No. 19-2039

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

CONVERSANT WIRELESS LICENSING S.A.R.L.,

Plaintiff-Appellant,

v.

APPLE INC.,

Defendant-Appellee.

On Appeal from the United States District Court for the Northern District of California, Case No. 5:15-cv-05008, Judge Nathanael M. Cousins.

CORRECTED BRIEF FOR PLAINTIFF-APPELLANT CONVERSANT WIRELESS LICENSING S.A.R.L.

DATED: October 14, 2019

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CERTIFICATE OF INTEREST

Counsel for Plaintiff-Appellant Conversant Wireless Licensing S.A.R.L. certifies the following:

1. The full name of every party or *amicus* represented by us is: Conversant Wireless Licensing S.A.R.L.

2. The name of the real party in interest (if the party in the caption is not the real party in interest) represented by me is: Conversant Wireless Licensing S.A.R.L.

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus represented by me are: Conversant Intellectual Property Management Corp.

4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court are:

Henry Charles Bunsow, Alden K.W. Lee, Brandon Goble Shelton, Brian A. E. Smith, Cliff Win, Jr., Craig Y. Allison, Denise M. De Mory, Dino Hadzibegovic, Matthew Franklin Greinert, Robert K. Curtis, Ziyong Li of Bunsow, De Mory, Smith & Allison LLP;

Alexander Chester Giza, Christopher Mitchell Hendy, Douglas James Dixon, John Charles Hueston, Marshall A. Camp, Michael J. Stpehan, Moez M.

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Adam S. Hoffman, Benjamin T. Wang, Brian D. Ledahl, C. Jay Chung, Jacob Buczko, James N. Pickens, Marc Fenster, Neil Alan Rubin and Reza Mirzaie of Russ, August & Kabat;

Kayvan B. Noroozi of Noroozi PC;

Douglas Gary Lichtman

5. The title and number of any case known to counsel to be pending in this or any other court or agency that will directly affect or be directly affected by this court's decision in the pending appeal. None.

Dated: October 14, 2019

/s/ Marc A. Fenster

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STATEMENT OF RELATED CASES

This appeal arises after remand from an appeal previously before this Court. In *Core Wireless Licensing S.a..r.l. (Plaintiff-Appellant) v. Apple Inc*. (Defendant-Appellee) (CAFC-2017-2102), this Court issued a decision on 8/16/2018 reported at *Core Wireless Licensing S.A.R.L. v. Apple Inc*., 899 F.3d 1356 (Fed. Cir. 2018). The panel was composed of Judges Reyna, Bryson and Hughes. Counsel are not aware of any cases that would affect or be affected by this appeal.

INTRODUCTION

After finding that Nokia, the original patentee of the '151 Patent, made an untimely disclosure of a related patent application to the ETSI standards setting body, this Court remanded to the district court to determine whether to apply the doctrine of implied waiver. This Court gave the lower court explicit instructions on remand. Because the extreme sanction of unenforceability was at stake, this Court required the district court to determine if "the patentee's misconduct ***resulted in*** an unfair benefit." *Core Wireless Licensing S.A.R.L. v. Apple Inc*., 899 F.3d 1356, 1368 (Fed. Cir. 2018), citing *Therasense, Inc. v. Becton, Dickinson and Co*., 649 F.3d 1276, 1292 (Fed. Cir. 2011). (Emphasis added). The district court ignored these instructions, finding the '151 Patent unenforceable, and in doing so committed three errors. Each error warrants reversal of the lower court's finding.

The first is an error of law and a failure to address the remand. The Court in *Core Wireless* remanded for a determination of whether "'inequitable consequence ***flowed from*** Nokia's failure to disclose its patent application." 899 F.3d at 1368 (emphasis added). The Court likened the implied waiver doctrine at issue here to inequitable conduct, and quoted *Therasense's* required proof of "but-for" causation. *Id*. The district court, however, incorrectly held that *Therasense's* standard of "but-for" causation "is not required," did not adhere to any specific standard of causation,

holding that Apple had no burden to "connect [Nokia's] non-disclosure with the [alleged] inequitable benefit." Appx43.

The district court's second error is another error of law in its refusal to apply the correct clear and convincing standard of proof on the issue of materiality and causation. Extensive case law emphasizes the importance of holding parties seeking the extreme sanction of unenforceability to their burden to prove causation and unfair benefit by clear and convincing evidence. The district court, however, found only that there is evidence that "**suggests that**, had Nokia disclosed its IPR, there was a **reasonable possibility** that the'151 patent would not have been incorporated into the GPRS standard." Appx43. Evidence that "suggests" a "reasonable possibility" is not clear and convincing. Meanwhile, the district court did not address the extensive countervailing evidence that participants in the ETSI standard setting would not have found a timely IPR disclosure by Nokia to be material. The purpose of the ETSI IPR policy is to avoid patent "hold up" and Nokia previously committed to license all its essential patents on FRAND terms.

The district court's third error is one of fact, in holding that the '151 Patent is essential, or "all but" essential, despite this Court having held, consistent with all of the evidence, that the single TAV approach disclosed by the '151 Patent is at most an option within the GPRS standard. The district court made clear that its finding that Nokia and Conversant Wireless received an unfair benefit relies entirely on this

finding of essentiality, finding, for example, that "[t]he '151 patent became standards-essential when ETSI incorporated the method into the GPRS standard, allowing Conversant to extract licenses from industry participants." Appx41. However, this Court's findings, as well as ETSI's IPR procedures, make clear that to be "essential" means that the standard cannot be practiced without practicing the essential patent. Thus an option is not, by definition, essential. The district court further found that *Core Wireless* "**all but** held that the '151 patent was essential to the GPRS standard" because "mobile devices were required to have the capability to operate in accordance with the patented method." Appx42. This is unsupported by either *Core Wireless* or the record. The district court's finding is based on the it's underlying confusion between the three different timing advance approaches or modes — continuous, initial, and on-demand – with the optional use in the continuous mode of either the infringing single timing advance value ("TAV") option or the alternative approach of the two-TAV option. Conversant's and Apple's witnesses agreed at trial that the standard gives mobile phones, including Apple's infringing products, the choice to not use the single TAV approach. The district court order cites no evidence to the contrary.

STATEMENT OF SUBJECT MATTER JURISDICTION

The District Court had jurisdiction over this case under 28 U.S.C. §§ 1331 and 1338(a). This Court has jurisdiction under 28 U.S.C. § 1295(a)(1).

STATEMENT OF ISSUES ON APPEAL

1. Whether, in determining that Patent No. 6,477,151 (the "'151", or the "'151 Patent") is unenforceable, the district court committed an error of law in failing to apply a "but for" standard of causation, or indeed any lesser, known standard of causation, to the question of whether Nokia's untimely disclosure to a standard setting committee "resulted in" an unfair benefit to Nokia or its successors.

2. Whether the district court committed an error of law in failing to apply the clear and convincing standard of evidence, or require Apple to meet its burden under this standard, to the question of whether Nokia's untimely disclosure "resulted in" an unfair benefit to Nokia or its successors.

3. Whether the district court clearly erred in the finding that the '151 Patent is "essential" to the GPRS standard, where this Court's findings in *Core Wireless*, ETSI's definition of "essential," and the testimony of all experts testifying at trial was that the patented invention was optional in the standard, and companies practicing the standard were not required to practice the '151 Patent.

STATEMENT OF THE CASE

In December 2016, the district court conducted a six-day jury trial. After each side presented numerous fact and expert witnesses and dozens of relevant documents, the jury deliberated for four days. The jury found claim 14 of the '151 Patent infringed and not invalid. Appx1071. On December 12, 2016, the district court conducted a bench trial and heard direct and cross-examination testimony directed to Apple's equitable argument that the '151 Patent is unenforceable. In a December 22, 2016 Order, the district court found that Apple failed to show that the Patent is unenforceable. Appx1089-1092. Judgment was entered on that same day. Appx1093.

Apple appealed to the Federal Circuit. On Appeal, this Court upheld the jury's verdict that claim 14 of the '151 patent was valid and infringed by Apple, but vacated and remanded the district court's determination on Apple's unenforceability defense. Appx2479-2500.

On remand, Apple filed a Motion for Judgment of Unenforceability of U.S. Patent No. 6,477,151. Appx2534-2563. Conversant Wireless[1] opposed, and Apple filed a reply. Appx2931-2961; Appx4245-4265. At Apple's request, the record for this briefing was limited to the trial record and prior discovery in the underlying

[1] Core Wireless Licensing S.A.R.L. changed its name to Conversant Wireless Licensing S.A.R.L. on July 17, 2017. Appx6180.

cases between these parties. Appx2526 at 10:4-17. After a hearing on May 1, 2019, the Court issued an order on May 10, 2019 granting Apple's motion. Appx34-44. In this Order, the Court did not find any "egregious misconduct" by the original patent holder Nokia or Conversant Wireless, but did find Nokia and Conversant "inequitably benefited" from Nokia not timely disclosing to a standards-setting organization a patent application relating to the '151 Patent. *Id*. Conversant appeals that order.

STATEMENT OF FACTS

I. THE ’151 PATENT

A. The State of the Art Prior to the “Single Timing Advance Value (‘TAV’)” Invention in the ‘151 Patent

The ’151 Patent claims an improved solution to problems associated with the propagation delay in the existing General Packet Radio Service (“GPRS”) system. Appx50 at 1:25-57. In this system, mobile stations, such as cell phones, avoid interfering with one another by scheduling their transmissions to arrive at the base station in specific time slots assigned to each mobile station. *Id.* at 1:33-47; Appx51 at 3:36-38.

The transmissions from each mobile station to a base station are not instantaneous, but rather, involve a time lag. This time lag is known as “propagation delay.” Appx50 at 2:18-31. For a transmission to arrive in its correct time slot, the mobile station must send each transmission a short time before it is scheduled to arrive. *Id.* That amount of time is known as the “timing advance value” (“TAV”). *Id.*

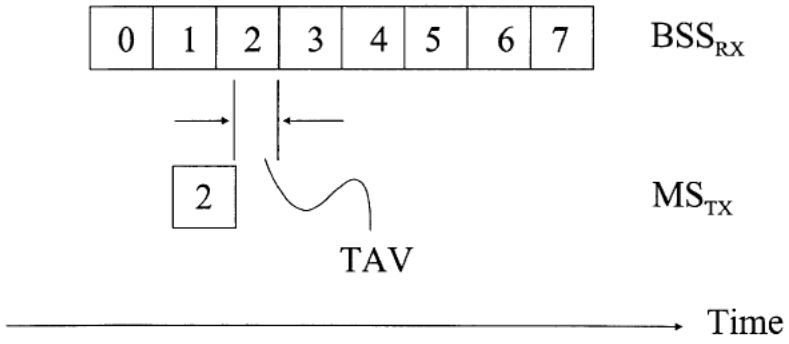


Figure 3

Appx46

Because they may move rapidly relative to the base station, mobile stations need to receive an updated TAV at regular intervals to continue to send transmissions on schedule. Appx50 at 2:28-31.

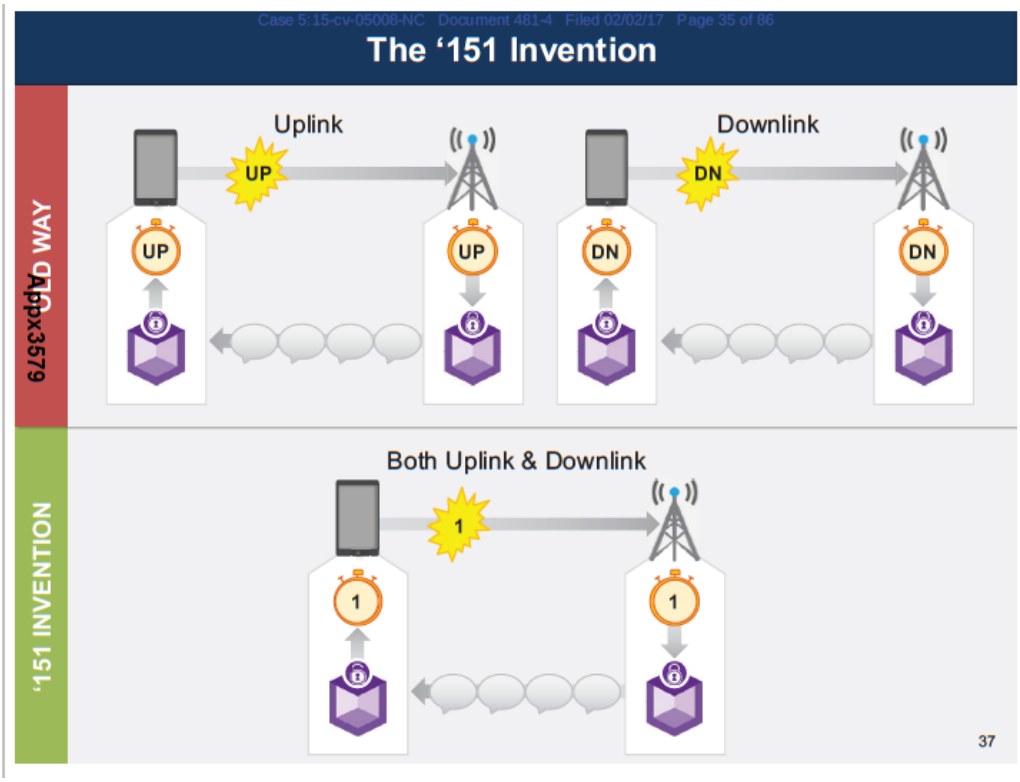
In old GPRS systems, the TAV was separately updated for each active uplink and downlink channel once every eight multiframes (*i.e.,* a "multiframe structure"). *Id.* at 1:38-57, 2:48-52; Appx348; Appx373. To update the TAVs for the uplink and downlink channels, the mobile station transmitted "timing access bursts" every eight multiframes – one for each channel. Appx50 at 2:39-52. At the time of the '151 Patent's invention, GPRS systems could perform three timing advance procedures or modes: "initial," "continuous" and "on-demand" (or "as-needed"). Appx365 at 394:14-18; Appx659 at 896:7-15. All three timing advance procedures are in the standard and are "different ways to get the job done" and each procedure could be used with the exclusion of the other two. Appx457 at 449:16-450:20. The '151

Patent concerns only the "continuous" timing advance procedure (the "continuous mode"). Appx365 at 394:19-22.

B. Claim 14 of the '151 Patent Covers the Use of A Single-TAV in the Continuous Mode

The '151 Patent recognized that an inefficiency resulted from the legacy of the base station repeating the channel-set up stage for both the uplink channel and the downlink channel. Appx51-52 at 3:36-56, 6:45-57. Every time a channel was established, the base station gave the mobile station a new timing advance index ("TAI"), which meant that a mobile station using uplink and downlink channels would receive two TAIs, send two bursts, and receive two TAVs, every multiframe structure. Appx50 at 2:39-52.

The '151 Patent provided an improvement to the existing GPRS system by configuring the mobile station to receive only ***a single timing advance value for all channels***, both uplink and downlink. Appx51-52 at 3:59-67, 6:58-7:10. This key change improved battery life on the mobile stations and resulted in less interference between mobile stations. Appx350. And because time slots are no longer reserved for the redundant timing access burst, timing advance index, and TAV, the '151 Patent approach can double the number of time slots available for additional mobile stations to transmit and receive timing advance information. Appx51 at 3:59-67.



Appx3579

Appx1158

II. NOKIA'S TECHNICAL PROPOSAL RELATING TO THE '151 PATENT WAS "REJECTED AND REPLACED" BY ERICSSON'S PROPOSAL, WHICH RENDERED NOKIA'S PROPOSAL OPTIONAL

Jarkko Oksala came up with the invention that would lead to the '151 patent in 1997, when he was an engineer at Nokia. Appx5442.

The European Telecommunications Standards Institute ("ETSI") was established in 1988 to develop and set European telecom standards. Appx2970 at ¶ 15. Its standards, including GSM (which includes GPRS) and UMTS, are used worldwide in mobile phones. *Id.* at ¶¶ 15 and 16. ETSI depends on member contributors to develop the standards that run mobile phones and other

telecommunications equipment. ETSI holds periodic meetings where technical delegates from members develop, discuss and agree on standards.

On November 10, 1997, ETSI began a meeting of the SMG2/3 WPA working group in Sophia Antipolis, France. Appx3288. During that working group meeting, technical proposals for the GPRS cellular phone specification were discussed. Nokia submitted a "Change Request" embodying Mr. Oksala's invention (the "Nokia Proposal"). The Nokia Proposal suggested a change to Section 6.5.7.2, a section titled "continuous timing advance update." Appx5436-5438. The Nokia Proposal noted that under the proposed standards "the network allocates the TAI-value[2] for each MS in the assignment procedure and the value is then further used in the continuous timing update procedure." *Id.* The Nokia Proposal was that "the network should allocate only one TAI-value for the MSs having bi-directional data transfer active." *Id.* The Nokia Proposal further described in its "Reason for change" that, without the proposal, "each MS having bi-directional data transfer active would, in the worst case, have two different TAI-values allocated." *Id.* In other words, under the current standard, two "TAI-values" could be allocated, but Nokia was proposing that the standard require that only one "TAI-value" be used for both up-link and down-link communications. The specific change Nokia recommended to Section 6.5.7.2 is:

[2] *I.e.,* timing advance value or "TAV."

