,\tilde{p})} \bmod 5$ and, as such, the index of the first orthogonal sequence can take the values 0, 1, 2, 3, and 4, and the index of the second orthogonal sequence $(n_{oc,1}^{(\tilde{p})})$ is related to the index of the first orthogonal sequence $(n_{oc,0}^{(\tilde{p})})$ by the equation $(n_{oc,1}^{(\tilde{p})}) = (3n_{oc,0}^{(\tilde{p})} \bmod 5$ and, as such, the index of the second orthogonal sequence corresponds to the index of the first orthogonal sequence according to the following:

$n_{oc,0}^{(\tilde{p})}$	$n_{oc,1}^{(\tilde{p})} = (3n_{oc,0}^{(\tilde{p})}) \bmod 5$
0	0
1	3
2	1
3	4
4	2

See, e.g., 3GPP TS 36.211 V10.1.0 § 5.4.2A.

334. Ford has indirectly infringed and continues to indirectly infringe at least claim 1 of the '936 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '936 patent.

335. Ford indirectly infringes by inducing third parties to infringe at least claim 1 of the '936 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 1 of the '936 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '936 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use

the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '936 patent.

336. Ford encourages end-users to infringe at least claim 1 of the '936 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '936 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '936 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 1 of the '936 patent. On information and belief,

the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '936 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '936 patent via such offers for sale and sales.

337. Ford has also indirectly infringed and continues to indirectly infringe at least claim 1 of the '936 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '936 patent by others.

338. Despite having knowledge of the '936 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '936 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 330-333.

339. Ford has been on notice of the '936 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '936 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '936 patent,

knowledge of infringement of the ’936 patent, intent to encourage others to infringe the ’936 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’936 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’936 patent by others in the United States.

340. Ford’s infringement of the ’936 patent has been and continues to be deliberate and with willful disregard of the ’936 patent.

COUNT SIXTEEN
INFRINGEMENT OF U.S. PATENT NO. RE48,101

341. Sol IP realleges and incorporates each of preceding paragraphs 1–340.

342. On July 14, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. RE48,101 (“the ’101 patent”), titled “Method of Transmitting Downlink Channel Rank Information Through Physical Uplink Shared Channel.” A true and correct copy of the ’101 patent is attached as Exhibit R.

343. Sol IP is the exclusive licensee of the ’101 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

344. The ’101 patent is valid and enforceable.

345. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the ’101 patent, including at least claim 5, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the ’101 patent without authority, either literally and/or under the doctrine of equivalents.

346. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 5 of the '101 patent.

347. The preamble of claim 5 of the '101 patent recites "[a] communication apparatus." To the extent the preamble limits the claim, each Accused LTE Product is a communication apparatus.

348. Claim 5 of the '101 patent recites "a processor." Each Accused LTE Product includes one or more processors that are configured to implement at least the features of 3GPP Release 10. For example, the Accused LTE Products include a 4G embedded processor.[41] The 4G embedded processor implements the features of 3GPP Release 10, as evidenced by its ability to connect to the LTE network using Release 10 features, including carrier aggregation.

349. Claim 5 of the '101 patent recites that the processor is configured to "map rank indication (RI) to a set of bits, the set of bits comprising N^{RI} bits $\{O_0^{RI}\ O_1^{RI} \ldots O_{N^{RI}-1}^{RI}\}$, wherein N^{RI} is an integer equal to or larger than 3." As recited in claim 5 of the '101 patent and in accordance with at least 3GPP Release 10, TS 36.212 Section 5.2.2.6, each Accused LTE Product includes one or more processors configured to map rank indication (RI) to a set of bits ($[O_0^{RI}\ O_1^{RI} \ldots O_{O^{RI}-1}^{RI}]$) where the RI feedback consists of $3 \leq O^{RI} \leq [11]$ bits of information. *See, e.g.*, 3GPP TS 36.212 V10.0.0 § 5.2.2.6.

350. Claim 5 of the '101 patent recites that the processor is configured to "encode the set of bits to generate a set of encoded bits." As recited in claim 5 of the '101 patent and in

[41] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

accordance with at least 3GPP Release 10, TS 36.212 Section 5.2.2.6, each Accused LTE Product includes one or more processors configured to obtain a coded bit sequence ($[\tilde{q}_0^{RI}\ \tilde{q}_1^{RI}, \ldots, \tilde{q}_{31}^{RI}]$) by using the bit sequence ($[O_0^{RI}\ O_1^{RI} \ldots O_{O^{RI}-1}^{RI}]$) as the input to the channel coding block. *See, e.g.*, 3GPP TS 36.212 V10.0.0 § 5.2.2.6.

351. Claim 5 of the '101 patent recites that the processor is configured to "generate symbols based on the set of encoded bits." As recited in claim 5 of the '101 patent and in accordance with at least 3GPP Release 10, TS 36.212 Section 5.2.2.8, each Accused LTE Product includes one or more processors configured to generate modulation symbols where the vector sequence ($\tilde{q}_0^{RI}$, $\tilde{q}_1^{RI}$, , $\tilde{q}_2^{RI}$ …, $\tilde{q}_{Q_{RI}-1}^{RI}$) for the rank information is mapped into a (R_{mux} x C_{mux}) matrix for transmission in a physical uplink shared channel (PUSCH) reporting format. *See, e.g.*, 3GPP TS 36.212 V10.0.0 § 5.2.2.8.

352. Claim 5 of the '101 patent recites that the processor is configured to "cause the communication apparatus to transmit the symbols, wherein the encoding is performed by the following expression:

$$q_i^{RI} = \sum_{n=0}^{N^{RI}-1} (O_n^{RI} \cdot M_{(imod32),n}) mod2 \quad (i = 0, 1, \ldots, Q_{RI} - 1)$$

where q_i^{RI} denotes a bit sequence obtained after encoding, Q_{RI}denotes a number of bits after encoding, and $M_{i,n}$ denotes a sequence defined by Table 1:

TABLE 1

i	$M_{i,0}$	$M_{i,1}$	$M_{i,2}$	$M_{i,3}$	$M_{i,4}$	$M_{i,5}$	$M_{i,6}$	$M_{i,7}$	$M_{i,8}$	$M_{i,9}$	$M_{i,10}$
0	1	1	0	0	0	0	0	0	0	0	1
1	1	1	1	0	0	0	0	0	0	1	1
2	1	0	0	1	0	0	1	0	1	1	1
3	1	0	1	1	0	0	0	0	1	0	1
4	1	1	1	1	0	0	0	1	0	0	1
5	1	1	0	0	1	0	1	1	1	0	1
6	1	0	1	0	1	0	1	0	1	1	1
7	1	0	0	1	1	0	0	1	1	0	1
8	1	1	0	1	1	0	0	1	0	1	1
9	1	0	1	1	1	0	1	0	0	1	1
10	1	0	1	0	0	1	1	1	0	1	1
11	1	1	1	0	0	1	1	0	1	0	1
12	1	0	0	1	0	1	0	1	1	1	1
13	1	1	0	1	0	1	0	1	0	1	1
14	1	0	0	0	1	1	0	1	0	0	1
15	1	1	0	0	1	1	1	1	0	1	1
16	1	1	1	0	1	1	1	0	0	1	0
17	1	0	0	1	1	1	0	0	1	0	0
18	1	1	0	1	1	1	1	1	0	0	0
19	1	0	0	0	0	1	1	0	0	0	0
20	1	0	1	0	0	0	1	0	0	0	1
21	1	1	0	1	0	0	0	0	0	1	1
22	1	0	0	0	1	0	0	1	1	0	1
23	1	1	1	0	1	0	0	0	1	1	1
24	1	1	1	1	1	0	1	1	1	1	0
25	1	1	0	0	0	1	1	1	0	0	1
26	1	0	1	1	0	1	0	0	1	1	0
27	1	1	1	1	0	1	0	1	1	1	0
28	1	0	1	0	1	1	1	0	1	0	0
29	1	0	1	1	1	1	1	1	1	0	0
30	1	1	1	1	1	1	1	1	1	1	1
31	1	0	0	0	0	0	0	0	0	0	0.

."

As recited in claim 5 of the '101 patent and in accordance with at least 3GPP Release 10, Sections 5.2.2.6.4 and 5.2.2.8, each Accused LTE Product includes one or more processors configured to transmit the symbols in a PUSCH-based reporting format. *See, e.g.*, 3GPP TS 36.212 V10.0.0 §§ 5.2.2.6.4, 5.2.2.8. As also recited in claim 5 of the '101 patent and in accordance with at least 3GPP Release 10, TS 36.212 Sections 5.2.2.6 and 5.2.2.6.4, the coded bit sequence [$\tilde{q}_0^{RI}$ $\tilde{q}_1^{RI}$, …, $\tilde{q}_{31}^{RI}$] for rank indication is encoded by the channel coding block (described in section 5.2.2.6.4), which uses a channel coding scheme expressed as $b_i = \sum_{n=0}^{0-1}(O_n * M_{i,n}) \bmod 2$ where i = 0,1, 2, … B-1, wherein $M_{i,n}$ denotes one of the basis sequences defined in Table 5.2.2.6.4-1 below:

Table 5.2.2.6.4-1: Basis sequences for (32, *O*) code.

i	$M_{i,0}$	$M_{i,1}$	$M_{i,2}$	$M_{i,3}$	$M_{i,4}$	$M_{i,5}$	$M_{i,6}$	$M_{i,7}$	$M_{i,8}$	$M_{i,9}$	$M_{i,10}$
0	1	1	0	0	0	0	0	0	0	0	1
1	1	1	1	0	0	0	0	0	0	1	1
2	1	0	0	1	0	0	1	0	1	1	1
3	1	0	1	1	0	0	0	0	1	0	1
4	1	1	1	1	0	0	0	1	0	0	1
5	1	1	0	0	1	0	1	1	1	0	1
6	1	0	1	0	1	0	1	0	1	1	1
7	1	0	0	1	1	0	0	1	1	0	1
8	1	1	0	1	1	0	0	1	0	1	1
9	1	0	1	1	1	0	1	0	0	1	1
10	1	0	1	0	0	1	1	1	0	1	1
11	1	1	1	0	0	1	1	0	1	0	1
12	1	0	0	1	0	1	0	1	1	1	1
13	1	1	0	1	0	1	0	1	0	1	1
14	1	0	0	0	1	1	0	1	0	0	1
15	1	1	0	0	1	1	1	1	0	1	1
16	1	1	1	0	1	1	1	0	0	1	0
17	1	0	0	1	1	1	0	0	1	0	0
18	1	1	0	1	1	1	1	1	0	0	0
19	1	0	0	0	0	1	1	0	0	0	0
20	1	0	1	0	0	0	1	0	0	0	1
21	1	1	0	1	0	0	0	0	0	1	1
22	1	0	0	0	1	0	0	1	1	0	1
23	1	1	1	0	1	0	0	0	1	1	1
24	1	1	1	1	1	0	1	1	1	1	0
25	1	1	0	0	0	1	1	1	0	0	1
26	1	0	1	1	0	1	0	0	1	1	0
27	1	1	1	1	0	1	0	1	1	1	0
28	1	0	1	0	1	1	1	0	1	0	0
29	1	0	1	1	1	1	1	1	1	0	0
30	1	1	1	1	1	1	1	1	1	1	1
31	1	0	0	0	0	0	0	0	0	0	0

See, e.g., 3GPP TS 36.212 V10.0.0 §§ 5.2.2.6, 5.2.2.6.4.

353. Ford has indirectly infringed and continues to indirectly infringe at least claim 5 of the '101 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '101 patent.

354. Ford indirectly infringes by inducing third parties to infringe at least claim 5 of the '101 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing

third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 5 of the '101 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '101 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '101 patent.

355. Ford encourages end-users to infringe at least claim 5 of the '101 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '101 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '101 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 5 of the '101 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '101 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '101 patent via such offers for sale and sales.

356. Ford has also indirectly infringed and continues to indirectly infringe at least claim 5 of the '101 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '101 patent by others.

357. Despite having knowledge of the '101 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '101 patent and

are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 347-352.

358. Ford has been on notice of the '101 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '101 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '101 patent, knowledge of infringement of the '101 patent, intent to encourage others to infringe the '101 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '101 patent by others in the United States, and knowledge that Ford's actions contribute to the direct infringement of the '101 patent by others in the United States.

359. Ford's infringement of the '101 patent has been and continues to be deliberate and with willful disregard of the '101 patent.