> For each MS having allocated TAI-value and uni-directional data transfer active, the network must use the same TAI-value for new packet data transfer allocation to the opposite direction. In other words, only one TAI-value shall be allocated to MS having bi-directional packet data transfer active.

Appx5438.

Shortly thereafter, during the December 1-4, 1997 SMG2 Plenary meeting in Cork, Ireland, the ETSI group "postponed and forwarded" Nokia's proposal to the next meeting. Appx3317. Subsequently, in an early/mid-January 1998 meeting in Germany, Nokia's change proposal reflecting Mr. Oksala's invention was "rejected and replaced" with a proposal by Ericsson ("the Ericsson Proposal"). Appx3354.

Like the Nokia Proposal, the Ericsson Proposal suggested a change to Section 6.5.7.2, "continuous timing advance update," and acknowledged that under the current standard two "TAI-values" could be allocated to be used in the continuous timing update procedure. Appx3320-3321. The Ericsson Proposal recommended that the standard not be changed to require one TAI-value, because using two TAI-values "might increase the complexity but also improve the performance." Appx3320. The Ericsson Proposal strikes entirely the proposed change of section 6.5.7.2 in the Nokia Proposal, and instead adds:

> If an MS is allocated different TAI-values for simultaneous uplink and downlink packet transfer, ***the MS may choose to use any one or both*** of the idle slots determined by the TAI value to send access bursts. In case both slots are used, the MS shall use the received TA value corresponding to the last transmitted burst.

Appx3321 (emphasis added).

The GPRS standard was "frozen" in June 1998 – six months after the Nokia Proposal was rejected and replaced with the Ericsson Proposal.

Accordingly, the Nokia Proposal never became part of the GPRS standard, but instead was rejected and replaced with the Ericsson Proposal, which made it the mobile phone's option to use to one TAI or use two.

III. APPLE SPECIFICALLY DESIGNED ITS PRODUCTS TO USE A SINGLE TAV IN THE CONTINUOUS MODE

Apple's infringing products work with "base stations" or cell towers that belong to cellular carriers. Appx629 at 775:3-17. The GPRS Standard describes that the base station sends a "timing advance index" that schedules an access burst for communication channels. Appx319-320 at 213:12-214:8; Appx346 at 320:10-321:8. The standard provides that a mobile phone that chooses to engage in continuous mode has the ***option*** to use: (1) separate timing advance indexes for the uplink and downlink channels, ***or*** (2) one timing advance index for both channels. Appx325; Appx360-361; Appx658-659. The mobile phone, not the base station, chooses whether to actually use the TAI to perform an access burst and receive a TAV for both channels or one channel. Appx361 at 378:19-379:8. Based on implementing specific source code, Apple ***chose option (2)*** and specifically designed its phones to use only one TAV for a multiframe in its continuous mode of operation. Appx352; Appx361. Because they use one timing advance index for both

channels, Apple's products send only one timing access burst and, necessarily receive only one TAV, for a multiframe structure. Appx352; Appx361; Appx777.

IV. ETSI'S IPR POLICY, WHOSE EXPRESS GOAL IS TO ENSURE THAT ALL IPR ESSENTIAL TO THE STANDARD ARE AVAILABLE TO LICENSE ON FRAND TERMS

During the relevant 1997 timeframe, ETSI had an interim IPR policy in place. The IPR Policy required that:

> Each MEMBER shall use its reasonable endeavors to timely inform ETSI of ESSENTIAL IPRs it becomes aware of. In particular, a MEMBER submitting a technica1 proposal for a STANDARD shall, on a bona fide basis, draw the attention of ETSI to any of that MEMBER's IPR which might be ESSENTIAL if that proposal is adopted.

Appx3335. The ETSI policy defined "ESSENTIAL" to mean "that it is not possible [to] comply with a STANDARD without infringing that IPR." *Id.*

The interim policy advised that the sole "Objective" of this policy was to "reduce the risk to ETSI, MEMBERS, and others applying ETSI STANDARDS, that investment in the preparation, adoption and application of STANDARDS could be wasted as a result of an ESSENTIAL IPR for a STANDARD being **unavailable**." Appx3331 (emphasis added). As noted in other ETSI documents, "unavailable" means a participant who holds an actually essential patent refuses to license the patent or refuses to license it on FRAND terms, thus rendering the patent "unavailable" to makers and users of telecommunication devices. Appx3025; Appx3331; Appx3179 at ¶ 6; Appx3185-3186 at ¶ 59. In the words of Apple's

expert on ETSI procedures, "the policy ensures that licenses for all technology essential to conforming to a standard are available to all parties wishing to implement the standard on FRAND terms." Appx3048-3049 at ¶ 18.

Thus the aim of the ETSI's IPR policy, including its timely disclosure requirements, was not to ensure selection of technical proposals that have no corresponding IPR, but rather to ensure that any technical solution that is adopted would be available to use under FRAND licensing terms. As an extensive review by ETSI of its IPR policy in 2003-2004 concluded,

> The main task of a Technical Body is the search for the best technical solution and the existence of essential lPRs is not a barrier. Non-disclosure of essential IPR in a specific technical solution ***is not a problem for the Technical Body*** unless, ultimately, licenses are not available under FRAND conditions …"

Appx3112 (emphasis added). *See also* Appx3331: ("3.1 STANDARDS shall be based on solution which best meet the technical objectives of the European telecommunications sector, as defined by the General Assembly.").

V. NOKIA MADE A BLANKET IPR "FRAND" COMMITMENT TO ETSI IN JANUARY 1997

In January 1997, Nokia made a blanket FRAND commitment to ETSI to license all of its patents and patent applications essential "to the GSM standard (relating to HSCSD and GPRS)" in accordance with Section 6.1 of the IPR Policy. Appx3240. As noted by Antii Toskala, a Nokia engineer who has been involved in Nokia's participation in standard setting since 1997, such a general "early

commitment" was uncommon among ETSI's members. Appx2976-2977 at ¶¶ 43, 46, 47. Thus, prior to the Nokia Proposal, Nokia had made clear it would not make IPR "unavailable." *See* Appx3068-3070 (Expert Report of Richard Buttrick) at ¶ 27 ("So by giving a general FRAND Licensing undertaking a participant has given sufficient assurance for its technologies to be selected by a Technical Body for a standard").[3]

VI. NOKIA MADE ITS SPECIFIC '151 PATENT IPR DISCLOSURE IN NOVEMBER 2002

On November 11, 1997, Nokia filed the Finnish patent application to which the '151 Patent claims priority, listing Mr. Oksala as the named inventor. Appx45. That application (No. 974200) lapsed in mid-1998. Appx5089. After the November 10-14 ETSI meeting, on November 21, 1997, Nokia filed another Finnish patent application. That application issued to a Finnish patent in December 2002. Appx5090, Appx3288.

Nokia did not disclose the pending application to ETSI. As the district court found in its order in the first bench trial on this issue, Nokia was waiting until after its claims progressed through patent prosecution before declaring the '151 Patent to ETSI, so the contours of the claims would be set. Appx1091. On November 10, 1998, Nokia filed a U.S. Patent Application (09/189,590), which eventually issued

[3] Richard Buttrick is an expert in "licensing in the context of industry standards relating to telecommunications and electronics." Appx3058 at ¶ 1.

on November 5, 2002 to be U.S. Patent 6,477,151. Appx45. Nokia received its first Notice of Allowance during the prosecution of the '151 patent in June 2002. Appx5069. Nokia specifically disclosed the '151 patent to ETSI one month later in July 2002—and re-confirmed its January 1997 blanket commitment to license the patent in accordance with FRAND and Section 6.1 of the ETSI IPR Policy. Appx3339.

VII. THE DISTRICT COURT FOUND THE '151 PATENT UNENFORCEABLE AGAINST PRODUCTS PRACTICING THE GPRS STANDARD

This district court's findings on remand were made over three pages of its order. After recognizing that this Court had held that the doctrine of implied waiver "should only be applied in instances where the patentee's misconduct resulted in [an] unfair benefit," the district court noted that "Apple contends that Conversant obtained benefits in the form of licensing fees and by increasing its leverage over industry participants who must produce standards-compliant products." Appx40-41. The district court then held that Nokia and Conversant Wireless had received an unfair benefit because the '151 patent was standard essential:

> Here, Nokia and Conversant have obtained such an unfair competitive advantage. *The '151 patent became standards-essential when ETSI incorporated the method into the GPRS standard, allowing Conversant to extract licenses from industry participants.* At trial, John Lindgren, Conversant's CEO, testified that Nokia and later Conversant licensed the '151 patent as part of a patent portfolio to numerous third parties, including Nokia's licenses to Microsoft, Sony, and Ericsson. *See* Trial Tr. at 606:18–23. And Nokia's patent licensing offer to Apple states that its essential patent families,

> which includes the '151 patent, commands substantial royalties. *See* PX0560 at 1–3. *This undeserved competitive advantage is further bolstered by the fact that the '151 patent is essential. Cf. Core Wireless*, 899 F.3d at 1367 ("[T]here is no ground for dispute that Nokia's proposal, if adopted, would have made [the '151] patent standards-essential."). As Lindgren recognized, "[s]tandards-essential patents cannot be 'designed around' and must be licensed by anyone using the standard."

Appx41 (emphases added).[4]

The district court recognized that the Nokia Proposal was in fact rejected by ETSI, but found that "[t]he Federal Circuit, however, *all but held* that the '151 patent was essential to the GPRS standard." Appx42. Although the district court noted that this Court's *Core Wireless* opinion had stated that the inventor "Oksala . . . explained the difference between [Nokia's] proposal and Ericsson's by pointing out that Ericsson's proposal is different only because it made his idea 'optional'", the district court nevertheless held:

> The patented method, however, was only optional for base stations; mobile devices were required to have the capability to operate in accordance with the patented method. Indeed, the jury found, and the Federal Circuit affirmed, that Apple's devices infringed the '151 patent because they were configured to operate in accordance with the patented method. As the Federal Circuit explained:
>
> > "[I]nfringement is not avoided merely because a non-infringing mode of operation is possible." *z4 Techs., Inc. v. Microsoft Corp*., 507 F.3d 1340, 1350 (Fed. Cir. 2007); *see also VirnetX, Inc. v. Cisco Sys., Inc*., 767 F.3d 1308, 1322 (Fed. Cir. 2014). To take a simple example, a patent that claims an automobile configured to operate in third gear

[4] This quotation of the district court's order includes corrected language included upon agreement of the parties and order of the district court. Appx4368-4372; Appx4390.

> would be infringed by an automobile that is configured to operate in first, second, and third gears. The automobile is at all times configured to operate in any one of its possible gears, including the infringing one, even if the automobile is never driven in the infringing gear. Similarly, claim 14 [of the '151 patent] is satisfied as long as Apple's devices are configured to operate in a mode that receives a TAV only once per multi-frame structure and uses it for all channels."

Id. at 1363. In short, the '151 patent was essential because industry participants must design their devices to be compatible with the patented method. *Cf. Momenta*, 298 F. Supp. 3d at 268 ("[T]he fact that the jury found that the [defendant] . . . infringe[d] the . . . patent supports an inference that use of the invention disclosed by the . . . patent 'reasonably might be necessary to comply with [the standard].").

Appx42. The district court also found that Nokia and Conversant's commitment to license the '151 Patent on FRAND terms was irrelevant because the '151 Patent was essential, finding that "[i]f the '151 patent was not essential, third parties may not have been required to obtain a license, regardless whether the license was on FRAND terms." Appx43.

The district court then turned to the question of whether Apple was required to present evidence that any specific unfair benefit related to the putative essentiality of the '151 Patent, holding that Apple had no such burden:

> Conversant argues that Apple failed to specifically trace any licensing revenue to the '151 patent. This argument is unpersuasive. Lindgren testified at trial that "it is rare for companies to take licenses to individual enumerated patents." Trial Tr. at 607:1–2. Requiring proof that a particular patent conferred specific monetary benefits would ignore that common practice. Rather, the Court infers from the fact that Conversant specifically identified the '151 patent for enforcement that the '151 patent has significant worth. Furthermore, the benefit conferred by the '151 patent was not limited to licensing revenue. As Nokia recognized, the value of each standards-essential

> patent lay not only in revenue attributable to it, but also in increasing Nokia's leverage by bolstering its patent portfolio. *See* PX0603 at 7.

Appx43.

Finally, on the question of whether Apple had met its burden "to connect [Nokia's] nondisclosure with the inequitable benefit," the district court again held that no such burden applied:

> Such but-for proof, however, is not required. Nokia's failure to disclose its IPR deprived ETSI members the opportunity to make a fully informed decision as to the technical solution for the GPRS standard. *See Core Wireless*, 899 F.3d at 1366. Nokia and Conversant cannot now "rely on the effects of its misconduct to shield it from the application of the equitable defense of implied waiver." *Qualcomm II*, 548 F.3d at 1021. In any case, Dr. Michael Walker, former Chairman of the Board of ETSI, testified that ETSI members are incentivized to choose technical solutions that are free of licensing costs. *See* Trial Tr. at 1420:2–14. Dr. Walker's testimony *suggests that, had Nokia disclosed its IPR, there was a reasonable possibility that the '151 patent would not have been incorporated into the GPRS standard.*

Appx43 (emphasis added).

Based on these findings, the district court held that "Nokia's failure to disclose its IPR allowed Nokia and Conversant to inequitably benefit from that misconduct," and further held that "Conversant has implicitly waived its rights to enforce the '151 patent against products practicing the GPRS standard." Appx43-44.

SUMMARY OF THE ARGUMENT

Three separate errors by the district court require reversal of its judgment of unenforceability. The first is an error of law and a failure to squarely address the question on remand. The Court in *Core Wireless* held that a finding of implied waiver requires proof of "but for" causation: "[b]ecause implied waiver, like the doctrine of inequitable conduct discussed in *Therasense*, may render an entire patent unenforceable, ***the doctrine should only be applied in instances where the patentee's misconduct resulted in an unfair benefit****."* 899 F.3d at 1368**,** quoting *Therasense*, 649 F.3d at 1292 (emphasis added). The Court thus remanded for a determination of whether "'inequitable consequence ***flowed from*** Nokia's failure to disclose its patent application." 899 F.3d at 1368 (emphasis added). The district court, however, incorrectly held that "such but-for proof . . . is not required," and in fact did not require proof of any specific standard of causation, holding that Apple had no burden to "connect [Nokia's] non-disclosure with the [alleged] inequitable benefit." Appx43.

The district court's second error is another error of law in its refusal to apply the correct clear and convincing standard of proof on the issue of materiality and causation. Where the district court looks to evidence at all, it accepts as sufficient proof evidence that, by the district court's own admission, no more than "**suggests that**, had Nokia disclosed its IPR, there was a **reasonable possibility** that the'151

patent would not have been incorporated into the GPRS standard." Appx43. Evidence that "suggests" a "reasonable possibility" is not clear and convincing. Meanwhile, the district court does not address the extensive countervailing evidence that participants in the ETSI standard setting would not have found a timely IPR disclosure by Nokia's to be material, had it been disclosed, given the purpose of ETSI's IPR policy. That purpose was to avoid patent "hold up", which was not at issue at the time of the Nokia Proposal because of Nokia's prior commitment to license all essential patents on FRAND terms. More generally, the district court simply failed to require Apple to meet its burden of proof, on the grounds that it might be hard to do so. But extensive case law emphasizes the importance of holding parties seeking the extreme sanction of unenforceability to their burden to prove causation and unfair benefit by clear and convincing evidence.

The district court's third error is one of fact, in holding that the '151 Patent is essential, or "all but" essential, despite this Court having held, consistent with all of the evidence, that the single TAV approach disclosed by the '151 Patent is at most an option within the GPRS standard. The district court makes clear that its finding that Nokia and Conversant Wireless received an unfair benefit relies entirely on this finding of essentiality, finding, for example, that "[t]he '151 patent became standards-essential when ETSI incorporated the method into the GPRS standard, allowing Conversant to extract licenses from industry participants." Appx41.

However, this Court's findings, as well as ETSI's IPR procedures, make clear that to be "essential" means that the standard cannot be practiced without practicing the essential patent. Thus an option is not, by definition, essential. Moreover, this Court in *Core Wireless,* as well as both Conversant Wireless's and Apple's experts, agreed that the single TAV approach was entirely optional in the standard. The district court's further finding that *Core Wireless* "**all but** held that the '151 patent was essential to the GPRS standard" because "mobile devices were required to have the capability to operate in accordance with the patented method" (Appx42) is similarly unsupported by either *Core Wireless* or the record. This finding is based on the district court's underlying confusion between the three different timing advance approaches or modes — continuous, initial, and on-demand – with the optional use in the continuous mode of either the infringing single-TAV option or the alternative approach of the two-TAV option. And, again, the evidence is that mobile devices, including Apple, are not required, by the standard or otherwise, to support the single TAV approach.

ARGUMENT

I. STANDARD OF REVIEW

Whether the '151 Patent is unenforceable due to waiver is a legal question with factual underpinnings.. Legal error is reviewed de novo. *Genentech, Inc. v. Chiron Corp.*, 220 F.3d 1345, 1351 (Fed. Cir. 2000). Moreover, the question of whether the district court properly interpreted the mandate of this Court in *Core Wireless* is reviewed de novo. *Tronzo v. Biomet, Inc*., 236 F.3d 1342, 1346 (Fed. Cir 2001). The district court's factual findings are reviewed for clear error. *Anderson v. City of Bessemer*, 470 U.S. 564 at 573 (1985)

As Apple has acknowledged, it bears the heavy burden of proving unenforceability due to waiver by clear and convincing evidence. *See* Appx2537 ("Issues to Be Decided" are "[w]hether clear and convincing evidence" supports finding of inequitable benefit or egregious misconduct). *See also Therasense, Inc.,* 649 F.3d at 1287 (Fed. Cir. 2011) (the accused must prove inequitable conduct, including materiality, by clear and convincing evidence); *Core Wireless,* 899 F.3d at 1368 (because "implied waiver … like inequitable conduct involves the breach of a disclosure duty," "analogous" requirements apply).