COUNT SEVENTEEN
INFRINGEMENT OF U.S. PATENT NO. 10,405,277

360. Sol IP realleges and incorporates each of preceding paragraphs 1–359.

361. On September 3, 2019, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,405,277 ("the '277 patent"), titled "Method for Reducing Power Consumption of Terminal in Mobile Communication System Using Multi-Carrier Structure." A true and correct copy of the '277 patent is attached as Exhibit S.

362. Sol IP is the exclusive licensee of the '277 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

363. The '277 patent is valid and enforceable.

364. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '277 patent, including at least claim 5, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '277 patent without authority, either literally and/or under the doctrine of equivalents.

365. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 5 of the '277 patent.

366. The preamble of claim 5 of the '277 patent recites "[a]n apparatus." To the extent the preamble limits the claim, each Accused LTE Product includes an apparatus.

367. Claim 5 of the '277 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[42]

368. Claim 5 of the '277 patent recites "a processor operably coupled to the memory." Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least the features of 3GPP Release 10. For example, the Accused LTE Products include a 4G embedded processor that

[42] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

is coupled to the memory. The 4G embedded processor implements the features of 3GPP Release 10, as evidenced by its ability to connect to the LTE network using Release 10 features, including carrier aggregation.

369. Claim 5 of the '277 patent recites that the processor is configured to "cause the apparatus to receive a first message comprising first information about a first discontinuous reception cycle from a base station." As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.331 Sections 6.2.2 and 6.3.2, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive an *RRCConnectionSetup* message comprising information about a long discontinuous reception cycle from a base station. *See, e.g.*, 3GPP TS 36.331 V10.0.0 §§ 6.2.2, 6.3.2.

370. Claim 5 of the '277 patent recites that the processor is configured to "cause the apparatus to monitor a physical downlink control channel (PDCCH) on a first component carrier based on the first discontinuous reception cycle." As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.300 Section 10.1.5.1, TS 36.213 Section 9.1.1, and TS 36.321 Section 5.7, each Accused LTE Product includes one or more processors configured to cause the apparatus to monitor a physical downlink control channel (PDCCH) on a first component carrier based on the long discontinuous reception cycle. *See, e.g.*, 3GPP TS 36.300 V10.0.0 §10.1.5.1; 3GPP TS 36.213 V10.0.0 §9.1.1; 3GPP TS 36.321 V10.0.0 §5.7.

371. Claim 5 of the '277 patent recites that the processor is configured to "cause the apparatus to receive first control information through the PDCCH on the first component carrier." As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.7 and TS 36.213 Section 9.1.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive downlink control information (DCI)

through the PDCCH on the first component carrier. *See, e.g.*, 3GPP TS 36.213 V10.0.0 § 9.1.1; 3GPP TS 36.321 V10.0.0 §5.7.

372. Claim 5 of the '277 patent recites that the processor is configured to "cause the apparatus to receive a second message from the base station based on the first control information, the second message related to a second discontinuous reception cycle." As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.331 Sections 6.2.2 and 6.3.2, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive an *RRCConnectionReconfiguration* message from the base station based on the DCI, the *RRCConnectionReconfiguration* message being related to a short discontinuous reception cycle. *See, e.g.*, 3GPP TS 36.331 V10.0.0 §§ 6.2.2, 6.3.2.

373. Claim 5 of the '277 patent recites that the processor is configured to "cause the apparatus to monitor, in response to receiving the second message, the PDCCH on the first component carrier based on the second discontinuous reception cycle." As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.7, each Accused LTE Product includes one or more processors configured to cause the apparatus to monitor, in response to receiving the *RRCConnectionReconfiguration* message, the PDCCH on the first component carrier based on the short discontinuous reception cycle. *See, e.g.*, 3GPP TS 36.321 V10.0.0 § 5.7.

374. Claim 5 of the '277 patent recites that the processor is configured to "cause the apparatus to receive second control information through the PDCCH on the first component carrier." As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.321 Section 5.7 and TS 36.213 Section 9.1.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive second downlink control information

through the PDCCH on the first component carrier. *See, e.g.*, 3GPP TS 36.321 V10.0.0 § 5.7; 3GPP TS 36.213 V10.0.0 § 9.1.1.

375. Claim 5 of the '277 patent recites that the processor is configured to "cause the apparatus to receive user data through a physical downlink shared channel (PDSCH) on a second component carrier based on the second control information, wherein the second discontinuous reception cycle is shorter than the first discontinuous reception cycle, and wherein the second control information comprises a carrier indicator (CI) indicating the second component carrier." As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.213 Sections 7.1 and 9.1.1, TS 36.212 Section 5.3.3.1, and TS 36.331 Section 6.3.4, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive user data through a physical downlink shared channel (PDSCH) on a second component carrier based on the second downlink control information. *See, e.g.*, 3GPP TS 36.213 V10.0.0 §§ 7.1, 9.1.1; 3GPP TS 36.212 V10.0.0 § 5.3.3.1; 3GPP TS 36.331 V10.0.0 § 6.3.4. As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.331 Section 6.3.2, the short discontinuous reception cycle is shorter than the long discontinuous reception cycle. *See, e.g.*, 3GPP TS 36.331 V10.0.0 § 6.3.2. As recited in claim 5 of the '277 patent and in accordance with at least 3GPP Release 10, TS 36.213 Section 7.1 and TS 36.212 Section 5.3.3.1, the second DCI comprises a carrier indicator (CI) indicating the second component carrier. *See, e.g.*, 3GPP TS 36.213 V10.0.0 §7.1; 3GPP TS 36.212 V10.0.0 §5.3.3.1.

376. Ford has indirectly infringed and continues to indirectly infringe at least claim 5 of the '277 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers,

customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '277 patent.

377. Ford indirectly infringes by inducing third parties to infringe at least claim 5 of the '277 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 5 of the '277 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '277 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to

third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '277 patent.

378. Ford encourages end-users to infringe at least claim 5 of the '277 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '277 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '277 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 5 of the '277 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '277 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '277 patent via such offers for sale and sales.

379. Ford has also indirectly infringed and continues to indirectly infringe at least claim 5 of the '277 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '277 patent by others.

380. Despite having knowledge of the ’277 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the ’277 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 366-375.