II. THE DISTRICT COURT COMMITTED LEGAL ERROR BY FAILING TO REQUIRE APPLE TO DEMONSTRATE BUT-FOR CAUSATION OR EVEN ANY LESSER STANDARD OF CAUSATION

A. This Court's Binding Precedent Requires A Finding That Nokia's Untimely Disclosure Was the But-For Cause of An Unfair Benefit to Nokia Or Its Successors

The district court held that "[]Conversant asserts that Apple has not met their burden because they failed to connect their non-disclosure with the inequitable benefit. ***Such but-for proof, however, is not required***." Appx43 (emphasis added). This was legal error. The panel in *Core Wireless* made clear that a finding of unenforceability under the equitable implied waiver doctrine requires proof of but-for causation: "Because implied waiver, like the doctrine of inequitable conduct discussed in *Therasense*, may render an entire patent unenforceable, ***the doctrine should only be applied in instances where the patentee's misconduct resulted in an unfair benefit***." 899 F.3d at 1368**,** quoting *Therasense*, 649 F.3d at 1292 (emphasis added).[5]

In citing to *Therasense* at 649 F.3d at 1292, *Core Wireless* makes clear that "***resulted in an unfair benefit***" in this context means: the unfair benefit would not have occurred "but-for" the patentee's misconduct. That passage from *Therasense* is expressly about the requirement for proof of but-for materiality, which is expressly synonymous with "misconduct result[ing] in the unfair benefit":

> This court holds that, as a general matter, the materiality required to establish inequitable conduct *is but-for materiality*…Because inequitable conduct

[5] *See also* 899 F.3d at 1368 (remanding the issue of unenforceability to the District Court to determine whether "'**inequitable consequence** flowed from Nokia's failure to disclose its patent application.'") (emphasis added)**.**

> renders an entire patent (or even a patent family) unenforceable, as a general rule, this *doctrine should only be applied in instances where the patentee's misconduct resulted in the unfair benefit* of receiving an unwarranted claim[.] *After all, the patentee obtains no advantage from misconduct if the patent would have issued anyway*.

649 F.3d at 1292 (emphasis added).

As *Therasense* makes clear, the basis of this requirement for but-for causation is the extreme nature of equitable relief of the sort sought by Apple in this case. The *en banc* Court in *Therasense* recognized "perhaps most importantly, the remedy [of unenforceability] is the 'atomic bomb' of patent law." 649 F.3d at 1288. Courts have further consistently held that the analysis and determinations that could detonate that "atomic bomb" of unenforceability should be applied consistently, no matter the equitable defense. *See, e.g., Eckes v. Card Prices Update*, 736 F.2d 859, 861–862 (2d Cir. 1984) ("Only the 'knowing failure to advise the Copyright Office of facts which might have occasioned a rejection of the application constitute[s] reason for . . . denying enforcement on the ground of unclean hands....").

The *only* exception to this requirement for a finding of causation is a finding of egregious misconduct, which of course the district court expressly found does not exist here. The district court recognized this rule, even while failing to apply it:

> Because implied waiver is an equitable defense, however, the doctrine "may only be applied in instances where the patentee's misconduct resulted in [an] unfair benefit." *Core Wireless*, 899 F.3d at 1368 (quoting *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1292 (Fed. Cir. 2011) (en banc)). Alternatively, implied waiver may also be found in cases of "egregious

> misconduct sufficient to justify the sanction of unenforceability of the patent at issue." *Id.*

Appx36.

B. The District Court Failed to Require Proof That Nokia's Untimely Disclosure Was the But-For Cause of An Unfair Benefit Or, Indeed, Require Proof of Any Lower, Specific Standard of Causation

As the above caselaw makes clear, the district court should have required proof that Nokia's late disclosure of the Finnish patent "resulted in" an unfair benefit, *i.e*., proof of but-for causation. But not only did the district court not require proof of but-for causation, it did not require proof of any specific standard of causation at all. The district court held, as noted above, not just that proof of but-for causation is not required, but that Apple need not even "connect [Nokia's] nondisclosure with the inequitable benefit." Appx43.

The district court confirmed its rejection of a requirement for proof of causation by stating "Nokia and Conversant cannot now 'rely on the effects of its misconduct to shield it from the application of the equitable defense of implied waiver.'" *Id*., quoting *Qualcomm Incorporated v. Broadcom Corp*. 548 F.3d 1004, 1021 (Fed. Cir. 2008). As its quote from and citation to *Qualcomm* make clear, the district court is relying on the holding in *Qualcomm* that a party advancing an implied waiver defense can "succeed on an implied waiver defense without specific findings as to detrimental reliance by [that party]." *Id*. *See also* Appx4261 (Apple's Reply Brief) at 13, the apparent source of this argument. The district court stretched

Qualcomm's finding that an accused infringer need not show that it would have acted differently if not for the patent-holder's failure to disclose, which is but one form of causation, to mean that neither proof of but-for causation, nor indeed proof on any specific standard of causation, is required.

This stretches the narrow issue addressed by *Qualcomm* (reliance by a defendant implementing the standard) far beyond its original application. In any case, to the degree *Qualcomm* fails to recognize a requirement for proof of causation in an implied waiver defense: (a) *Qualcomm* turns on a finding of egregious misconduct (*see* Appx39), an exception to the rule that causation must be proved; and (b) *Qualcomm* predates and is overruled by the *en banc* holding of *Therasense*, to the extent there is any contradiction between *Qualcomm* and the requirements for proof of causation articulated in *Therasense* and *Core Wireless.*

The district court made a fundamental error of law in failing to require proof of but-for causation, or of any particular standard of causation. Reversal is therefore required. As discussed below in Section II, the record demonstrates that, had the district court required Apple to prove causation by the correct clear and convincing standard of proof (which it did not), Apple could not meet this burden. Its equitable defense of unenforceability must fail.

C. Contrary to the District Court's Suggestion, This Court in *Core Wireless* Did Not Already Determine that Nokia's Untimely Disclosure "Resulted In" An Unfair Benefit

The district court's order rests on the premise that this Court may have already determined causation in its finding in *Core Wireless* that "'Nokia's failure to disclose its IPR deprived ETSI members of the opportunity to make a fully informed decision as to the technical solution for the GPRS standard." Appx43 citing *Core Wireless*, 899 F.3d at 1366.. However, while *Core Wireless* found ETSI did not have information it *might* have found relevant, the Court did not find that the information ETSI was deprived of was in fact relevant to its decision-making, or that ETSI would in fact have not included the single TAV approach as an option, through the Ericsson Proposal, in the standard had Nokia made its disclosure prior to the standard being locked on June 8, 1998. The entire point of the remand was to determine this very point.

For example, the passage from *Core Wireless* relied upon by the district court, goes only to the question of whether Nokia had breached its duty of disclosure, not the actual resulting consequences of that failure:

> The district court's interpretation of the policy would undermine the very purpose of disclosure, which Dr. Walker testified was to permit the standards-setting decisionmakers to make an informed choice about whether to adopt a particular proposal. Dr. Walker's unrebutted testimony made it clear that an ETSI member's duty to disclose a patent application on particular technology attaches at the time of the proposal and is not contingent on ETSI ultimately deciding to include that technology in an ETSI standard.

899 F.3d at 1367. This passage, like the holding in *Core Wireless* in general, goes only to the question of whether Nokia violated ETSI's rules. Here specifically, the Court considered whether ETSI's disclosure rule depends on whether that IPR was ultimately adopted in the standard. The Court found such a duty exists because the IPR disclosure *might* be material. The Court did not decide what would have happened if Nokia had made a timely disclosure, or, to put it another way, what the result of Nokia's untimely disclosure was. To read this passage to mean that Nokia's late disclosure caused it to receive an unfair benefit would be to render this remand moot, as this is the very question the Court remanded to be answered.

Moreover, such a reading would imply that every breach of ETSI's IPR disclosure rules should result in unenforceability of that IPR, regardless of effect. Not only is this inconsistent with this Court's description of the remedy of unenforceability as the "'atomic bomb' of patent law," a remedy so extreme that but-for causation of an inequitable consequence must be proven by clear and convincing evidence, such a reading could render this extreme remedy extremely commonplace for patents owned by parties who have participated in standard setting. One estimate is that from 1996 through 2010, 88% of all IPR disclosed to ETSI were disclosed after the publication of the technical standard. Appx3083 at ¶ 53, citing "Accessing IPR Disclosures Within Standard Setting: An ICT Case Study," Anne Layne Farrar. The perverse result would punish common industry practice on IPR disclosures,

which consists of non-material technical violations of ETSI policy by companies who provided the technology and standards foundational to mobile phone industry.

III. THE DISTRICT COURT'S ERROR WAS NOT HARMLESS AND WAS COMPOUNDED BY THE FAILURE TO REQUIRE CLEAR AND CONVINCING PROOF OF A CAUSAL CONNECTION BETWEEN UNTIMELINESS OF DISCLOSURE AND AN UNFAIR BENEFIT

A. The District Court Expressly Failed to Apply the Clear and Convincing Burden of Proof to Whether Nokia's Untimeliness "Resulted In" An Unfair Benefit and, Instead, Asked Whether There Was a Mere "Reasonable Possibility" that It Did

The parties do not dispute the well-established burden of proof Apple has in establishing its implied waiver defense. In fact, Apple has acknowledged that it bears the heavy burden of proving unenforceability due to implied waiver by clear and convincing evidence. For example, in its Motion for a Judgment of Unenforceability, Apple stated that the "Issues to Be Decided" are "[w]hether clear and convincing evidence" supports finding of inequitable benefit or egregious misconduct. Appx2537. This is consistent with the holding in *Therasense* that the accused must prove inequitable conduct, including materiality, by clear and convincing evidence. 649 F.3d at 1287. As noted above, the same considerations requiring proof of causation in *Therasense* apply in the context of implied waiver. And the district court recognized that the clear and convincing standard applies, at least, to the question of egregious conduct. Appx39 ("Put simply, Apple has not shown by clear and convincing evidence that Nokia had an improper motive . . .").

Nevertheless, the district court failed to apply the clear and convincing standard to the question of whether Nokia's late disclosure "resulted in" an unfair benefit. The district court does not refer to this standard of proof in the context of this question at all, and makes no findings that Apple has met its burden of proof by clear and convincing evidence.

Instead, the district court held that Apple met its burden merely through the testimony of Apple's expert that "ETSI members are incentivized to choose technical solutions that are free of licensing costs . . .[which] ***suggests that***, had Nokia disclosed its IPR, there was a ***reasonable possibility*** that the'151 patent would not have been incorporated into the GPRS standard." Appx42 (emphasis added). What evidence the district court does cite does not and cannot meet this standard, as demonstrated by the district court's own characterization of this evidence, discussed below.

B. The Only Evidence the District Court Cites As Suggesting "Reasonable Possibility" Is Insufficient on Its Face to Meet the Clear and Convincing Standard

Evidence that merely "[s]uggests . . a reasonable possibility" obviously does not satisfy the clear and convincing evidence standard. But the evidence on which the district court relied is not even as strong as the district court claimed. Dr. Walker's testimony actually shows that, even if there is a theoretical circumstance where Nokia's IPR could have been seen as relevant by the ETSI committee (had

they not rejected the Nokia Proposal in any case), this circumstance did not exist in this case.

The relevant testimony was:

> Well, you may, for instance, see that there are a couple of proposals on the table, one of which IPR is essential for, and another may be totally IPR-free. Now, you wouldn't choose something just because it was IPR-free. Your requirement is to say, oh, choose the best technical solution. But if those two solutions were technically the best, then you're more likely to choose the one for which there was no cost ultimately to your company than the one that ultimately, no matter how small, there would be some cost.

Appx970 at 1420:2-14.

The circumstance Dr. Walker describes, in which the disclosure of IPR might lead to choosing one technical solution over another, posits a circumstance where one proposal is lower cost than another because it is not subject to IPR. However, there is no evidence in this case that there were alternatives to Nokia's technology that were not subject to IPR. There is no evidence, for example, that the two-TAV option recommended by the Ericsson Proposal was IPR-free, let alone of equal technical value but lower cost. Dr. Walker's testimony therefore cannot possibly be the basis for a finding that had Nokia disclosed its Finnish application, the single-TAV approach would not have been included as an option in the standard.

C. On the Other Hand, Overwhelming Evidence *Uniformly* Shows that ETSI Participants Would *Not Have* Excluded the Use of A Single Timing Value as An Option Had Nokia Timely Disclosed Its IPR

Moreover, in determining whether Apple has or can meet its clear and convincing burden, what evidence Dr. Walker's testimony provides must be considered in light of the overwhelming evidence that a timely Nokia disclosure would not have affected whether the single-TAV approach was included in the standard as an option.

Indeed, ETSI documents describing the purpose of its IPR disclosure policies (policies made by the very standard setting participants about whom Dr. Walker hypothesized above) make clear that the existence of Nokia IPR would not be considered to be a material factor in choosing among technical solutions, unless that IPR represented a potential "hold up" to implementation because it was not subject to licensing on fair, reasonable and non-discriminatory ("FRAND") terms. Accordingly, based on collective input from the organization, ETSI's 2004 document "Implementation of the ETSI IPR Policy" concludes that:

> The main task of the Technical Body is the search for the best technical solution and [] the existence of essential IPR is not a barrier. ***Non-disclosure of essential IPR in a specific technical solution is not a problem for the Technical body, unless, ultimately, licenses are not available under FRAND conditions[.]***

Appx3112 (emphasis added).

Even the interim ETSI IPR policy in place at the time of the Nokia Proposal made it clear that the ""Objective" of ETSI policy remained the same as in the 2004 guidance: to "reduce the risk to ETSI, MEMBERS, and others applying ETSI STANDARDS, that investment in the preparation, adoption and application of STANDARDS could be wasted as a result of an ESSENTIAL IPR for a STANDARD being *unavailable*." Appx3331 (emphasis added). The 2007 "ETSI Guide on Intellectual Property Rights (IPRs)," in its section "What is the Purpose of the IPR Policy," further defines what ETSI meant by "unavailable": "a Deliverable that could be subsequently blocked by an Essential IPR," because "licenses are not available under fair, reasonable and non-discriminatory (FRAND) terms and conditions." Appx3023. *See also* Appx3268 (2013 "ETSI Guide on IPRs" still containing the same section in 2013). In other words, in the words of Dr. Walker, "the policy aims to ensure that licenses for all technology essential to conforming to a standard are available to all parties wishing to implement the standard on FRAND terms." Appx3048-3049 at ¶ 18.

Thus, the evidence conclusively establishes that, even under the hypothetical circumstance Dr. Walker posits of a choice between two technically equal proposals, one of which is more greatly burdened by IPR, the existence of said IPR would only be of concern to ETSI members if it was not subject to a FRAND commitment. In this case, however, in January 1997 Nokia made a blanket FRAND commitment to

ETSI to license all of its patents and patent applications essential to GPRS. Appx3420. Dr. Walker conceded that "[a]ll the [ETSI] members there would be aware that Nokia had made a statement that it was prepared to—whatever IPR put into the standard, if it was essential, then it would license under FRAND terms." Appx3172 at 120:9-22. Thus there would have been no concern that the Finnish application might make the single TAV approach "unavailable," and no motivation to exclude the option of the single TAV approach. This is confirmed by Antii Toskala, a Nokia engineer who has been involved in Nokia's participation in standard setting since 1997, who stated "[i]n my own experience in standardization, there was never attempts (at least visible to me) by anybody to try to avoid a solution with potential Nokia essential IPR, since Nokia had made FRAND commitment early in the process." Appx2975 at ¶ 36.

More generally, the evidence is that participants in ETSI committee meetings did not concern themselves with IPR declarations at all. Dr. Walker could not recall a single instance of a member disclosing IPRs at a meeting discussing such proposals. Appx3161 at 87:7-12 ("Q: But in your, you testified earlier, 50 meetings that you were involved in over the years, you can't recall a single person ever making an IPR declaration; is that right? A: In the meetings I was involved with, that is absolutely correct."). In fact, no witness in this case who participated in ETSI

meetings could recall any occasions where IPR was announced at such a meeting. Appx3003 at 67:18-23; Appx3010 at 16:2-5; Appx3017 at 69:2-21.

The point here is not, as Apple argued below (*see, e.g.* Appx4250), that Conversant Wireless seeks to excuse Nokia's later disclosure or argue that Nokia's FRAND commitment cured its breach of ETSI policy. But the question before the district court was the effect of that breach, and whether it "resulted in," an unfair benefit to Nokia or its successors. The evidence is that participants in ETSI standard setting would not have regarded Nokia's Finnish application to be reason to exclude the single TAV approach from the standard, because Nokia's FRAND commitment satisfied the kind of concern such an IPR might raise. If Apple is held to its burden of proving by clear and convincing evidence that, had Nokia disclosed the Finnish application, the single TAV approach would not have been included as an option in the standard, it cannot meet this burden under this record.