381. Ford has been on notice of the ’277 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’277 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’277 patent, knowledge of infringement of the ’277 patent, intent to encourage others to infringe the ’277 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’277 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’277 patent by others in the United States.

382. Ford’s infringement of the ’277 patent has been and continues to be deliberate and with willful disregard of the ’277 patent.

COUNT EIGHTEEN
INFRINGEMENT OF U.S. PATENT NO. 10,863,439

383. Sol IP realleges and incorporates each of preceding paragraphs 1–382.

384. On December 8, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,863,439 ("the '439 patent"), titled "Method for Reducing Power Consumption of Terminal in Mobile Communication System Using Multi-Carrier Structure." A true and correct copy of the '439 patent is attached as Exhibit T.

385. Sol IP is the exclusive licensee of the '439 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

386. The '439 patent is valid and enforceable.

387. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '439 patent, including at least claim 6, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '439 patent without authority, either literally and/or under the doctrine of equivalents.

388. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 6 of the '439 patent.

389. The preamble of claim 6 of the '439 patent recites "[a]n apparatus." To the extent the preamble limits the claim, each Accused LTE Product is an apparatus.

390. Claim 6 of the '439 patent recites "a circuitry." Each Accused LTE Product includes one or more circuitries configured to implement at least the features of 3GPP Release 12. For example, the Accused LTE Products include a 4G embedded processor comprising such

circuitry.[43] The 4G embedded processor implements the features of 3GPP Release 12, as evidenced by its ability to connect to the LTE network using Release 12 features, including LTE-A.

391. Claim 6 of the '439 patent recites that the circuitry is configured to "cause the apparatus to receive a first message comprising first information about a first discontinuous reception cycle from a base station." As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.331 Section 6.3.2, each Accused LTE Product includes one or more circuitries configured to cause the apparatus to receive, from a base station, an *RRCConnectionSetup* message comprising information about a first discontinuous reception (DRX) cycle (*shortDRX-Cycle*). *See, e.g.*, 3GPP TS 36.331 V12.9.0 § 6.3.2.

392. Claim 6 of the '439 patent recites that the circuitry is configured to "cause the apparatus to monitor a physical downlink control channel (PDCCH) on a first component carrier based on the first discontinuous reception cycle." As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.300 Section 12 and TS 36.321 Section 5.7, each Accused LTE Product includes one or more circuitries configured to cause the apparatus to monitor a physical downlink control channel (PDCCH) on a first component carrier based on the *shortDRX*-Cycle. *See, e.g.*, 3GPP TS 36.300 V11.3.0 § 12; 3GPP TS 36.321 V12.9.0 § 5.7.

393. Claim 6 of the '439 patent recites that the circuitry is configured to "cause the apparatus to receive first control information through the PDCCH on the first component carrier." As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.213 Section 9.1.1 and TS 36.321 Section 5.7, each Accused LTE Product includes one or more

[43] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

circuitries configured to cause the apparatus to receive downlink control information (DCI) through the PDCCH on the first component carrier. *See, e.g.*, 3GPP TS 36.213 V12.0.0 § 9.1.1; 3GPP TS 36.321 V12.9.0 § 5.7.

394. Claim 6 of the '439 patent recites that the circuitry is configured to "cause the apparatus to receive a second message from the base station based on the first control information, the second message related to a second continuous reception cycle." As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.321 Section 5.7, each Accused LTE Product includes one or more circuitries configured to cause the apparatus to receive a long DRX command medium access control (MAC) control element based on the DCI on PDCCH, instructing the apparatus to change the DRX operation from the *shortDRX*-cycle to a *longDRXcycle*. *See, e.g.*, 3GPP TS 36.321 V12.9.0 § 5.7.

395. Claim 6 of the '439 patent recites that the circuitry is configured to "cause the apparatus to, in response to receiving the second message, monitor the PDCCH on the first component carrier based on the second discontinuous reception cycle." As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.321 Section 5.7, each Accused LTE Product includes one or more circuitries configured to cause the apparatus to monitor the PDCCH on the first component carrier based on the *longDRX*-cycle in response to receiving the long DRX command MAC control element. *See, e.g.*, 3GPP TS 36.321 V12.9.0 § 5.7.

396. Claim 6 of the '439 patent recites that the circuitry is configured to "cause the apparatus to receive second control information through the PDCCH on the first component carrier." As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.213 Section 9.1.1 and TS 36.321 Section 5.7, each Accused LTE Product includes one or

more circuitries configured to cause the apparatus to receive a second DCI through the PDCCH on the first component carrier. *See, e.g.*, 3GPP TS 36.213 V12.0.0 § 9.1.1; 3GPP TS 36.321 V12.9.0 § 5.7.

397. Claim 6 of the '439 patent recites that the circuitry is configured to "cause the apparatus to receive user data through a physical downlink shared channel (PDSCH) on a second component carrier based on the second control information, wherein the second discontinuous reception cycle is longer than the first discontinuous reception cycle, and wherein the second control information comprises a carrier indicator (CI) indicating the second component carrier." As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.213 Section 7.1, each Accused LTE Product includes one or more circuitries configured to cause the apparatus to receive user data through a physical downlink shared channel (PDSCH) on a second component carrier based on the DCI received over PDCCH. *See, e.g.*, 3GPP TS 36.213 V12.0.0 § 7.1. As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.331 Section 6.3.2, the *longDRX*-Cycle is a multiple of *shortDRX*-Cycle. *See, e.g.*, 3GPP TS 36.331 V12.0.0 § 6.3.2. As recited in claim 6 of the '439 patent and in accordance with at least 3GPP Release 12, TS 36.212 Section 5.3.3.1, a DCI comprises a carrier indicator (CI) indicating the second component carrier. *See, e.g.*, 3GPP TS 36.212 V12.9.1 § 5.3.3.1.

398. Ford has indirectly infringed and continues to indirectly infringe at least claim 6 of the '439 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '439 patent.

399. Ford indirectly infringes by inducing third parties to infringe at least claim 6 of the '439 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 6 of the '439 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '439 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g.,

operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '439 patent.

400. Ford encourages end-users to infringe at least claim 6 of the '439 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '439 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '439 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 6 of the '439 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '439 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '439 patent via such offers for sale and sales.

401. Ford has also indirectly infringed and continues to indirectly infringe at least claim 6 of the '439 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '439 patent by others.