D. Even Assuming The '151 Patent's Single-TAV Option Was "Incorporated Into The Standard" As A Result of Nokia's Untimeliness, the District Court Further Erred By Failing to Require Apple to Prove that Any Unfair Benefits Resulted from the Incorporation of that Option

1. The District Court's Finding of A Benefit to Licensing Is Unsupported by Clear and Convincing Evidence

The district court concluded that Nokia and Conversant somehow obtained licenses as a result of the "essentiality" of the '151 Patent, and cites in support of these alleged benefits testimony that Nokia and Conversant had "licensed the '151

patent as part of its patent portfolio to numerous third parties, including Microsoft, Sony, and Ericsson" and stated in negotiations that Nokia's "essential patent families, which includes the '151 patent, commands substantial royalties." Appx41.[6] As addressed below, the district court's finding that the '151 Patent is essential is an error of fact. But in any case, the district court cites no evidence, because there is none, that Nokia's licenses, encompassing portfolios of hundreds and sometimes thousands of patents, were affected by the alleged "essentiality" of the '151 Patent. There is no evidence in the record that anyone ever took a license from Nokia, or paid more for a license, because of the '151 Patent.

The district court recognizes this to be true, but instead of finding that Apple has therefore failed to meet its burden, the district court simply fails to hold Apple to that burden, holding that precisely because portfolio licensing in common this industry, the standard of proof should be suspended:

> Conversant argues that Apple failed to specifically trace any licensing revenue to the '151 patent. This argument is unpersuasive. Lindgren testified at trial that "it is rare for companies to take licenses to individual enumerated patents." Trial Tr. at 607:1–2. Requiring proof that a particular patent conferred specific monetary benefits would ignore that common practice.

Appx43.

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[6] The district court attributed these licenses to Conversant, but was misreading the trial transcript, which made clear that these were all large Nokia licenses pre-dated the assignment of the '151 to Conversant. The district court subsequently granted a motion to correct the order on this point. Appx4368-4372; Appx4390.

Essentially, the district court held that Apple need not meet its clear and convincing burden of proof because it is hard to do so. As an initial matter, the fact that patents are licensed in portfolios does not necessarily mean that it cannot be shown that a particular patent played a role in that license. For example, in a parallel context, it is not uncommon for a patent-holder to use a portfolio license including a patent in suit as a secondary indicia of non-obviousness, but the fact that the license is a portfolio license does not relieve that patent holder from showing that there is evidence that the patent in suit played a role in the decision to take the license or the royalty paid, *i.e*., a nexus between the license and the patent in suit. *ABT Systems, LLC v. Emerson Elec. Co.,* 797 F.3d 1350, 1361 (Fed. Cir. 2015). The district court relieved Apple of the burden of showing even a nexus, or a "connection" as the district court put it, let alone requiring Apple to actually prove causation by clear and convincing evidence.

The district court here seems to be buying into another argument Apple made for the first time in its Reply in support of its Motion: that Apple should be relieved of its burden because it is hard to meet, and because Nokia breached a duty. Appx4261 at n.8. Apple cited an antitrust case, *United States v. Microsoft*, 253 F.3d 34, 79 (D.D.C. 2001), in support of the principle that where it is difficult to prove something because of the defendant's bad conduct, "the defendant is made to suffer the uncertain consequences of its own undesirable conduct,'" with Nokia here being

presented as standing in the shoes of the "defendant." This cite does not apply here, as there is no evidence that Nokia is responsible for Apple's inability to prove an unfair licensing benefit. But more importantly, immediate after the passage in *Microsoft* cited by Apple, the D.C. Circuit makes clear that such burden lightening or shifting *does not apply* where extreme equitable relief is sought. In such cases, proof of causation cannot be disregarded: "[M]ore extensive equitable relief, particularly remedies such as divestiture designed to eliminate the monopoly altogether, raise more serious questions and require a clearer indication of a significant casual connection between the conduct and creation or maintenance of the market power." *Id.* This holding is consistent with the holding in *Therasense* requiring but-for causation where the extreme relief of extinguishing the monopoly right granted under a patent (*i.e.,* the right to exclude others from using the invention and seek damages where that right is violated) is sought.

The district court also found a more general "unfair benefit" related to licensing, through the '151 Patent's alleged contribution to the number and proportion of "essential" Nokia patents: "As Nokia recognized, the value of each standards-essential patent may not only in revenue attributable to it, but also in increasing Nokia's leverage by bolstering its patent portfolio." Appx43 citing Appx3250 (PX603-7). But Nokia "recognized" nothing of the kind: Appx3250 shows that Nokia is a "leader in telecommunication R&D, standardization and patent

ownership" because its patents make up a significant percentage of those in each standard. *Id.* But nowhere does Nokia say that the essentiality of a single patent is relevant to this leadership, let alone the '151 Patent specifically. In fact, Appx3250 shows Nokia claiming to have 274 patents declared essential to the GSM standard (which includes GPRS). Nokia also claimed that these patents represent 45% of the patents essential to the GSM standard. *Id*. Even if one were to assume that these 274 patents include the '151, and subtract that patent from the total, the result of Nokia being able to claim it has 274 rather than 273 patents is negligible: a change from 45% to 44.9%, a difference likely to be entirely eliminated by rounding up. This is certainly not clear and convincing proof of an unfair benefit resulting from Nokia's late disclosure.

2. The District Court's Finding of A Litigation Benefit Is Unsupported by Clear and Convincing Evidence

The district court also ascribed an "unfair benefit" to the fact that Conversant believed the '151 Patent had value in litigation, stating "the Court infers from the fact that Conversant specifically identified the '151 patent for enforcement that the '151 patent has significant worth." Appx43. But that Conversant asserted a patent against Apple is not clear and convincing evidence of an unfair benefit, especially given that Conversant was correct that Apple infringes the '151 Patent, as has been found by a jury and affirmed on appeal**.** After all, "enforcement of an otherwise valid patent does not injure the public merely because of misconduct, lurking

somewhere in [the past], that was immaterial to the patent's [enforcement]." *Core Wireless*, 899 F.3d at 1368.

Moreover, as discussed below, Apple chose to design its phones in an infringing manner. The trial record tied infringement not to the standard, but rather to Apple's source code. *See, e.g.,* Appx361 at 379:9-380:6; *Core Wireless*, 899 F.3d at 1363 ("Dr. Richard Wesel testified that, *based on Apple's source code*, Apple's devices are programmed to use only a single TAI, to send only a single timing access burst, and to receive only one TAV per multi-frame structure") (emphasis added). The fact that Apple opted to design its phones to infringe many years after Nokia's 2002 public disclosure of the standard-optional '151 Patent IPR precludes any notion that there is any "unfair benefit" to Nokia or unfair prejudice to Apple, let alone one that should render the patent unenforceable.

3. The Other Supposed Benefits Apple Has Identified During Remand Are Also Unsupported by Clear and Convincing Evidence

In its Motion for a Finding of Unenforceability, Apple identified several other putative benefits Nokia or Conversant Wireless allegedly received as "the result of" Nokia's late disclosure. The district court apparently did not consider these even worthy of mention, and indeed they suffer from the same infirmities as the alleged benefits the district court did address, and more.

Apple claims that Nokia and/or Conversant Wireless benefited from the transaction in which Nokia and Microsoft set up and transferred 2,000 Nokia patents

into the patent assertion entity that would eventually become Conversant Wireless. Appx2555-2556. But Apple presents no evidence that the '151 Patent played any special role in the decision to set up that entity or the terms of the several agreements governing the deal. Apple cites to projections that Conversant's portfolio might result in more than $1 billion in revenue. Appx2555. But there is no evidence that the presence or absence of any one patent affected this estimate, and after all this was an estimate of future return, not an actual return. Strangely, the only concrete "benefit" to Conversant Wireless Apple points to is its *spending* $75 million in efforts to monetize the portfolio. Appx2556. In other words, Apple cannot identify any benefit from the setting up of Conversant Wireless, let alone an "unfair benefit" that can be shown to be caused by Nokia's late disclosure.

Finally, Apple claims that Conversant Wireless used the fact that the '151 Patent had been declared possibly essential to "get in the Courthouse doors," because the '151 was described as essential in the Complaint. But Apple being sued on a patent it actually infringed cannot be called an "unfair benefit." Moreover, any of Apple's claims to have itself been directly "harmed" by Nokia's late disclosure have been disclaimed by its own witness. During discovery, Apple's 30(b)(6) witness on all equitable defenses was asked how Apple has been "unfairly impacted by the timing of Nokia's disclosure"—and could not identify any such impact. Appx3145 at 263:15-25.

4. Additionally, There Is No Evidence of the Primary Inequitable Benefit Associated With Implied Waiver: Patent Holdup

Finally, it is of note that there is no evidence that Nokia or Core Wireless have obtained, or tried to obtain, the "unfair benefit" that the ETSI IPR Policy actually sought to avoid: patent "hold up" through the refusal to offer to license on FRAND terms. As discussed below. the'151 Patent is not "ESSENTIAL" under ETSI's definitions. The GPRS standard gives Apple and all mobile phones the option to not infringe. Appx325; Appx352; Appx360-361; Appx658-659; Section IV, *infra*. In any event, both Nokia and Core Wireless committed to license the '151 Patent under FRAND terms. Appx3240; Appx3339, Appx3242. Because Nokia gave such an early FRAND commitment, there was never any threat of "hold-up" or "ambush" (Appx3082 at ¶ 50), and ETSI members have therefore never attempted to "avoid a solution with potential Nokia essential IPR." Appx2975 at ¶ 36.

Even Dr. Walker admitted that there is no evidence in this case that Nokia ever had a plan to "ambush" or "hold up" anyone:

> Q. [Holdup] involves an attempt to exclude others with your standard-essential
> patent rights right?
> A. To delay the patent, yes.
> ***Q. And [] you're aware of no evidence in this case that Nokia has tried to hold up Apple; correct?***
> A. ***No, I am not suggesting that.***

Appx974 at 1434:11-1435:12. Dr. Walker also conceded that the same is true for Conversant Wireless. Appx3168-3169 at 95:16-19, 96:4-10 (Q. Holdup does not

include situations where [] a member offers a license to its IPRs on FRAND terms, correct? A. That is correct.; Q. And so Core Wireless isn't attempting to hold up Apple, right? A. As far as I'm aware, they're not.; Q. So holdup is not a particular problem in this case, correct? A. That is correct.").

IV. THE DISTRICT COURT CLEARLY ERRED IN FINDING THAT THE '151 PATENT IS ESSENTIAL OR "ALL BUT" ESSENTIAL, CONTRARY TO THE LAW OF THE CASE AND ALL EVIDENCE

A. The District Court's Unenforceability Ruling Rests on the Baseless and Contradictory Premise that the '151 Patent is Standard-Essential.

Even if the district court had not committed reversable legal error by holding Apple need not prove but-for causation and failing to require proof of causation by clear and convincing evidence, the district court's ruling should fail as well because of its conclusion that the '151 Patent is standard essential, in contradiction of both the findings of *Core Wireless* and the evidence. The district court's ruling that Nokia and Conversant Wireless received an unfair benefit relies entirely on this finding of essentiality. The district court, for example, held that "[t]he '151 patent became standards-essential when ETSI incorporated the method into the GPRS standard, allowing Conversant to extract licenses from industry participants." Appx41. *See also* Appx42 ("This undeserved competitive advantage is further bolstered by the fact that the '151 patent is essential"): Appx43 (finding Nokia's FRAND commitment to be irrelevant because "If the '151 patent was not essential, third parties may not have been required to obtain a license, regardless whether the license

was on FRAND terms."). The district court recognized that the logic of its holding rests entirely on the alleged essentiality of the '151 Patent, and hence makes a series of faulty findings on this issue that either contradict this Court's holdings or the evidence, or both. But there can be no question (and this Court has already found) that the use of a single TAV value is optional under the standard, and so by definition it cannot be essential. Nor is there any support for the district court's baseless theory that phones are required to use or support this option because the base stations tell them to. In fact, all evidence is to the contrary.

B. The District Court Erred In Concluding that the '151 Patent Is Essential; This Court Found that the Use of a Single Timing Value Was Optional, And this Finding Is Supported By The Evidence

This Court found in *Core Wireless* that practicing the '151 Patent, by using a single TAV in the continuous mode, is optional in the GPRS standard. The '151 Patent is therefore, by definition, not essential.

As this Court found in *Core Wireless*, ***the definition*** of "essential" in the operative ETSI policy is:

> [I]t is not possible on technical (but not commercial) grounds, taking into account normal technical practice and the state of the art generally available at the time of standardization, to make, sell, lease, otherwise dispose of, repair, use or operate equipment or methods which comply with a standard without infringing that IPR.

Core Wireless, 899 F.3d at 1366.

The use of a single TAV is, however, expressly optional in the standard, and thus it is possible "on technical . . . grounds" to "comply with [the GPRS] standard without infringing the IPR." The Nokia Proposal required that only the single TAV approach be permitted under the standard, but that proposal was rejected, and the language Nokia proposed to add to Section 6.5.7.2 (titled "continuous timing advance update") (see Appx5438) was never included in the standard. Given that the Nokia Proposal was *not* adopted, it is particularly odd that the district court cites, as support for its holding that the '151 is essential, the statement in *Core Wireless* that "'[T]here is no ground for dispute that Nokia's proposal, if adopted, would have made [the '151] patent standards-essential.'" Appx41, quoting 899 F.3d at 1367. The Nokia Proposal was not adopted, so this does not support an assertion that the '151 Patent is essential.

The Ericsson Proposal, for its part, acknowledged that under the then-current proposed standard either one or two "TAI-values," *i.e.*, TAVs, could be allocated to be used in the continuous timing update procedure. Appx3320-3321. While Ericsson suggested using two TAVs "might increase the complexity but also improve the performance," it did not propose the standard require either the two or the one TAV approach. *Id*. Or, as this Court put it:

> At a January 1998 ETSI committee meeting, Nokia's proposal was **rejected and replaced** by a competing proposal submitted by Ericsson. Ericsson's proposal was similar to Nokia's, except that it **merely permitted a mobile device to use a single TAV for bi-directional transfer, rather than requiring it**.

Core Wireless, 899 F.3d at 1365 (emphasis added). It was based on this record that this Court expressly found "the standard that was adopted . . . made Nokia's proposal 'optional'" 899 F.3d at 1368.

This very lack of essentiality was a key issue addressed in this Court's opinion on whether Nokia had violated ETSI's IPR disclosure policy. This Court held that the ETSI policy was violated even though Nokia's proposal was not adopted, as "ETSI's intellectual property rights policy states that the disclosure requirement attaches to a member 'submitting a technical proposal' if that party has intellectual property that '*might'* be essential '*if* that proposal is adopted.'" *Core Wireless*, 899 F.3d at 1367 (emphasis in original). In other words, the policy applied because, even though the '151 Patent was optional rather than essential, prior to the rejection of the Nokia Proposal the invention ultimately disclosed in the '151 Patent "might" have become essential. If the '151 Patent was actually essential despite this rejection, this analysis by the Court in *Core Wireless* of the effect of the '151 Patent's non-essentiality would have been irrelevant from the start.

Moreover, all the technical experts at trial (Conversant Wireless's expert Dr. Wesel, and Apple's experts Drs. Walker and Meyer) agreed that the '151 Patent is not essential. Conversant's expert Dr. Wesel testified that the GPRS standard gives the mobile station the choice whether to use one timing advance value (the '151 Patent invention) or two timing advance values:

> A. . . According to the standard, if the base stations choose to send a different timing advance indexes, one for the uplink channel and one for the downlink channel, that the mobile station has a choice whether to practice the '151 patent in that case or not.
> ***Q. Okay. So the standard gives the mobile station the choice whether to use the '151 invention or whether to use two timing advance values; is that right?***
> ***A. That's correct.***

Appx361 at 378:19-379:8 (emphasis added). It is precisely because the GPRS standard can therefore be practiced without necessarily infringing the '151 Patent that Dr. Wesel had to look to the source code for the chips in the accused Apple handsets to find evidence of infringement, rather than just relying on Apple's admissions that its products practice the relevant standards:

> Q. And in this case, Core Wireless is contending that the patent covers a portion of the GPRS standard; right?
> A. Well, actually -- so where we ended up today is showing that there is a way to practice the GPRS standard that Infringes the '151 patent.
> ***Q. And in addition to the standard, we need to look at the Qualcomm chips that support those standards; correct?***
> ***A. Yes***.
> …
> ***Q. Does section 6.5.2 of exhibit 212, the technical specification, give Apple the option to choose whether to receive one or two TAV's per multiframe structure?***
> ***A. Yes. When the base sends one timing advance index for uplink and one timing advance index for downlink, yes.***
> Q. And the source code you say shows that they chose to use -- to receive only one?
> A. That's correct.
> ***Q. And may I publish only to the jury, please. This is source code that we looked at before at page 1467 of exhibit 52. . . . And is this where it shows the choice that apple made to use the '151 invention when the standard gave it its choice whether to infringe or not?***

A. Yes.

Appx363 at 388:23-389:8, Appx361 at 379:24-380:15 (emphases added).

This testimony also addresses a passing suggestion by the district court in its order that the jury's finding of infringement means that the '151 Patent must be essential. *See* Order at 9, citing holding in *Momenta Pharmaceuticals, Inc. v. Amphastar Pharmaceuticals, Inc.* 298 F.Supp.3d 258, 268 (D. Mass. 2018) that "[T]he fact that the jury found that the [defendant] . . . infringe[d] the . . . patent supports an inference that use of the invention disclosed by the . . . patent 'reasonably might be necessary to comply with [the standard]". Infringement in this case was not proved based on Apple's compliance with the GPRS standard, and therefore the jury's verdict is only evidence that Apple infringed the '151 Patent, not that the '151 Patent is essential.

For his part, Dr. Walker agreed that the standard did not require Apple to practice the '151 Patent, testifying that, because the '151 Patent was not standard essential, "then you don't have to infringe the patent [because] there's always a workaround." Appx3156-3157 at 64:14-16, 65:1-3. And Apple's technical expert identified the two-TAV approach recommended as the better option in the Ericsson Proposal as a non-infringing alternative available to Apple. Appx3194-3195 at ¶ 132. This evidence also illustrates the error of the district court supporting its finding that that Nokia received an "undeserved competitive advantage" because "the '151

patent is essential" with testimony from a Conversant Wireless witness that "[s]tandards-essential patents cannot be 'designed around' and must be licensed by anyone using the standard." Appx41. The district court's reliance on such evidence is an unintended admission that its holding is based on a counterfactual assumption unsupported by the evidence, as the evidence is clear that the standard permitted the '151 Patent to be designed around, and so the '151 Patent is not essential.

The district court's finding that "[t]he '151 patent became standards-essential when ETSI incorporated the method into the GPRS standard" (Appx41) is therefore clear error, as it contradicts the express findings of this Court, as well as the evidence. The district court's conclusion that this alleged essentiality of the '151 Patent "allow[ed] Conversant to extract licenses from industry participants" therefore fails as well.

C. The District Court Further Erred In Concluding that the '151 Patent Was "All But" Essential

Perhaps recognizing that the this Court has held that the '151 Patent is not essential, and that the parties' experts all agree to the same, the district court goes on to conclude that the Court in *Core Wireless* "all but held that the '151 patent was essential to the GPRS standard" because "[t]he patented method, however, was only optional for base stations; mobile devices were required to have the capability to operate in accordance with the patented method." Appx42. There are three errors in this holding. First, it relies on a misreading of the holding in *Core Wireless* on

infringement. The district court confused the discussion in that holding (and elsewhere) about the fact that Apple's infringing cell phones support three different timing advance approaches or modes — continuous, initial, and on-demand – with the optional use in the continuous mode of either the infringing single-TAV option or the two-TAV option. Second, the district court ignores the overwhelming evidence that mobile phones are not required to have the capability to operate in accordance with the patented method, and in fact cites no evidence supporting its conclusion to the contrary. Finally, even if it were the case that mobile phones were required to have the capability to use a single TAV value (and there is no evidence that this is the case), the district court does not explain why this would be the "result of" Nokia's late disclosure. The district court identifies no evidence that the standard requires this capability, or that Nokia's failure to make a timely IPR disclosure affected what is included in the standard.

On the first point, in support of its conclusion that "[t]he Federal Circuit, however, all but held that the '151 patent was essential to the GPRS standard" (Appx42), the district court cites to *Core Wireless's* analysis rejecting Apple's claim that "the claim is infringed only when a mobile device is configured to receive one and only one TAV transmission per multi-frame structure. . .. And that the Apple products therefore do not infringe because its accused devices are always configured to operate in a variety of modes and to receive more than one TAV per

multi-frame structure." *Core Wireless*, 899 F.3d at 1362-63. *Core Wireless* noted that as long as a product is configured to operate in an infringing manner, that product infringes even if can also operate in non-infringing manner: "[I]nfringement is not avoided merely because a non-infringing mode of operation is possible." *Id.*, 899 F.3d at 1363. The Court does not say here that the GPRS standard or any other standard *required* the Apple products to be so configured, or indeed that the Apple products are *required* to support the single TAV approach at all. The Court instead cites Dr. Wesel's testimony that "based on Apple's source code," not Apple's compliance with any standard, "Apple's devices are programmed to use only a single TAI, to send only a single timing access burst, and to receive only one TAV per multi-frame structure." *Id.* at 1363.

Core Wireless does cite Dr. Wesel to the effect that the base stations are not required to use any particular timing advance **mode or approach**, and that "the iPhone is configured to be able to work with a base station regardless of which **mode or modes** it is employing, including a continuous-only mode." *Id.* (emphasis added). *Core Wireless* cites testimony from Apple's expert, Dr. Knightly, that he agrees with Dr. Wesel that "Apple's devices must 'be ready for all three, so of course it has to be ready for just one.'" *Core Wireless,* 899 F.3d at 1363. But, again, there is no reference to the *standard* requiring said readiness. Moreover, the reference to "all three" here drives home the point that what is being discussed are the three timing

advance procedures or modes – continuous, initial, and on-demand – not the two options within the continuous mode of one or two timing advance values that was discussed in the Ericsson Proposal. Thus any finding or evidence that the three modes must be supported, for whatever reason, does not touch on the question of whether the '151 Patent *must* be supported by a phone that supports the continuous mode.

The district court's confusion on this point is not accidental. In its Reply brief below, Apple first made the argument that the '151 Patent is essential because its cell phones are required by the base station to support the single TAV approach, quoting testimony by Dr. Knightly that "It's mandatory to have all three procedures." Appx4256 *quoting* Appx659 at 896:7-898:15. But as the reference to "three procedures" here makes clear, at best Dr. Knightly's testimony is that the standard requires support of all three of the continuous, initial, and on-demand procedures or modes, not that the standard requires support of the single-TAV option.[7]

On the second point, when one looks at the question of whether either the standard requires handsets to support or use the single TAV approach, the evidence

[7] *See, e.g.,* Appx659 at 896:7-15 (**Q:** Now, you mentioned that the plan for GPRS involved flexibility. How many different types of timing advance procedures were ultimately adopted in the final GPRS standards? **A:** Well, both in the original proposal and the final one, there are three different procedures. The procedures are called Continuous Timing Advance Procedure; Initial Timing Advance Procedure; and On Demand Timing Advance Procedure.")

is that this is not the case. Apple's technical expert testified at trial that the standard gives a choice to the base station which option to choose, and the base station then gives an option to the handset. Appx777 at 1022:22-1023:19 ("The Ericsson proposal left an option on the base station side for timing advance indexes, and because there's an option on the base station side, *there's also an option on the mobile side*.").[8] And as noted above, Dr. Wesel testified that "the standard gives the mobile station the choice whether to use the '151 invention or whether to use two timing advance values." Appx361 at 378:19-379:8.

Thus, there is no evidence that the base stations are required by the standard to require handsets to use or support the single TAV approach, or indeed that the base stations require this at all, for any reason. The district court's conclusion that the single TAV approach is "all but" essential rests entirely on misreading this Court's finding of infringement in *Core Wireless*, and confusing the three timing advance modes or procedures with the two options within one of those procedures.

Finally, as noted above, even if there were evidence that handsets are required, for some reason, to support the single TAV option (and there is not), there is no

[8] *See also,* Appx777 at 1023:14-19 (emphasis added):
Q. And the source code confirms that Apple's accused products *choose* to use only one? Given the choice, they *choose* to use only one; right?
A. One timing advance index?
Q. That's correct?
A. That's correct, yes.

evidence that such a requirement comes from the standard. Moreover, there is no evidence that there is any connection between Nokia's late disclosure of the Finnish patent and any such putative and unproven "requirement." Indeed, addressed above, the district court fails to require, and Apple fails to prove, any such "connection," let alone causation, by clear and convincing evidence.

D. This District Court's Finding That the '151 Patent is Essential Is Not Harmless Error

The district court's counterfactual and unsupported conclusion that the '151 Patent is essential fills the gap in the district court's analysis, connecting Nokia's late disclosure and what the district court calls "unfair benefit" in the form of licensing. Only by assuming that "[t]he '151 patent became standards-essential when ETSI incorporated the method into the GPRS standard" can the district court conclude that Conversant and Nokia were "allowed" to "extract licenses from industry participants." Appx41. As this factual finding is clear error, the district court's judgement of unenforceability must be reversed.

V. CONCLUSION

For the foregoing reasons, the Court should reverse the district court's finding of unenforceability.

Respectfully submitted,

Dated: October 14, 2019

/s/ Marc A. Fenster

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CERTIFICATE OF SERVICE

I certify that on October 14, 2019, the foregoing **CORRECTED PLAINTIFF-APPELLANT CORE WIRELESS LICENSING S.A.R.L.'S OPENING BRIEF** was filed with the Clerk of the United States Court of Appeal for the Federal Circuit using the appellate CM/ECF system and served electronically on all counsel of record.

Dated: October 14, 2019

/s/ Marc A. Fenster

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CERTIFICATE OF COMPLIANCE

This document complies with the word limit of Fed. R. App. P. 27(d)(2)(A) because, excluding the parts of the document exempted by Fed. R. App. P. 32(f), this document contains 13,390 words.

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Addendum

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

CONVERSANT WIRELESS LICENSING S.A.R.L.,,

Plaintiff,

v.

APPLE, INC.,

Defendant.

Case No.15-cv-05008-NC

JUDGMENT

In accordance with the Federal Circuit's December 26, 2018, mandate and this Court's May 10, 2019, order granting Apple's motion for a finding of unenforceability of U.S. Patent No. 6,477,151, judgment is entered in favor of defendant Apple, Inc. and against plaintiff Conversant Wireless Licensing, S.A.R.L. with respect to issues on remand from the Federal Circuit. The clerk is ordered to terminate case No. 15-cv-5008-NC.

IT IS SO ORDERED.

Dated: May 10, 2019

NATHANAEL M. COUSINS
United States Magistrate Judge

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

CONVERSANT WIRELESS LICENSING S.A.R.L.,,

Plaintiff,

v.

APPLE, INC.,

Defendant.

Case No.15-cv-05008-NC

ORDER GRANTING DEFENDANT'S MOTION FOR A FINDING OF UNENFORCEABILITY OF U.S. PATENT NO. 6,477,151

Re: Dkt. No. 547

On remand from the Federal Circuit, defendant Apple, Inc. moves for a finding of unenforceability of U.S. Patent No. 6,477,151 ("'151 patent") held by plaintiff Conversant Wireless Licensing S.A.R.L. *See* Dkt. No. 547. The Court must address a single, narrow issue: whether some inequitable consequence flowed from Nokia's failure to disclose its intellectual property rights before a standard setting organization. If so, the Court must apply the doctrine of implied waiver and find the '151 patent unenforceable. For the reasons stated below, the Court GRANTS Apple's motion.

I. Background

A. Procedural History

In December 2016, the Court held an eight-day jury trial. *See* Dkt. Nos. 406, 465. The jury returned a verdict for Conversant, finding that Apple infringed on both the '151 patent and the '536 patent. *See* Dkt. No. 466. The Court denied Apple's post-trial motions

challenging the jury's verdict, its award of damages, and motion for unenforceability. *See* Dkt. No. 501.

Apple appealed. *See* Dkt. No. 506. On appeal, the Federal Circuit affirmed in part, reversed in part, and vacated in part. *See* Dkt. No. 528; *see also Core Wireless Licensing S.A.R.L. v. Apple, Inc.*, 899 F.3d 1356 (Fed. Cir. 2018).[1] Relevant here, the Federal Circuit affirmed the jury's verdict as to Apple's infringement of the '151 patent, but remanded to this Court on the single issue of "whether Nokia or [Conversant] inequitably benefited from Nokia's failure to disclose, or whether Nokia's conduct was sufficiently egregious to justify finding implied waiver without regard to any benefit that Nokia or [Conversant] may have obtained as a result of that misconduct." *Core Wireless*, 899 F.3d at 1368–69.

B. Factual Background[2]

U.S. Patent No. 6,477,151 ('151 patent) describes a method in which mobile devices communicate with base stations. *See id.* at 1358. Specifically, the '151 patent describes a method of synchronizing base stations with mobile devices using "continuous" transmissions from a base station to a mobile device. *See id.* at 1362. Jarkko Oksala, a Nokia employee, is the named inventor of the '151 patent. *Id.* at 1365. In 2011, Nokia assigned the '151 patent to Conversant. *See* Trial Tr. at 591:11–592:4.

In 1997 and 1998, the European Telecommunications Standards Institute ("ETSI"), a standards-setting organization ("SSO"), was considering proposals to modify the General Packet Radio Service ("GPRS") standard used in telecommunications. *See id.* ETSI required its members, which included Nokia, to "use its reasonable endeavours to timely inform ETSI of essential IPRs [intellectual property rights] it becomes aware of." *Id.* The purpose of this disclosure requirement "was to permit the standards-setting decisionmakers to make an informed choice about whether to adopt a particular proposal." *Id.* at 1367. ETSI members were required to disclose their patents and patent applications on particular

[1] While this appeal was pending, Core Wireless Licensing S.A.R.L. was renamed to Conversant Wireless Licensing S.A.R.L. *See* Dkt. No. 592 at 1.
[2] This factual background is largely drawn from the Federal Circuit's panel opinion.

technology at the time they make a proposal, regardless whether that proposal is ultimately adopted. *Id.*

On November 4, 1997, Oksala prepared an invention report for Nokia describing the synchronization method that would ultimately become the '151 patent. *Id.* at 1365; *see also* DX0115. Nokia submitted Oksala's invention to ETSI for consideration in connection with the GPRS standard. *Id.* At the same time, Nokia filed a Finnish patent application based on that same invention. *Id.*

ETSI rejected Nokia's proposal in January 1998. *Id.* Instead, ETSI adopted a similar proposal by Ericsson, which described the same synchronization method except that it made the method "optional." *Id.* In July 2002, Nokia finally disclosed to ETSI the Finnish patent application and its related U.S. patent application. *Id.*

II. Legal Standard

Even when a patent is otherwise valid, "[a] member of an open standard setting organization may . . . have impliedly waived its right to assert infringement claims against standard-compliant products." *Hynix Semiconductor Inc. v. Rambus Inc.*, 645 F.3d 1336, 1347–48 (Fed. Cir. 2011) (quoting *Qualcomm Inc. v. Broadcom Corp.* ("*Qualcomm II*"), 548 F.3d 1004, 1019 (Fed. Cir. 2008)); *see also Core Wireless*, 899 F.3d at 1365.

To succeed on an implied waiver claim in the SSO context, the accused infringer must first show by clear and convincing evidence that: "(1) the patentee had a duty of disclosure to the standard setting organization, and (2) the patentee breached that duty." *Hynix*, 645 F.3d at 1348. Because implied waiver is an equitable defense, however, the doctrine "may only be applied in instances where the patentee's misconduct resulted in [an] unfair benefit." *Core Wireless*, 899 F.3d at 1368 (quoting *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1292 (Fed. Cir. 2011) (en banc)). Alternatively, implied waiver may also be found in cases of "egregious misconduct sufficient to justify the sanction of unenforceability of the patent at issue." *Id.*

III. Findings of Fact and Conclusions of Law

On appeal, the Federal Circuit held that Nokia "had a duty to disclose its IPR no

later than June 1998 [and] its later disclosure was clearly untimely and not sufficient to cure the earlier breach of its duty." *Id.* Thus, the only question remaining is whether "inequitable consequence flowed from Nokia's failure to disclose its patent application" such that the doctrine of implied waiver should prevent enforcement of the '151 patent. *Id.* Specifically, this Court must decide "whether Nokia or [Conversant] inequitably benefited from Nokia's failure to disclose, or whether Nokia's conduct was sufficiently egregious to justify finding implied waiver without regard to any benefit that Nokia or [Conversant] may have obtained as a result of that misconduct." *Id.* at 1368–69.

A. Egregious Misconduct

Apple argues that Nokia's failure to disclose its IPR to ETSI was sufficiently egregious to justify implied waiver. Apple identifies three categories of evidence supporting their conclusion: (1) Nokia's motivation for patenting Oksala's invention; (2) the timing of Nokia's patent filing and ETSI proposal; and (3) Nokia's delay in finally disclosing its IPR. *See* Dkt. No. 547-3.

Because "[i]mplied waiver is an equitable doctrine, [it] 'hinges on basic fairness.'" *Core Wireless*, 899 F.3d at 1368. As a result, "the remedy imposed by a court of equity should be commensurate with the violation." *Id.* (quoting *Columbus Bd. of Educ. v. Penick*, 443 U.S. 449, 465 (1979)). Thus, it is not enough that Nokia committed misconduct; that misconduct must be "sufficiently egregious." *Id.* at 1369.

There is no bright-line rule for what constitutes "sufficiently egregious" misconduct. *Cf. Therasense*, 649 F.3d at 1293 ("equitable doctrines require some measure of flexibility"). *Therasense* provides a useful starting point. *Cf. Core Wireless*, 899 F.3d at 1368 (citing *Therasense*). There, the Federal Circuit "recognize[d] an exception" to the general rule that the defense of inequitable conduct required but-for proof of materiality "in cases of affirmative egregious misconduct." *Therasense*, 649 F.3d at 1292. The court derived that exception from early Supreme Court cases dealing with the doctrine of unclean hands involving perjury, bribery, and manufacture and suppression of evidence. *Id.* at 1292–93 (citing *Precision Instrument Mfg. Co. v. Auto. Maint. Mach. Co.*, 324 U.S.