402. Despite having knowledge of the '439 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products

include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '439 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 389-397.

403. Ford has been on notice of the '439 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '439 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '439 patent, knowledge of infringement of the '439 patent, intent to encourage others to infringe the '439 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '439 patent by others in the United States, and knowledge that Ford's actions contribute to the direct infringement of the '439 patent by others in the United States.

404. Ford's infringement of the '439 patent has been and continues to be deliberate and with willful disregard of the '439 patent.

COUNT NINETEEN
INFRINGEMENT OF U.S. PATENT NO. 10,462,776

405. Sol IP realleges and incorporates each of preceding paragraphs 1–404.

406. On October 29, 2019, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,462,776 ("the '776 patent"), titled "Method for Transmitting and

Receiving Control Information of a Mobile Communication System." A true and correct copy of the '776 patent is attached as Exhibit U.

407. Sol IP is the exclusive licensee of the '776 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

408. The '776 patent is valid and enforceable.

409. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '776 patent, including at least claim 13, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '776 patent without authority, either literally and/or under the doctrine of equivalents.

410. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 13 of the '776 patent.

411. The preamble of claim 13 of the '776 patent recites "[a] communication device for a terminal." To the extent the preamble limits the claim, each Accused LTE Product is a communication device for a terminal.

412. Claim 13 of the '776 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[44]

413. Claim 13 of the '776 patent recites "a processor operably coupled to the memory."

[44] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

414. Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least the features of 3GPP Release 11. For example, the Accused LTE Products include a 4G embedded processor that is coupled to the memory.[45] The 4G embedded processor implements the features of 3GPP Release 11, as evidenced by its ability to connect to the LTE network using Release 11 features, including LTE-A.

415. Claim 13 of the '776 patent recites that the processor is configured to "cause the terminal to receive a first message." As recited in claim 13 of the '776 patent and in accordance with at least 3GPP Release 11, TS 36.331 Section 6.3.2, each Accused LTE Product includes one or more processors configured to cause the terminal to receive an EPDCCH-Config for enhanced physical downlink control channel (EPDCCH) monitoring in a first subframe. *See, e.g.*, 3GPP TS 36.331 V11.2.0 § 6.3.2 (EPDCCH-Config).

416. Claim 13 of the '776 patent recites that the processor is configured to "decide, using the first message, to monitor an enhanced physical downlink control channel (ePDCCH) in a first subframe, wherein the first subframe consists of resource elements arranged in frequency and time domain, the first subframe consists of a first region of resource elements and a second region of resource elements, each of the resource elements in the first region precedes each of the resource elements in the second region in time domain, the first region includes a physical downlink control channel (PDCCH), and the second region includes a physical downlink shared channel for data transmission." As recited in claim 13 of the '776 patent and in accordance with at least 3GPP

[45] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

Release 11, TS 36.331 Section 6.3.2, each Accused LTE Product includes one or more processors configured to decide, using the EPDCCH-Config, for EPDCCH monitoring in a first subframe. *See, e.g.*, 3GPP TS 36.331 V11.2.0 § 6.3.2 (EPDCCH-Config). As recited in claim 13 of the '776 patent and in accordance with at least 3GPP Release 11, TS 36.331 Section 6.3.2, TS 36.211 Section 6.2.2, and TS 36.300 Section 5.1.3, EPDCCH-Config indicates the OFDM starting symbol for an EPDCCH and physical downlink shared channel (PDSCH) scheduled by EPDCCH on the same cell, where a first n OFDM symbols, in a subframe consisting of resource elements arranged in frequency and time domain, include a PDCCH and the remaining region of the subframe includes a PDSCH. *See, e.g.*, 3GPP TS 36.331 V11.2.0 § 6.3.2 (EPDCCH-Config); 3GPP TS 36.211 V8.9.0 § 6.2.2; 3GPP TS 36.300 § 5.1.3.

417. Claim 13 of the '776 patent recites that the processor is configured to "determine a location of a search space for the ePDCCH in the second region at least based on an identifier of the terminal." As recited in claim 13 of the '776 patent and in accordance with at least 3GPP Release 11, TS 36.213 Section 9.1.4, each Accused Device includes one or more processors configured to determine a location of a search space for the EPDCCH in the second region based on an identifier of the terminal (n_{RNTI}). *See, e.g.*, 3GPP TS 36.213 V11.3.0 § 9.1.4.

418. Claim 13 of the '776 patent recites that the processor is configured to "cause the terminal to obtain the ePDCCH at least based on the location of the search space." As recited in claim 13 of the '776 patent and in accordance with at least 3GPP Release 11, TS 36.213 Section 9.1.4, each Accused Device includes one or more processors configured to cause the terminal to obtain the EPDCCH at least based on the EPDCCH UE-specific search spaces. *See, e.g.*, 3GPP TS 36.213 V11.3.0 § 9.1.4.

419. Ford has indirectly infringed and continues to indirectly infringe at least claim 13 of the '776 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '776 patent.

420. Ford indirectly infringes by inducing third parties to infringe at least claim 13 of the '776 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 13 of the '776 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '776 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE

Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '776 patent.

421. Ford encourages end-users to infringe at least claim 13 of the '776 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '776 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '776 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 13 of the '776 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '776 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE

standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '776 patent via such offers for sale and sales.

422. Ford has also indirectly infringed and continues to indirectly infringe at least claim 13 of the '776 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '776 patent by others.

423. Despite having knowledge of the '776 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '776 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 411-418.

424. Ford has been on notice of the '776 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '776 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '776 patent, knowledge of infringement of the '776 patent, intent to encourage others to infringe the '776 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '776 patent by others in the United

States, and knowledge that Ford's actions contribute to the direct infringement of the '776 patent by others in the United States.

425. Ford's infringement of the '776 patent has been and continues to be deliberate and with willful disregard of the '776 patent.

COUNT TWENTY
INFRINGEMENT OF U.S. PATENT NO. 10,009,896

426. Sol IP realleges and incorporates each of preceding paragraphs 1–425.

427. On June 26, 2018, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,009,896 ("the '896 patent"), titled "Methods for Transmitting and Receiving of Control Channel in Wireless Communication Systems." A true and correct copy of the '896 patent is attached as Exhibit V.