806, 816 – 20 (1945); *Hazel-Atlas Glass Co. v. Hartford-Empire Co.*, 322 U.S. 238, 240 (1944); *Keystone Driller Co. v. Gen. Excavator Co.*, 290 U.S. 240, 243 (1933)); *see also Apotex Inc. v. UCB, Inc.*, 763 F.3d 1354, 1362 (Fed. Circ. 2014) (finding "particularly significant and inexcusable the fact that [the inventor] arranged for the preparation and submission of an expert declaration containing false statements instrumental to issuance of the patent."). This exception was necessary to give courts sitting in equity "sufficient flexibility to capture extraordinary circumstances." *Id.* at 1293.

As explained above, the Federal Circuit found that Nokia "had a duty to disclose its IPR no later than June 1998 [and] its later disclosure was clearly untimely and not sufficient to cure the earlier breach of its duty." *Core Wireless*, 899 F.3d at 1368. Thus, Nokia's failure to disclose its IPR was misconduct. The Court FINDS, however, that Nokia's misconduct was not egregious or extraordinary.

As *Therasense* and its progeny make clear, egregious misconduct is a high bar. Misconduct is "egregious" in cases where the patent holder or applicant makes affirmative false statements or otherwise attempts to actively mislead relevant decision-makers. *See, e.g.*, *Apotex*, 763 F.3d at 1362; *Intellect Wireless, Inc. v. HTC Corp.*, 732 F.3d 1339, 1343–44 (Fed. Cir. 2013) ("[F]iling a false affidavit is exactly the sort of 'affirmative act[] of egregious misconduct' that renders the misconduct 'material.'"). Here, by contrast, Nokia made no similarly false statements, but simply failed to disclose its IPR. *Cf. Skedco, Inc. v. Strategic Operations, Inc.*, 287 F. Supp. 3d 1100, 1144 n.15 (D. Or. 2018) (questioning application of "egregious misconduct" exception to cases of omission).

Apple points to Oksala's invention report as evidence of egregiousness. That report shows that Oksala's manager did not initially view Oksala's invention as high-value and did not recommend Nokia pursue a patent. *See* DX0115 at 4. However, Nokia nonetheless applied to patent Oksala's invention and that method was ultimately adopted by ETSI, not through Nokia's efforts, but through *Ericsson's* proposal. It may well be that Nokia simply disagreed with Oksala's manager's initial assessment. After all, Ericsson seemingly arrived at a similar method and deemed it sufficiently worthy of consideration

to include in their own ETSI proposal. Put simply, Apple has not shown by clear and convincing evidence that Nokia had an improper motive when it applied to patent and propose to ETSI Oksala's invention despite the initially lukewarm assessment of the invention.

Likewise, Apple has not shown by clear and convincing evidence that Nokia's simultaneous patent application and ETSI proposal was nefarious and not merely convenient. Oksala's invention report was created on November 4, 1997. *See* Trial Tr. at 232:14–19. Nokia applied to patent that invention a week later on November 11, 1997 (*see* DX0076 at 2), and submitted its ETSI proposal that same week (*see* Trial Tr. at 1426:23–1427:3). It is unclear, however, why this timing is suspicious and Apple offers no evidence to explain.

Closer to the mark is Nokia's four-year delay in disclosing its IPR. But Apple has not shown by clear and convincing evidence that this delay was egregious. *Qualcomm* provides a useful comparison. *See Qualcomm, Inc. v. Broadcom Corp.* ("*Qualcomm I*"), 539 F. Supp. 2d 1214 (S.D. Cal. 2007) *aff'd in part & rev'd in part by Qualcomm II*, 548 F.3d at 1022, 1026 (affirming district court's finding of implied waiver, but vacating the scope of the district court's unenforceability remedy).

There, the district court applied the implied waiver doctrine to render Qualcomm's video compression patents unenforceable. *Qualcomm II*, 548 F. 3d at 1008. The court found "that Qualcomm and its employees orchestrated a plan to ignore Qualcomm's duty to disclose [its] patents to the JVT[,]" the SSO responsible for the standard in question. *Qualcomm I*, 539 F. Supp. 2d at 1228. In particular, the court documented extensive communications between various Qualcomm employees conspiring to "extend" Qualcomm's patents to cover the standard at issue when the patents "almost exclusively" referred to different material. The court also noted communication by Qualcomm employees recommending that Qualcomm "lobby[] [its] technology in the appropriate forums." *Id.* at 1228–29. Moreover, Qualcomm failed to disclose its patents to the SSO until after it initiated its lawsuit against Broadcom. *Id.* at 1228.

By contrast, there was no similar evidence here. While Qualcomm conspired to "extend" its pre-existing patents, which, in the words of its own employees, covered "almost exclusively" different material, Nokia sought to patent a wholly new invention. Qualcomm's manipulation of its intellectual property made its nondisclosure particularly exceptional and therefore egregious. But here, Apple's characterization of Nokia's motivation to patent Oksala's invention as nefarious is not persuasive. There simply is not clear and convincing evidence of egregiousness.

Apple also cites *Momenta Pharmaceuticals, Inc. v. Amphastar Pharmaceuticals, Inc.*, 298 F. Supp. 3d 258 (D. Mass. 2018) in support of its position. *Momenta* is likewise distinguishable. First, the Court notes that *Momenta* did not specifically address the implied waiver doctrine's equitable considerations. *See id.* at 264 (describing two-pronged test for implied waiver requiring duty and breach). It is not clear whether the district court applied implied waiver because Momenta engaged in egregious misconduct or because it obtained an unjust benefit. In any case, *Momenta* engaged with more egregious facts.

Momenta held a patent in "a set of manufacturing quality control processes that ensure that each batch of generic enoxaparin[,]" drug used to prevent blood clots, includes specific sugar chains. *Id.* at 262. When the United States Pharmacopeia ("USP") sought to incorporate Momenta's patented method into the standard for formulating enoxaparin, Momenta not only failed to disclose its ownership of the patent, but also "asked the USP to request that [a different pharmaceutical company] affirmatively abandon its patent that might cover [the standard] instead of simply allowing it to lapse." *Id.* at 267. Similar evidence is not present here.

In short, Nokia's failure to disclose its IPR to ETSI was undoubtedly misconduct. But that misconduct does not clearly and convincingly rise to the level of "affirmative egregious misconduct" required. *Therasense*, 649 F.3d at 1292.

B. Inequitable Benefit

Apple next argues that Conversant obtained unjust benefits from Nokia's misconduct, justifying unenforceability under the implied waiver doctrine. In particular,

Apple contends that Conversant obtained benefits in the form of licensing fees and by increasing its leverage over industry participants who must produce standards-compliant products. *See* Dkt. No. 547-3.

"[I]n some circumstances courts have held that an equitable defense will not be recognized if the offending party did not gain a benefit from its wrongdoing." *Core Wireless*, 899 F.3d at 1368 (citing *Therasense*, 649 F.3d at 1292). Because the implied waiver doctrine can render a patent unenforceable, the doctrine "should only be applied in instances where the patentee's misconduct resulted in [an] unfair benefit." *Id.* (quoting *Therasense*, 649 F.3d at 1292) (alterations in original). If the patentee obtained "an unjust advantage" or "an undeserved competitive advantage," the implied waiver doctrine may justify a sanction of unenforceability of the patent at issue. *Id.*

Here, Nokia and Conversant have obtained such an unfair competitive advantage. The '151 patent became standards-essential when ETSI incorporated the method into the GPRS standard, allowing Conversant to extract licenses from industry participants. At trial, John Lindgren, Conversant's CEO, testified that Conversant licensed the '151 patent as part of its patent portfolio to numerous third parties, including Microsoft, Sony, and Ericsson. *See* Trial Tr. at 606:18–23. And Nokia's patent licensing offer to Apple states that its essential patent families, which includes the '151 patent, commands substantial royalties. *See* PX0560 at 1–3. This undeserved competitive advantage is further bolstered by the fact that the '151 patent is essential. *Cf. Core Wireless*, 899 F.3d at 1367 ("[T]here is no ground for dispute that Nokia's proposal, if adopted, would have made [the '151] patent standards-essential."). As Lindgren recognized, "[s]tandards-essential patents cannot be 'designed around' and must be licensed by anyone using the standard." *See* PX0561 at 21.

Conversant raises several arguments against a finding of an inequitable benefit. First, Conversant argues that its '151 patent is not essential because ETSI did not accept Nokia's proposal and incorporated Ericsson's proposal instead. The Federal Circuit, however, all but held that the '151 patent was essential to the GPRS standard. "Oksala . . .

explained the difference between [Nokia's] proposal and Ericsson's by pointing out that Ericsson's proposal is different only because it made his idea 'optional.'" *Core Wireless*, 899 F.3d at 1367. The patented method, however, was only optional for base stations; mobile devices were required to have the capability to operate in accordance with the patented method. Indeed, the jury found, and the Federal Circuit affirmed, that Apple's devices infringed the '151 patent because they were configured to operate in accordance with the patented method. As the Federal Circuit explained:

> "[I]nfringement is not avoided merely because a non-infringing mode of operation is possible." *z4 Techs., Inc. v. Microsoft Corp.*, 507 F.3d 1340, 1350 (Fed. Cir. 2007); *see also VirnetX, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1322 (Fed. Cir. 2014). To take a simple example, a patent that claims an automobile configured to operate in third gear would be infringed by an automobile that is configured to operate in first, second, and third gears. The automobile is at all times configured to operate in any one of its possible gears, including the infringing one, even if the automobile is never driven in the infringing gear. Similarly, claim 14 [of the '151 patent] is satisfied as long as Apple's devices are configured to operate in a mode that receives a TAV only once per multi-frame structure and uses it for all channels.

Id. at 1363. In short, the '151 patent was essential because industry participants must design their devices to be compatible with the patented method. *Cf. Momenta*, 298 F. Supp. 3d at 268 ("[T]he fact that the jury found that the [defendant] . . . infringe[d] the . . . patent supports an inference that use of the invention disclosed by the . . . patent 'reasonably might be necessary to comply with [the standard].").

Next, Conversant argues that its commitment to fair, reasonable, and non-discriminatory ("FRAND") licensing of its patents means that it could not have obtained an inequitable benefit. The Court disagrees; whether Conversant offered FRAND terms is beside the point. The issue is whether Conversant should have been able to request a license at all. A FRAND license may be inequitable if the licensing party was forced to

obtain the license. *Cf. Qualcomm II*, 548 F.3d at 1021 ("Forcing a party to accept a license and pay whatever fee the licensor demands . . . are significant burdens."). If the '151 patent was not essential, third parties may not have been required to obtain a license, regardless whether the license was on FRAND terms.

Third, Conversant argues that Apple failed to specifically trace any licensing revenue to the '151 patent. This argument is unpersuasive. Lindgren testified at trial that "it is rare for companies to take licenses to individual enumerated patents." Trial Tr. at 607:1–2. Requiring proof that a particular patent conferred specific monetary benefits would ignore that common practice. Rather, the Court infers from the fact that Conversant specifically identified the '151 patent for enforcement that the '151 patent has significant worth. Furthermore, the benefit conferred by the '151 patent was not limited to licensing revenue. As Nokia recognized, the value of each standards-essential patent lay not only in revenue attributable to it, but also in increasing Nokia's leverage by bolstering its patent portfolio. *See* PX0603 at 7.

Finally, Conversant asserts that Apple has not met their burden because they failed to connect their nondisclosure with the inequitable benefit. Such but-for proof, however, is not required. Nokia's failure to disclose its IPR deprived ETSI members the opportunity to make a fully informed decision as to the technical solution for the GPRS standard. *See Core Wireless*, 899 F.3d at 1366. Nokia and Conversant cannot now "rely on the effects of its misconduct to shield it from the application of the equitable defense of implied waiver." *Qualcomm II*, 548 F.3d at 1021. In any case, Dr. Michael Walker, former Chairman of the Board of ETSI, testified that ETSI members are incentivized to choose technical solutions that are free of licensing costs. *See* Trial Tr. at 1420:2–14. Dr. Walker's testimony suggests that, had Nokia disclosed its IPR, there was a reasonable possibility that the '151 patent would not have been incorporated into the GPRS standard.

In sum, although Nokia's conduct before ETSI was not egregious, Nokia's failure to disclose its IPR allowed Nokia and Conversant to inequitably benefit from that misconduct.

C. Scope of Remedy

Unenforceability remedies must be "properly limited in relation to the underlying breach." *Qualcomm II*, 548 F.3d at 1026. In the SSO context, unenforceability remedies must be limited to the relevant standards. *See id.* at 1026.

The '151 patent was incorporated into the GPRS standard as a result of Nokia's nondisclosure. Accordingly, the Court FINDS that Conversant has implicitly waived its rights to enforce the '151 patent against products practicing the GPRS standard.

IV. Conclusion

The Court GRANTS Apple's motion for unenforceability. The Court FINDS that Conversant has implicitly waived its rights to enforce the '151 patent and its continuations, continuations-in-part, divisions, reissues, or any other derivatives of the '151 patent against products practicing the GPRS standard, including the accused Apple products.

IT IS SO ORDERED.

Dated: May 10, 2019

NATHANAEL M. COUSINS
United States Magistrate Judge

(12) **United States Patent**
Oksala

(10) **Patent No.: US 6,477,151 B1**
(45) **Date of Patent: Nov. 5, 2002**

(54) **PACKET RADIO TELEPHONE SERVICES**

(75) Inventor: **Jarkko Oksala**, Tampere (FI)

(73) Assignee: **Nokia Mobile Phones Ltd.**, Espoo (FI)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/189,590**

(22) Filed: **Nov. 10, 1998**

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Nov. 21, 1997 (FI) 974290

(51) **Int. Cl.**[7] **H04Q 7/00**

(52) **U.S. Cl.** **370/314**; 370/324; 370/347; 370/350; 370/508; 370/509

(58) **Field of Search** 370/277, 278, 370/280, 282, 313, 314, 328, 329, 330, 336, 337, 345, 347, 350, 442, 503, 508, 509, 324, 312

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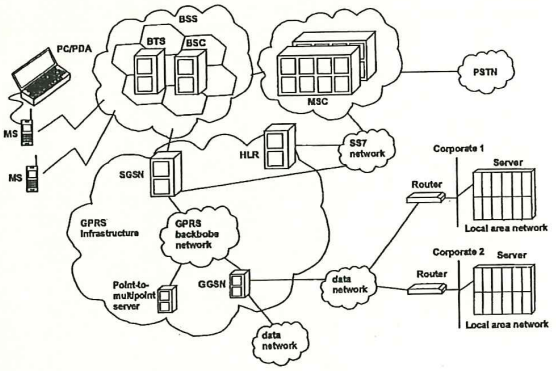
(57) **ABSTRACT**

A method of synchronising radio signal transmission slots at a mobile station to radio signal reception slots at a base station subsystem to account for a propagation delay between the mobile station and the base station subsystem. The method is applicable to a GPRS packet switched cellular telephone network in which a downlink channel is defined for transmitting user data from the base station subsystem to the mobile station and an uplink channel is defined for transmitting user data from the mobile station to the base station subsystem. These channels comprise dynamically allocated time slots in a time division multiple access frame. An updated timing advance value indicative of the radio propagation delay between the mobile station and the base station subsystem at a given time is calculated at the base station once every 8 multiframes. The timing advance value is identified to the mobile station by a timing advance index previously allocated to the mobile station. The mobile station uses the timing advance value to advance transmission slots at the mobile station for both the uplink and downlink channels so that transmitted data is received at the base station subsystem in the allocated base station subsystem reception slots.