428. Sol IP is the exclusive licensee of the '896 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

429. The '896 patent is valid and enforceable.

430. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '896 patent, including at least claim 9, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '896 patent without authority, either literally and/or under the doctrine of equivalents.

431. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 9 of the '896 patent.

432. The preamble of claim 9 of the '896 patent recites "[a] communication apparatus." To the extent the preamble limits the claim, each Accused LTE Product is a communication apparatus.

433. Claim 9 of the '896 patent recites "a memory." Each Accused LTE Product includes one or more memories. For example, the Accused LTE Products include a 4G embedded processor that requires a memory to operate.[46]

434. Claim 9 of the '896 patent recites "a processor operably coupled to the memory." Each Accused LTE Product includes one or more processors operably coupled to the one or more memories, wherein the one or more processors are configured to implement at least the features of 3GPP Release 11. For example, the Accused LTE Products include a 4G embedded processor that is coupled to the memory.[47] The 4G embedded processor implements the features of 3GPP Release 11, as evidenced by its ability to connect to the LTE network using Release 11 features, including LTE-A.

435. Claim 9 of the '896 patent recites that the processor is configured to "cause the apparatus to receive a first message from an eNode-B." As recited in claim 9 of the '896 patent and in accordance with at least 3GPP Release 11, TS 36.331 Sections 6.2.2 and 6.3.2, each Accused LTE Product includes one or more processors configured to cause the apparatus to

[46] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

[47] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

receive, from an eNode-B, an *RRCConnectionSetup* message, which includes an information field *RE-MappingQCLConfigToAddModList-r11*. *See, e.g.*, 3GPP TS 36.331 V11.2.0 §§ 6.2.2, 6.3.2.

436. Claim 9 of the '896 patent recites that the processor is configured to "cause the apparatus to receive control information from the eNode-B, the control information being received through a physical downlink control channel (PDCCH) of a subframe." As recited in claim 9 of the '896 patent and in accordance with at least 3GPP Release 11, TS 36.212 Section 5.3.3 and TS 36.213 Section 7.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive from an eNode-B downlink control information (DCI format 2D), through a physical downlink control channel (PDCCH) of a subframe. *See, e.g.*, 3GPP TS 36.212 V11.2.0 § 5.3.3; 3GPP TS 36.213 V11.2.0 § 7.1.

437. Claim 9 of the '896 patent recites that the processor is configured to "determine whether the subframe is allocated for Multicast-Broadcast Single Frequency Network (MBSFN) at least based on the control information." As recited in claim 9 of the '896 patent and in accordance with at least 3GPP Release 11, TS 36.213 Section 7.1 and TS 36.331 Sections 6.3.2 and 6.3.7, each Accused LTE Product includes one or more processors configured to determine whether the subframe is allocated for multimedia broadcast multicast service single frequency network (MBSFN) at least based on the value of the "PDSCH RE Mapping and Quasi-Co-Location indicator" field. *See, e.g.*, 3GPP TS 36.213 V11.2.0 § 7.1; 3GPP TS 36.331 V11.2.0 §§ 6.3.2, 6.3.7.

438. Claim 9 of the '896 patent recites that the processor is configured to "cause the apparatus to receive data in the subframe from the eNode-B, wherein the first message comprises a plurality of parameter sets, and the control information comprises an indicator indicating one of the plurality of parameter sets, and wherein each of the plurality of parameter sets indicates a

starting symbol of a downlink shared channel in a subframe on which data is transmitted and an MBSFN subframe configuration." As recited in claim 9 of the '896 patent and in accordance with at least 3GPP Release 11, TS 36.213 Section 7.1, each Accused LTE Product includes one or more processors configured to cause the apparatus to receive physical downlink shared channel (PDSCH) in the subframe from the eNode-B. *See, e.g.*, 3GPP TS 36.213 V11.2.0 § 7.1. As recited in claim 9 of the '896 patent and in accordance with at least 3GPP Release 11, TS 36.331 Sections 6.2 and 6.4, the *RRCConnectionSetup* message comprises a PDSCH-RE-MappingQCL-Configr11 information element. *See, e.g.*, 3GPP TS 36.331 V11.2.0 §§ 6.2 and 6.4. As recited in claim 9 of the '896 patent and in accordance with at least 3GPP Release 11, TS 36.212 Section 5.3.3.1.5, the DCI format 2D includes a PDSCH RE Mapping and Quasi-Co-Location Indicator indicating one of the plurality of parameter sets. *See, e.g.*, 3GPP TS 36.212 V11.2.0 § 5.3.3.1.5. As recited in claim 9 of the '896 patent and in accordance with at least 3GPP Release 11, TS 36.331 Sections 6.3.2 and 6.3.7, each *PDSCH-RE-MappingQCL-Config-r11* information element includes a "*pdsch-Start-r11*" field indicating a starting symbol of PDSCH in a subframe and an MBSFN subframe configuration. *See, e.g.*, 3GPP TS 36.331 V11.2.0 §§ 6.3.2, 6.3.7.

439. Ford has indirectly infringed and continues to indirectly infringe at least claim 9 of the '896 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '896 patent.

440. Ford indirectly infringes by inducing third parties to infringe at least claim 9 of the '896 patent by using the LTE capabilities of the Accused LTE Products in their normal and

customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 9 of the '896 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '896 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g., operating systems running on Accused LTE Products and other software and/or firmware used to

operate components of the Accused LTE Product) that may be required for or associated with infringement of the '896 patent.

441. Ford encourages end-users to infringe at least claim 9 of the '896 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '896 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '896 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 9 of the '896 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '896 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '896 patent via such offers for sale and sales.

442. Ford has also indirectly infringed and continues to indirectly infringe at least claim 9 of the '896 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '896 patent by others.

443. Despite having knowledge of the '896 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products include proprietary hardware components and software instructions that work in concert to

perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the ’896 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 432-438.

444. Ford has been on notice of the ’896 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the ’896 patent since at least as early as the service of this Complaint. Ford’s continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford’s knowledge of the ’896 patent, knowledge of infringement of the ’896 patent, intent to encourage others to infringe the ’896 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford’s encouraging acts actually result in direct infringement of the ’896 patent by others in the United States, and knowledge that Ford’s actions contribute to the direct infringement of the ’896 patent by others in the United States.

445. Ford’s infringement of the ’896 patent has been and continues to be deliberate and with willful disregard of the ’896 patent.

COUNT TWENTY-ONE
INFRINGEMENT OF U.S. PATENT NO. 10,893,525

446. Sol IP realleges and incorporates each of preceding paragraphs 1–445.

447. On January 12, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,893,525 (“the ’525 patent”), titled “Method for Transmitting and

Receiving Control Channel in Wireless Communication Systems." A true and correct copy of the '525 patent is attached as Exhibit W.

448. Sol IP is the exclusive licensee of the '525 patent and holds all substantial rights to that patent, including the sole right to sue and recover for any and all infringements.

449. The '525 patent is valid and enforceable.

450. Ford, in violation of 35 U.S.C. § 271(a), has infringed and continues to infringe one or more claims of the '525 patent, including at least claim 13, by making, using, selling, offering for sale, and/or importing into the United States the Accused LTE Products that practice the subject matter claimed in the '525 patent without authority, either literally and/or under the doctrine of equivalents.

451. Ford makes, uses, sells, offers for sale, and/or imports the Accused LTE Products, which are configured to implement at least the features of 3GPP Release 8, thereby infringing at least claim 13 of the '525 patent.

452. The preamble of claim 13 of the '525 patent recites "[a] communication device for a terminal." To the extent the preamble limits the claim, each Accused LTE Product is a communication device for a terminal.

453. Claim 13 of the '525 patent recites "a circuitry." Each Accused LTE Product includes one or more circuitries that are configured to implement at least the features of 3GPP Release 11. For example, the Accused LTE Products include a 4G embedded processor comprising such circuitry.[48]

[48] *Sync Technology*, FORD.COM, https://www.ford.com/technology/sync/ (last visited Mar. 31, 2022); FordPass Connect Reference Guide, https://pictures.dealer.com/billcolwellfordfd/7a1277d70a0e0ca3664f2f8f0e02ad54.pdf (last visited Mar. 31, 2022).

454. Claim 13 of the '525 patent recites that the circuitry is configured to "cause the terminal to receive a first message, the first message comprising a first set of parameters and a second set of parameters, wherein the first set of parameters comprises first location information and the second set of parameters comprises a second location information." As recited in claim 13 of the '525 patent and in accordance with at least 3GPP Release 11, TS 36.331 Section 6.2.2, each Accused LTE Product includes one or more circuitries configured to cause the terminal to receive an *RRCConnectionSetup* message. *See, e.g.*, 3GPP TS 36.331 V11.2.0 § 6.2.2. As recited in claim 13 of the '525 patent and in accordance with at least 3GPP Release 11, TS 36.331 Sections 6.2.2, 6.3.2, and 6.4, the *RRCConnectionSetup* message includes a first *PDSCH-RE-MappingQCLConfig-r11* and a second *PDSCH-RE-MappingQCL-Config-r11*. *See, e.g.*, 3GPP TS 36.331 V11.2.0 §§ 6.2.2, 6.3.2, 6.4. As recited in claim 13 of the '525 patent and in accordance with at least 3GPP Release 11, TS 36.331 Sections 6.2.2 and 6.3.2, the first *PDSCH-RE-MappingQCLConfig-r11* includes a first *pdsch-Start* and the second *PDSCH-RE-MappingQCL-Config-r11* includes a second *pdsch-Start*. *See, e.g.*, 3GPP TS 36.331 V11.2.0 §§ 6.2.2, 6.3.2.

455. Claim 13 of the '525 patent recites that the circuitry is configured to "cause the terminal to receive control information through a Physical Downlink Control Channel (PDCCH) in a first subframe, the control information comprising an identifier to identify the first set of parameters." As recited in claim 13 of the '525 patent and in accordance with at least 3GPP Release 11, TS 36.212 Section 5.3.3 and TS 36.213 Section 7.1, each Accused Device includes one or more circuitries configured to cause the terminal to receive downlink control information (DCI format 2D) through a physical downlink control channel (PDCCH) of a subframe. *See, e.g.*, 3GPP TS 36.212 V11.2.0 § 5.3.3; 3GPP TS 36.213 V11.2.0 § 7.1. As recited in claim 13 of the '525 patent and in accordance with at least 3GPP Release 11, TS 36.212 Section 5.3.3 and TS 36.213 Section

7.1.9, the DCI format 2D includes a *PDSCH RE Mapping and Quasi-Co-Location Indicator* to identify the first *PDSCH-RE-MappingQCL-Config-r11*. *See, e.g.*, 3GPP TS 36.212 V11.2.0 § 5.3.3; 3GPP TS 36.213 V11.2.0 § 7.1.9.

456. Claim 13 of the '525 patent recites that the circuitry is configured to "determine a starting Orthogonal Frequency Division Multiplexing (OFDM) symbol of a Physical Downlink Shared Channel (PDSCH) in the first subframe based on the first location information." As recited in claim 13 of the '525 patent and in accordance with at least 3GPP Release 11, TS 36.213 Sections 7.1.6.4 and 7.1.9, each Accused LTE Product includes one or more circuitries configured to determine a starting OFDM symbol for a physical downlink shared channel (PDSCH) in the subframe based on the value of the *pdsch-Start* field in the first *PDSCH-RE-MappingQCL-Config-r11*. *See, e.g.*, 3GPP TS 36.213 V11.2.0 §§ 7.1.6.4, 7.1.9.

457. Claim 13 of the '525 patent recites that the circuitry is configured to "cause the terminal to receive data on the PDSCH in the first subframe." As recited in claim 13 of the '525 patent and in accordance with at least 3GPP Release 11, TS 36.213 Sections 7.1 and 7.1.9, each Accused LTE Product includes one or more circuitries configured to cause the terminal to receive data on the PDSCH in the subframe. *See, e.g.*, 3GPP TS 36.213 V11.2.0 §§ 7.1, 7.1.9.

458. Ford has indirectly infringed and continues to indirectly infringe at least claim 13 of the '525 patent under 35 U.S.C. § 271(b), either literally and/or under the doctrine of equivalents, by actively inducing others, including OEMs, agent-subsidiaries, affiliates, partners, software and hardware providers, manufacturers, system integrators, distributors, importers, resellers, customers, end users, and/or other third parties, in this district and elsewhere in the United States, to directly infringe the '525 patent.