14 Claims, 4 Drawing Sheets



THIS IS TO CERTIFY that this is a true copy from the records of the U.S. Patent and Trademark Office of the first page of the above identified patent:

Certifying Officer *Date* 10/19/2018

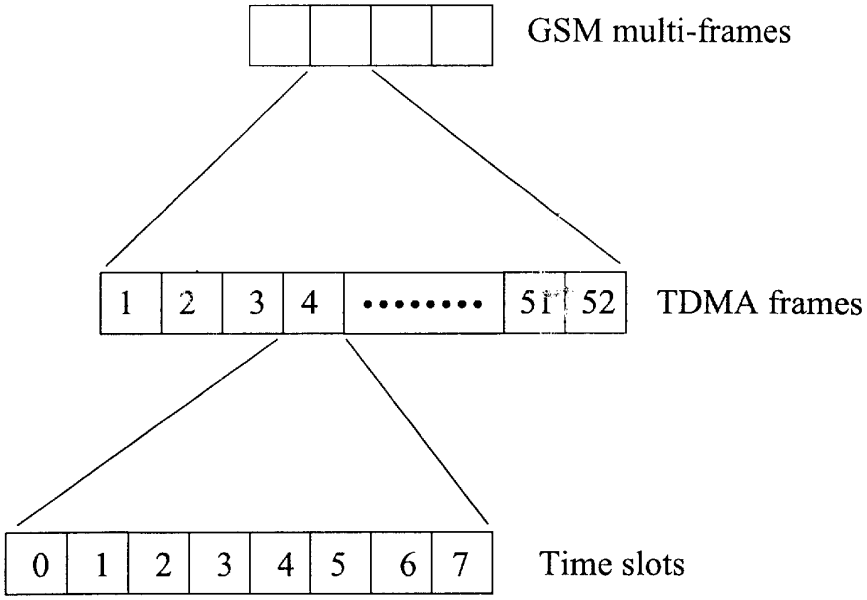


Figure 1

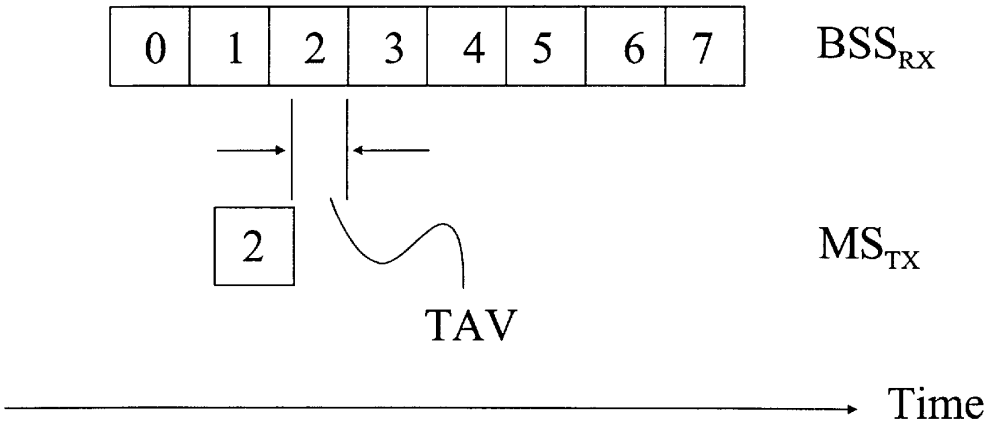


Figure 3

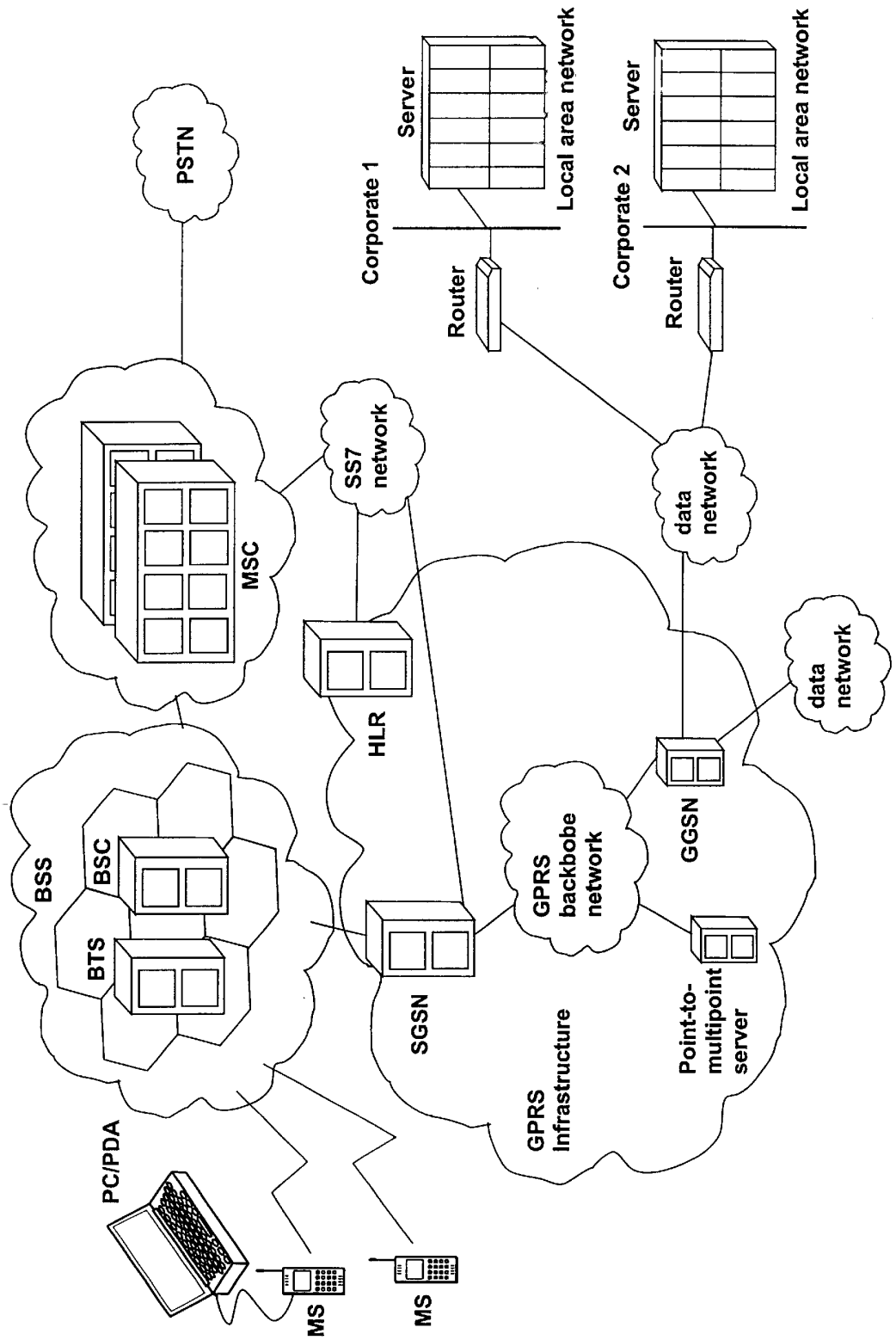


Figure 2

Appx047

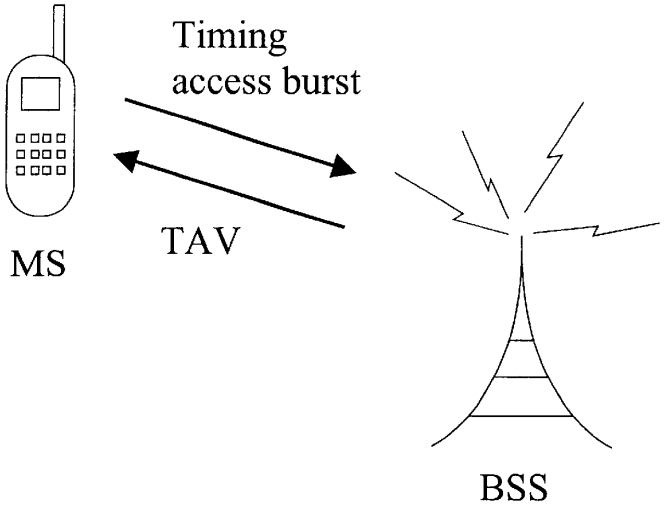


Figure 4

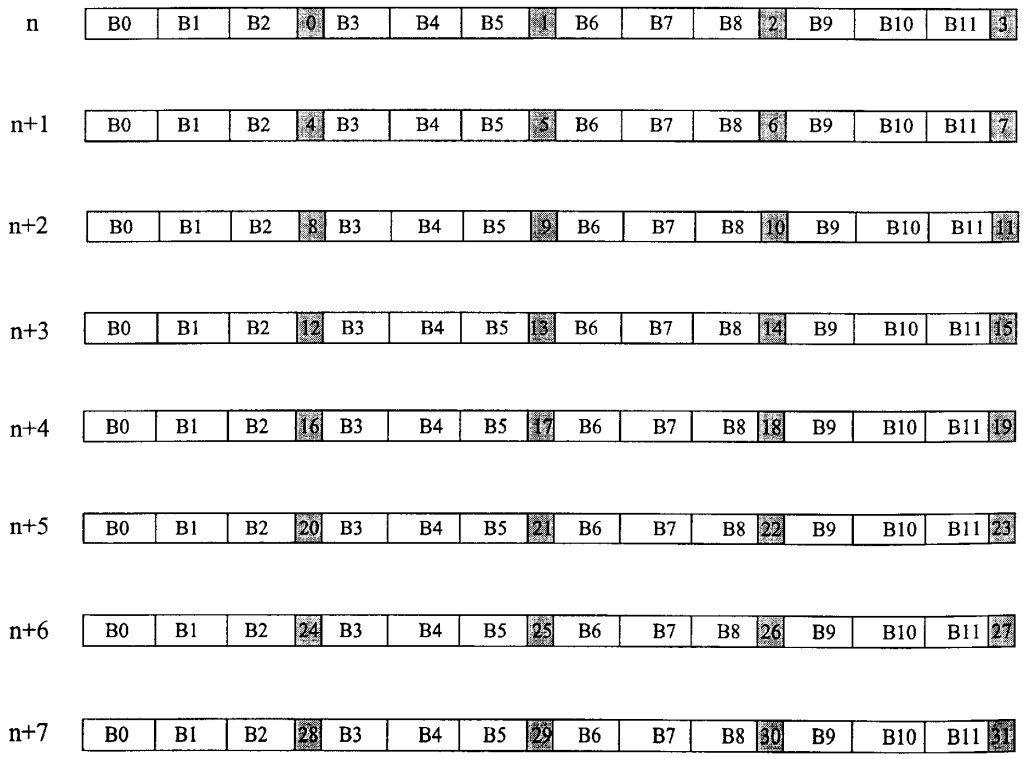


Figure 5

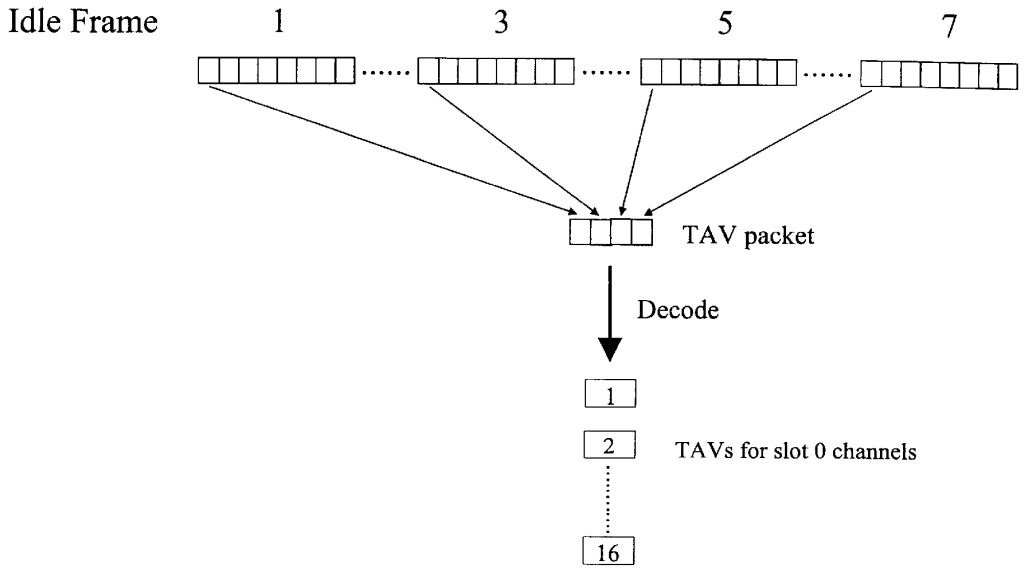

Idle Frame
1
3
5
7
TAV packet
Decode
1
2
TAVs for slot 0 channels
16

Figure 6

PACKET RADIO TELEPHONE SERVICES

FIELD OF THE INVENTION

The present invention relates to packet switched radio telephone services and is applicable in particular, though not necessarily, to the General Packet Radio Service (GPRS).

BACKGROUND OF THE INVENTION

Current digital cellular telephone systems such as GSM (Global System for Mobile communications) were designed with an emphasis on voice communications. Data is normally transmitted between a mobile station (MS) and a base station subsystem (BSS) over the air interface using the so called "circuit switched" transmission mode in which a series of regularly spaced time slots on one frequency band are reserved for the duration of the call. For voice communications, where the stream of information to be transmitted is relatively continuous, the circuit switched transmission mode is reasonably efficient. However, during data calls, e.g., internet access or facsimile transmission, the data stream is "bursty" and the long term reservation of time slots in the circuit switched mode represents an uneconomic use of the air interface.

Given that the demand for data services with digital cellular telephone systems is increasing rapidly, a new GSM based service known as the General Packet Radio Service (GPRS) is currently being standardised by the European Telecommunications Standards Institute (ETSI) and is defined in overall terms in recommendation GSM 03.60. GPRS provides for the dynamic allocation of transmission capacity for data transmission. That is to say that time slots on a frequency band (or bands) are allocated to a particular MS to BSS link only when there is data to be transmitted. The unnecessary reservation of time slots when there is no data to be transmitted is avoided.

GPRS is intended to operate in conjunction with conventional GSM circuit switched transmission to efficiently use the air interface for both data and voice communications. GPRS will therefore uses a basic channel structure similar to that defined for GSM. In GPRS, a given frequency band is divided in the time domain into multi-frames, each multiframe consisting in turn of 52 TDMA (Time Division Multiple Access) frames. The length of a TDMA frame is 4.61 5 ms and each TDMA frame is in turn divided into eight consecutive slots of equal duration. This frame structure is illustrated in FIG. **1** and is relative to the transmission and reception time at the BSS. p In the conventional circuit switched transmission mode, when a call is initiated, two physical channels are defined for that call at the BSS by reserving two respective time slots, separated by two intervening slots, in each of a succession of TDMA frames. One of these channels provides a downlink channel for carrying user data from the BSS to the MS whilst the other provides the uplink channel for carrying user data from the MS to the BSS.

With the introduction of GPRS (the general architecture of a GSM/GPRS network is illustrated in FIG. **2**) the fixed relationship between time slots allocated for uplink and downlink channels no longer applies. Time slots may be dynamically assigned to the uplink channel and the downlink channel for a given MS depending upon demand and capacity and MS multi-slot class. So, for example, in any given TDMA frame one time slot may be allocated to the downlink channel with two slots being allocated to the uplink channel. Also, there is no fixed time relationship between the uplink and the downlink allocated slots. Slot allocation is notified to the MS during a channel set-up stage.

When a MS first connects to a GPRS cellular network, the MS synchronises itself to the BSS using information carried by a synchronisation channel (SCH) transmitted by the BSS to all listening MSs. Synchronisation involves the initialisation of a modulo counter at the MS which has a 52 TDMA frame cycle. When a user data transmission channel (either uplink or downlink or both) is requested, the BSS allocates time slots for user data and notifies the MS of the allocation. Time slots are allocated in consecutive TDMA frames and may be reserved for a fixed number of frames or until the MS or the BSS chooses to release the channel. For data transmissions from the BSS to the MS, the transmission slots coincide with those defined by the modulo counter and the MS therefore knows when to "listen" for its allocated slots.

The correct synchronisation of the receiver at a MS is therefore easily achieved using the BSS broadcast synchronisation channel. Synchronisation of the transmitter of a MS is however somewhat more complex. As data transmitted from the MS (MS_{TX}) to the BSS must arrive at the BSS in the allocated time slot (BSS_{RX}), it is necessary to advance the transmission of data (by a timing advance value TAV relative to the time defined by the modulo counter) to take account of the propagation delay from the MS to the BSS (as illustrated in FIG. **3** where slot number **2** is reserved to the MS for transmission). Moreover, as the MS may be moving rapidly relative to the BSS, it is necessary to recalculate the propagation delay at regular intervals and to provide the updated values to the MS.

It will be clear that a TAV is required when an uplink channel is established for transmitting user data from the MS to the BSS. However, a TAV is also required when a downlink channel is established as, even though user data is coming from the BSS to the MS, certain signalling data (e.g. acknowledgements) is going in the reverse direction (i.e. the uplink direction).

In the current GPRS recommendation, a MS transmits a "timing access burst" to the BSS on an uplink Packet Timing Advance Control Channel (PTCCH) channel once every eight multiframes. One access burst is transmitted for each channel allocated to the MS (uplink and downlink). The timing access burst is transmitted in a slot allocated to the MS for this purpose. This transmission is not advanced and so the BSS is able to determine the TAV by determining the time shift in the access burst relative to the time base of the BSS. The TAV for each channel allocated to a MS is transmitted to the MS (on a downlink PTCCH) and is updated once every eight multiframes, i.e. following receipt of each new corresponding timing access burst. This process is illustrated schematically in FIG. **4**.

FIG. **5** illustrates eight consecutive multiframes, n to n+7, each of which comprises 52 TDMA frames. The multiframe structure provides 12 radio blocks B**0** to B**11**, each radio block comprising 4 consecutive TDMA frames. The radio blocks are used for transmitting user data (and also some signalling information). In the current GPRS proposal, each slot in a TDMA frame may be simultaneously allocated to up to 16 different downlink channels or to 8 different uplink channels. In the case of a downlink channel, a MS must therefore listen during its allocated slot(s) in each TDMA frame (according to the time base defined by its modulo counter), and decode the received signal to determine if the signal is intended for it.

Each multiframe also contains 4 "idle" TDMA frames (numbered **0** to **31** in the 8 multiframe structure of FIG. **5**).

The even numbered idle frames, **0**, **2**, **4** etc, are used to accommodate timing access bursts transmitted from the MSs to the BSS whilst the odd numbered idle frames, **1**, **3**, **5** etc, are used to accommodate TAVs transmitted from the BSS to the MSs. Considering the former, one time slot is able to accommodate one timing access burst. Given that 16 channels may be allocated to each time slot, with two idle frames per multiframe allocated for access bursts (e.g. idle frames **0** and **2** in multiframe n), it takes all eight of the multiframes shown in FIG. **5** to convey the maximum possible number of timing access bursts.

Considering the transmission of TAVs from the BSS to the MSs, once calculated, TAVs for the 16 channels (assuming maximum allocation) allocated to a given time slot are coded and transmitted as a split packet. Thus, a packet carrying TAVs for the slot **0** allocated channels is transmitted in the first slot of each of four consecutive idle TDMA frames allocated for TAVs (e.g. idle frames **1**,**3**,**5**,**7**). Similarly, the TAVs for the slot **1** allocated channels are transmitted in the second slot of each of these same idle frames, and so on for the slot **2**, **3** etc allocated channels.

It will be appreciated that TAVs can be sent for all channels and for all slots in two consecutive multiframes. Before transmitting the next TAV packet in the next two multiframes (e.g. in idle frames **9**,**11**,**13**,**15**), the BSS calculates a new TAV for each of the channels for which it received a timing access burst in the preceding two multiframes, i.e. four channels for each slot. These new values are then transmitted together with the 12 "old" TAVs for each slot. Given that a TAV for a given channel is updated only once every eight multiframes, a MS has four opportunities to recover its allocated TAV(s). However, if it receives its TAV(s) correctly in the first transmission, it need not listen to any of the TAV idle frames in the next 6 multiframes.

During a channel set-up stage, the BSS allocates to a MS, one or more slots in the radio block TDMA frames for transmitting or receiving data. The BSS also allocates to the channel a slot number for the idle frames, and a 4-bit timing advance index (TAI). The TAI serves three purposes. Firstly, the TAI identifies that idle frame, of all the idle frames present in the eight multiframe structure, in which the MS must transmit (in the specified time slot) a timing access burst for the corresponding channel. Secondly, it identifies the four idle frame series in which the newly updated TAV for that channel is transmitted—the MS only listening to the remaining idle frames if it does not correctly recover the TAV from the newly updated series. Thirdly, the TAI enables the MS to recover its own TAV(s) from the TAV packet. This TAV recovery procedure is illustrated in FIG. **6**.

Assuming that all MSs are involved in bi-directional communication with the BSS, i.e. two channels per MS, the signalling structure outlined above allows 8 MSs to share a single time slot as for any given time slot only 16 access bursts may be sent every 8 multi-frames.

SUMMARY OF THE INVENTION

It is an object of the present invention to increase the number of mobile stations which may use the same time slot in an idle frame for transmitting and receiving timing advance information. This and other objects are met by allocating a single timing advance index to the uplink and downlink channels of a mobile station. Thus, both the uplink and downlink channels will share the same timing advance value for transmissions in the uplink direction and will also make use of a common timing access burst.

According to a first aspect of the present invention there is provided a method of synchronising radio signal transmission slots at a mobile station to radio signal reception slots at a base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, said reception slots corresponding to uplink and/or downlink user data packet switched transmission channels allocated dynamically by the base station subsystem, the method comprising:

at the base station subsystem, allocating to the mobile station a single timing advance index, which index identifies one idle frame in a multiframe structure in which the mobile station should transmit a timing access burst to the base station subsystem and one or more further idle frames in said multiframe structure in which the base station subsystem should transmit an updated timing advance value to the mobile station;

at the base station subsystem, allocating to the mobile station an idle frame slot number, said slot number identifying the time slot in said idle frames when said timing access burst and said timing advance values should be transmitted;

transmitting said timing advance index and said idle frame slot number to the mobile station; and

at the mobile station, subsequently using said timing advance index and said idle frame slot number to determine timing advance values for all user data channels allocated to the mobile station.

Embodiments of the present invention provide for the sharing of a single timing advance index between all channels allocated to a single mobile station. This maximises the number of mobile stations which can share a time slot in an idle frame for receiving and transmitting timing advance information, i.e. timing access bursts and timing advance values. The number of slots to which a mobile station must listen for timing advance values, and in which a mobile station must transmit timing access bursts, is also reduced.

In the application of the present invention to GPRS, said multiframe structure consists of 8 multiframes, each multiframe consisting of 52 TDMA frames, and each TDMA frame consisting of 8 time slots.

According to a second aspect of the present invention there is provided a method of synchronising radio signal transmission slots at a mobile station to radio signal reception slots at a base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, the method comprising:

at the base station subsystem, defining a downlink channel for transmitting user data from the base station subsystem to the mobile station and defining an uplink channel for transmitting user data from the mobile station to the base station subsystem, said channels each comprising one or more dynamically allocated time slots in a time division multiple access frame where the time slot(s) allocated to each of the uplink and downlink channels are not necessarily equal in number and do not necessarily having a fixed time relationship;

determining at the base station subsystem a timing advance value indicative of the radio propagation delay between the mobile station and the base station subsystem at a given time;

transmitting the timing advance value once, from the base station subsystem to the mobile station; and

using the timing advance value at the mobile station to advance transmission slots at the mobile station for

both the uplink and downlink channels so that transmitted data is received at the base station subsystem in the allocated base station subsystem reception slots.

Preferably, said timing advance value is transmitted from the base station subsystem to the mobile station in a data packet, said packet also containing timing advance values associated with other mobile stations communicating with the same base station subsystem. The data packet may be distributed over a plurality of time division multiple access frames.

Preferably, the method comprises updating the timing advance value after predetermined intervals and transmitting the updated value as part of a new data packet containing updated values for the other mobile stations.

Preferably, the method comprises allocating to the uplink and downlink channels, during a channel set-up stage, a common timing advance index, which index allows the mobile station to extract the corresponding timing advance value from said data packet.

According to a third aspect of the present invention there is provided a radio telephone network comprising a base station subsystem and a plurality of mobile stations for communicating with the base station subsystem and in which radio signal transmission slots at a mobile station are synchronised to radio signal reception slots at the base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, said reception slots corresponding to uplink and/or downlink user data packet switched transmission channels allocated dynamically by the base station subsystem, the base station subsystem comprising:

first allocation means for allocating to a mobile station a single timing advance index, which index identifies one idle frame in a multiframe structure in which the mobile station should transmit a timing access burst to the base station subsystem and one or more further idle frames in said multiframe structure in which the base station subsystem should transmit an updated timing advance value to the mobile station;

second allocating means for allocating to a mobile station an idle frame slot number, said slot number identifying the time slot in said idle frames when said timing access burst and said timing advance values should be transmitted; and

transmitting means for transmitting said timing advance index and said idle frame slot number to the mobile station,

the mobile stations each comprising transmitting means for using said timing advance index and said idle frame slot number to determine timing advance values for all user data channels allocated to the mobile station.

According to a fourth aspect of the present invention there is provided a radio telephone network comprising a base station subsystem and a plurality of mobile stations for communicating with the base station subsystem, the base station subsystem comprising:

channel allocation means for defining a downlink channel for transmitting user data from the base station subsystem to the mobile station and for defining an uplink channel for transmitting user data from the mobile station to the base station subsystem, said channels each comprising one or more dynamically allocated time slots in a time division multiple access frame where the time slot(s) allocated to each of the uplink and downlink channels are not necessarily equal in number and do not necessarily having a fixed time relationship;

measuring means for determining a timing advance value indicative of the radio propagation delay between the mobile station and the base station subsystem at a given time; and

transmission means for transmitting the timing advance value once, from the base station subsystem to the mobile station,

the mobile station comprising radio transmission control means for advancing transmission slots at the mobile station for both the uplink and downlink channels using the received timing advance value so that transmitted data is received at the base station subsystem in the allocated base station subsystem reception slots.

According to a fifth aspect of the present invention there is provided a base station subsystem for use in the radio telephone network of the above third or fourth aspect of the present invention.

According to a sixth aspect of the present invention there is provided a mobile station for use in the radio telephone network of the above third or fourth aspect of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention and in order to show how the same may be carried into effect reference will now be made, by way of example, to the accompanying drawings, in which:

FIG. **1** shows the division of a GPRS multi-frame into 52 TDMA frames and the division of a TDMA frame into eight time slots;

FIG. **2** shows schematically the architecture of a GSM/GPRS digital cellular telephone network;

FIG. **3** illustrates the timing advance applied to transmissions from a mobile station;

FIG. **4** illustrates the exchange of timing advance information between a mobile station and a base station subsystem;

FIG. **5** illustrates the multiframe structure used in GPRS; and

FIG. **6** illustrates a TAV data packet carrying timing advance values for a number of mobile stations.

DETAILED DESCRIPTION

As has been described above, and according to current proposals, when either a mobile station (MS) or a base station subsystem (BSS) in a cellular telephone network requests GPRS communication between the MS and the BSS, either a downlink channel (user data transmission from the BSS to the MS) or an uplink channel (user data transmission from the MS to the BSS) or both (bidirectional communication), are defined by the BSS. This involves allocating specific time slots within a series of TDMA frames (making up the radio blocks) to the defined channel (s) and notifying the MS of the allocation by transmitting specific resource assignment messages to the MS.

In the embodiment of the present invention described here, regardless of how many user data channels are to be defined between the MS and the BSS, each MS is allocated only a single timing advance index (TAI) and a single idle frame slot number. The TAI performs exactly the same function as that of the TAI defined for the existing GPRS proposal, i.e. it identifies one idle frame in the multiframe structure where the MS should transmit its timing access burst, it identifies the four idle frame sequence in which the newly updated TAV for the MS is transmitted, and it allows

the MS to decode the TAV packet to recover the TAV for the MS. Similarly, the idle frame slot number allocated to the MS identifies the slot in the idle frames where the timing access burst for the MS should be transmitted and in which the TAV packet is transmitted. However, the timing access burst and the TAV are common to all channels allocated to the MS. There is no need to repeat the transmission of timing advance information for all channels as the same timing advance value can be used for all uplink transmissions (associated with both uplink and downlink channels).

It will be appreciated that modifications may be made to the above described embodiment without departing from the scope of the present invention.

BSC	Base Station Controller
BSS	Base Station Subsystem
BTS	Base Transceiver Station
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HLR	Home Location Register
MS	Mobile Station
MSC	Mobile Switching Center
PC/PDA	Personal Computer/Personal Data Assistant
PSTN	Public-Switched Telephone Network
SGSN	Serving GPRS Support Node
SS7	Signalling System number 7
TDMA	Time Division Multiple Access
UMTS	Universal Mobile Telecommunications Service

What is claimed is:

1. A method of synchronising radio signal transmission slots at a mobile station to radio signal reception slots at a base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, said reception slots corresponding to uplink and/or downlink user data packet switched transmission channels allocated dynamically by the base station subsystem, the method comprising:

at the base station subsystem, allocating to the mobile station a single timing advance index, which index identifies one idle frame in a multiframe structure in which the mobile station should transmit a timing access burst to the base station subsystem and one or more further idle frames in said multiframe structure in which the base station subsystem should transmit an updated timing advance value to the mobile station;

at the base station subsystem, allocating to the mobile station an idle frame slot number, said slot number identifying the time slot in said idle frames when said timing access burst and said timing advance values should be transmitted;

transmitting said timing advance index and said idle frame slot number to the mobile station; and

at the mobile station, subsequently using said timing advance index and said idle frame slot number to determine timing advance values for all user data channels allocated to the mobile station.

2. A method according to claim **1**, wherein the method forms part of a General Packet Radio Service and said multiframe structure consists of 8 multiframes, each multiframe consisting of 52 TDMA frames, and each TDMA frame consisting of 8 time slots.

3. A method according to claim **1**, wherein said timing advance value is transmitted from the base station subsystem to the mobile station in a data packet, said packet also containing timing advance values associated with other mobile stations communicating with the same base station subsystem.

4. A method according to claim **2**, wherein said timing advance value is transmitted from the base station subsystem to the mobile station in a data packet, said packet also containing timing advance values associated with other mobile stations communicating with the same base station subsystem, and wherein said data packet is split between four time slots, one slot in each of four idle frames in a the multiframe structure, and said slots corresponding to said idle frame slot number assigned to the mobile station.

5. A method according to claim **1**, and comprising updating said timing advance value once in every multiframe structure, following receipt by the base station subsystem of said timing access burst.

6. A radio telephone network comprising a base station subsystem and a plurality of mobile stations for communicating with the base station subsystem and in which radio signal transmission slots at a mobile station are synchronised to radio signal reception slots at the base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, said reception slots corresponding to uplink and/or downlink user data packet switched transmission channels allocated dynamically by the base station subsystem, the base station subsystem being configured to:

allocate to a mobile station a single timing advance index, which index identifies one idle frame in a multiframe structure in which the mobile station should transmit a timing access burst to the base station subsystem and one or more further idle frames in said multiframe structure in which the base station subsystem should transmit an updated timing advance value to the mobile station;

allocate to a mobile station an idle frame slot number, said slot number identifying the time slot in said idle frames when said timing access burst and said timing advance values should be transmitted; and

transmit said timing advance index and said idle frame slot number to the mobile station, and

the mobile stations each comprising being configured to use said timing advance index and said idle frame slot number to determine timing advance values for all user data channels allocated to the mobile station.

7. A base station subsystem for use in a radio telephone network, said radio telephone network comprising a base station subsystem and a plurality of mobile stations for communicating with the base station subsystem and in which radio signal transmission slots at a mobile station are synchronised to radio signal reception slots at the base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, said reception slots corresponding to uplink and/or downlink user data packet switched transmission channels allocated dynamically by the base station subsystem, the base station subsystem being configured to:

allocating to a mobile station a single timing advance index, which index identifies one idle frame in a multiframe structure in which the mobile station should transmit a timing access burst to the base station subsystem and one or more further idle frames in said multiframe structure in which the base station subsystem should transmit an updated timing advance value to the mobile station;

allocate to a mobile station an idle frame slot number, said slot number identifying the time slot in said idle frames when said timing access burst and said timing advance values should be transmitted; and

transmit said timing advance index and said idle frame slot number to the mobile station.

8. A method of synchronizing radio signal transmission slots at a mobile station to radio signal reception slots at a base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, the method comprising the steps of:

at the base station subsystem, defining a downlink channel for transmitting user data from the base station subsystem to the mobile station and defining an uplink channel for transmitting user data from the mobile station to the base station subsystem, the downlink channel and the uplink channel each comprising one or more dynamically allocated time slots in a time division multiple access frame where the time slot(s) allocated to each of the uplink and downlink channels are not necessarily equal in number and do not necessarily have a fixed time relationship;

determining at the base station subsystem a timing advance value indicative of the radio propagation delay between the mobile station and the base station subsystem at a given time;

transmitting the timing advance value once, from the base station subsystem to the mobile station; and

using the timing advance value at the mobile station to advance transmission slots at the mobile station for both the uplink and downlink channels so that transmitted data is received at the base station subsystem in the allocated base station subsystem reception slots.

9. A method according to claim **8**, wherein the timing advance value is transmitted from the base station subsystem to the mobile station in a data packet, the packet also containing timing advance values associated with other mobile stations communicating with the same base station subsystem.

10. A method according to claim **9**, further comprising the step of updating the timing advance value after predetermined intervals and transmitting the updated value as part of a new data packet containing updated values for the other mobile stations.

11. A method according to claim **10**, further comprising the step of allocating to the uplink and downlink channels, during a channel set-up stage, a common timing advance index, which index allows the mobile station to extract a corresponding timing advance value from the data packet.

12. A radio telephone network comprising a base station subsystem and a plurality of mobile stations for communicating with the base station system, the base station subsystem being configured to:

define a downlink channel for transmitting user data from the base station subsystem to the mobile station and for defining an uplink channel for transmitting user data from the mobile station to the base station subsystem, the downlink channel and uplink channel each comprising one or more dynamically allocated time slots in a time division multiple access frame where the time slot(s) allocated to each of the uplink and downlink channels are not necessarily equal in number and do not necessarily have a fixed time relationship;

determine a timing advance value indicative of the radio propagation delay between the mobile station and the base station subsystem at a given time; and

transmit the timing advance value once, from the base station subsystem to the mobile station, and wherein

the mobile station is configured to advance transmission slots at the mobile station for both the uplink and downlink channels using the received timing advance value so that transmitted data is received at the base station subsystem in the allocated base station subsystem reception slots.

13. A mobile station for use in a radio telephone network, the radio telephone network comprising a base station subsystem and a plurality of mobile stations for communicating with the base station subsystem and in which radio signal transmission slots at a mobile station are synchronised to radio signal reception slots at the base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, the reception slots corresponding to uplink and/or downlink user data packet switched transmission channels allocated dynamically by the base station subsystem, the mobile station being configured to receive:

a single timing advance index allocated to the mobile station at the base station subsystem, which index identifies one idle frame in a multiframe structure in which the mobile station should transmit a timing access burst to the base station subsystem and one or more further idle frames in the multiframe structure in which the mobile station should receive an updated timing advance value;

the one or more further idle frames in the multiframe structure identified by the timing advance index;

an idle frame slot number, which is allocated to the mobile station at the base station subsystem, identifying the time slot in the idle frames when the timing access burst and the timing advance values should be transmitted;

the updated timing advance value in the further one or more idle frames, and the mobile station further being configured to transmit; and

data using the timing advance index and the idle frame slot number to determine timing advance values for all user data channels allocated to the mobile station.

14. A mobile station for use in a radio telephone network, the radio telephone network comprising a base station subsystem and a plurality of mobile stations for communicating with the base station subsystem and in which radio signal transmission slots at a mobile station are synchronised to radio signal reception slots at the base station subsystem to account for a propagation delay between the mobile station and the base station subsystem, the reception slots corresponding to uplink and/or downlink user data packet switched transmission channels allocated dynamically by the base station subsystem, the mobile station being configured to:

receive a timing advance value once, from the base station subsystem to the mobile station, and to;

advance transmission slots at the mobile station for both the uplink and downlink channels using the received timing

advance value so that transmitted data is received at the base station subsystem in the allocated base station subsystem reception slots.

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