459. Ford indirectly infringes by inducing third parties to infringe at least claim 13 of the '525 patent by using the LTE capabilities of the Accused LTE Products in their normal and customary way in the United States and in this district. Ford also indirectly infringes by inducing third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) to infringe at least claim 13 of the '525 patent by offering for sale and selling the Accused LTE Products. For example, Ford actively induces third parties, including without limitation end-users of the Accused LTE Products and dealerships that sell and offer to sell the Accused LTE Products (to the extent not agents of Ford), to infringe the '525 patent by, among other things, (i) designing, manufacturing, offering for sale, selling, or otherwise providing the Accused LTE Products to third parties (e.g., dealerships, to the extent they are not deemed to be Ford's agents) with the knowledge and intent that the third parties will sell the Accused LTE products to end users; (ii) designing and manufacturing the Accused LTE Products with the knowledge and intent that end-users will use the LTE capabilities of such devices in accordance with the LTE standards; (iii) enabling end-users of Accused LTE Products to use the devices in accordance with at least the LTE standards; (iv) providing instructions to end-users for using the Accused LTE Products in their customary way, including instructions on using the cellular connectivity features of the devices; (v) providing cellular connectivity, remote diagnosis, and important firmware updates for the Accused LTE Products over cellular networks; (vi) enabling users to monitor and control their Accused LTE Products over cellular networks using Ford's Mobile App; (vii) sending notifications for events and enabling end-users to receive notifications over cellular networks; (viii) advertising compliance of the Accused LTE Products with at least the LTE standards; and (ix) providing to third parties the hardware components (e.g., antenna(s), filter(s), switch(es), transceiver(s), and/or baseband processor(s) contained in Accused LTE Products) and software components (e.g.,

operating systems running on Accused LTE Products and other software and/or firmware used to operate components of the Accused LTE Product) that may be required for or associated with infringement of the '525 patent.

460. Ford encourages end-users to infringe at least claim 13 of the '525 patent with knowledge and the specific intent to cause the acts of direct infringement performed by these third parties. On information and belief, despite having knowledge of the '525 patent at least as early as the receipt of the Notice Letter, Ford has and will continue to engage in activities constituting inducement of such direct infringement, notwithstanding its knowledge, or willful blindness thereto, that the activities it induces result in infringement of the '525 patent. Ford is aware that the Accused LTE Products are manufactured to comply with the LTE standards, and that the subsequent sale, offer for sale, and use of the LTE capabilities of such devices in the United States would result in direct infringement of at least claim 13 of the '525 patent. On information and belief, the LTE capabilities of the Accused LTE Products cannot be operated in their normal and customary way without complying with the LTE standards. Therefore, Ford is aware that at least the end-users of its Accused LTE Products will infringe the '525 patent by using the LTE capabilities of those devices in their ordinary and customary way in accordance with the LTE standards. Ford is also aware that dealerships that offer for sale and sell the Accused LTE Products will infringe the '525 patent via such offers for sale and sales.

461. Ford has also indirectly infringed and continues to indirectly infringe at least claim 13 of the '525 patent under 35 U.S.C. § 271(c), either literally and/or under the doctrine of equivalents, by contributing to the infringement of the '525 patent by others.

462. Despite having knowledge of the '525 Patent, Ford has provided the Accused LTE Products to others (e.g., end users and dealerships), knowing that the Accused LTE Products

include proprietary hardware components and software instructions that work in concert to perform specific, intended functions. Such specific intended functions, carried out by these hardware and software combinations, are a material part of the inventions of the '525 patent and are not staple articles of commerce suitable for substantial non-infringing use. Specifically, each of the Accused LTE Products contains at least a baseband processor and associated transceiver that are specifically programmed and/or configured to implement the functionality described in paragraphs 452-457.

463. Ford has been on notice of the '525 patent since at least as early as the receipt of the Notice Letter. Additionally, Ford has been on notice of the '525 patent since at least as early as the service of this Complaint. Ford's continued actions of making, using, selling, offering for sale, and/or importing into the United States any of the Accused LTE Products after receiving the Notice Letter and/or service of the Complaint, have been with Ford's knowledge of the '525 patent, knowledge of infringement of the '525 patent, intent to encourage others to infringe the '525 patent through sale, offer for sale, and use of the Accused LTE Products, knowledge that Ford's encouraging acts actually result in direct infringement of the '525 patent by others in the United States, and knowledge that Ford's actions contribute to the direct infringement of the '525 patent by others in the United States.

464. Ford's infringement of the '525 patent has been and continues to be deliberate and with willful disregard of the '525 patent.

DEMAND FOR TRIAL BY JURY

465. Sol IP respectfully requests a trial by jury on all issues so triable in accordance with Rule 38 of the Federal Rules of Civil Procedure.

PRAYER FOR RELIEF

466. WHEREFORE, Sol IP respectfully requests that the Court enter judgment in its favor on the claims set forth above and respectfully requests the following relief:

a) Entry of judgment that Ford has directly and/or indirectly infringed the Asserted Patents, and continues to do so;

b) Entry of judgment against Ford, awarding Sol IP damages adequate to compensate Sol IP for Ford's direct and/or indirect infringement of the Asserted Patents, and for any continuing or future infringement through the date such judgment is entered, including pre-judgment interest and post-judgment interest, costs, and expenses, as well as an accounting and award of damages against Ford for all future infringing acts occurring after the date such judgment is entered;

c) Entry of judgment that Ford's direct and/or indirect infringement of the Asserted Patents has been and continues to be willful;

d) Entry of judgment as provided by 35 U.S.C. § 284 for an award of treble damages against Ford for its willful direct and/or indirect infringement of the Asserted Patents;

e) Entry of judgment as provided by 35 U.S.C. § 285 that this case is exceptional and an award granting Sol IP its reasonable attorneys' fees, expenses, and costs; and

g) Entry of judgment in favor of Sol IP granting any further or additional relief the Court deems just and proper.

Dated: April 22, 2022

Respectfully submitted,

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CERTIFICATE OF SERVICE

I certify that on April 22, 2022, the foregoing document was electronically filed in compliance with Local Rule CV-5(a) and was served on all counsel of record who have consented to electronic service, per Local Rule CV-5(a)(3).

/s/ Brent N. Bumgardner
BRENT N. BUMGARDNER