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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION
Petitioner

v.

QUALCOMM INCORPORATED
Patent Owner

Case IPR2019-00128
U.S. Patent No. 9,154,356

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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I. INTRODUCTION

The primary argument Patent Owner raises is one of claim construction, and specifically, what the proper construction of the term “carrier aggregation” is. The text of the '356 patent provides the answer, stating that carrier aggregation “is simultaneous operation on multiple carriers.” Ex. 1301, 1:32-33; *see id.*, 2:53-54. The patent's written description is expansive in its description of technologies to which the alleged invention applies, and it describes LTE carriers as just one example. *Id.*, 2:38-67. Especially under the broadest reasonable interpretation standard that applies to claim construction in this trial, “carrier aggregation” is properly understood as meaning exactly what the patent says it means: “simultaneous operation on multiple carriers.” Under that claim construction, Patent Owner raises no argument against anticipation by the Lee reference for at least some claims of the '356 patent. *See* POR, 32-34.

Seeking to avoid that outcome of unpatentability, Patent Owner proposes an odd – and narrow – tripartite claim construction of “carrier aggregation.” Specifically, Patent Owner argues that “carrier aggregation” requires “[1] simultaneous operation on multiple carriers [2] that are combined as a single virtual channel [3] to provide higher bandwidth.” Parts [2] and [3] of that construction come from outside the '356 patent, and they are not supported by the intrinsic evidence at all, let alone the broadest reasonable interpretation in light of that

evidence. The Board should reject this post-hoc attempt to rewrite the '356 patent and its claims.

But even if the Board were to adopt Patent Owner's proposed construction, the challenged claims are still invalid as obvious in view of Lee (Ex. 1335) and the Feasibility Study (Ex. 1304), which Patent Owner does not dispute discloses "[1] simultaneous operation on multiple carriers [2] that are combined as a single virtual channel [3] to provide higher bandwidth." Patent Owner fails to rebut Petitioner's evidence regarding why a person of ordinary skill in the art ("POSITA") would have been motivated to combine the teachings of Lee with Feasibility Study. Instead of finding fault with the motivations to combine identified by Petitioner, Patent Owner criticizes aspects of the prior art references not relied on by Petitioner. Patent Owner's attack on positions never advanced by Petitioner fails to rebut Petitioner's expressly stated reasons to combine, which largely come from the text of the references themselves.

II. PATENT OWNER'S PROPOSED CLAIM CONSTRUCTION IS INCORRECT AND OVERLY NARROW

A. "Carrier Aggregation" Should be Construed in Accordance With its Broadest Reasonable Interpretation

As set forth in the Petition, "carrier aggregation" should be construed as "simultaneous operation on multiple carriers." This construction comes directly from the specification, which defines the term. See Ex. 1301, 1:32-33 ("A wireless

device may support *carrier aggregation, which is simultaneous operation on multiple carriers.*”);¹ *id.*, 2:53-54; *id.*, 2:54-55 (“Carrier aggregation may also be referred to as multi-carrier operation.”). See Ex. 1302, ¶59. Given the clear guidance in the specification, “carrier aggregation” should be construed as “simultaneous operation on multiple carriers” under the broadest reasonable interpretation (“BRI”) claim construction standard. See *Apple Inc. v. Immersion Corp.*, IPR2016-01372, 2017 WL 376909, at *3 (P.T.A.B. Jan. 11, 2017) (“use of the word ‘is’ in the specification may ‘signify that a patentee is serving as its own lexicographer’” and applying express definition under BRI); see also *In re Imes*, 778 F.3d 1250, 1252-53 (Fed. Cir. 2015) (where the specification “expressly and unambiguously defines” a term, construction of the term is “straightforward”). This meaning is consistent with the understanding of the term by a POSITA. Ex. 1302, ¶60. Paper 3, Petition (“Pet.”), 28.

Indeed, in the ITC 1093 Investigation, the Administrative Law Judge (“ALJ”) construed “carrier aggregation” as Petitioner proposes here—“simultaneous operation on multiple carriers”—despite Patent Owner’s similar arguments. Ex. 1336 (Inv. No. 337-ITC-1093, Order No. 38), 17; see also *id.*, App’x A at 30 (“[F]ree from artificial limitations, the proper construction of ‘carrier aggregation’ comes

¹ Emphasis in quotations and annotations to figures added unless stated otherwise.

straight from the specification of the '356 patent.”). The ITC ALJ made this construction under the *Phillips* standard. Ex. 1336, 12.

For this IPR proceeding, the BRI claim construction standard applies. Paper 9, Decision on Institution (“DOI”), 12. Petitioner submits that the BRI construction must be at least as broad as a proper *Phillips* construction. *Rembrandt Wireless Techs., L.P. v. Samsung Elecs. Co.*, 853 F.3d 1370, 1377 (Fed. Cir. 2017) (“the Board in IPR proceedings operates under a broader claim construction standard than the federal courts”). *See* DOI, 12; *see also* Pet., 28. The BRI construction should also be at least broad enough to encompass the patentee’s own definition of the term. *See Apple Inc.*, IPR2016-01372, 2017 WL 376909, at *3.

B. Patent Owner’s Proposed Construction of “Carrier Aggregation” is Far Narrower than the Broadest Reasonable Interpretation of that Term in Light of the Specification

Though the '356 patent expressly defines “carrier aggregation” as “simultaneous operation on multiple carriers” and discusses “Bluetooth,” WiFi (e.g., “802.11”), and “LTE” devices (among others) that support carrier aggregation, Patent Owner selects just one subset of those, LTE, and then proposes a construction of carrier aggregation that is even narrower than any disclosure in the '356 specification, stitching its construction together from different pieces of extrinsic evidence and hidden portions of its voluminous information disclosure statement (“IDS”) citations. Ex. 1339, ¶16.

1. The Intrinsic Evidence Does Not Support Patent Owner's Construction

As stated above, that tripartite proposed construction is “[1] simultaneous operation on multiple carriers [2] that are combined as a single virtual channel [3] to provide higher bandwidth.” The Board should reject Patent Owner's proposed construction. Patent Owner's citation of the '356 patent specification fails to support this proposed construction. Patent Owner includes repeated citations to column 2, lines 63-67 of the '356 patent in support of “combined higher bandwidth channel for communications,” and the addition of LTE-Advanced carrier aggregation “[t]o relieve this [data] rate-limiting step.” POR, 12-14. However, the '356 patent includes no discussion of these concepts. Ex. 1301. Instead, for parts [2] and [3] of its proposed construction, Patent Owner's arguments that the specification supports them are based only on its expert's unsupported extrapolations and augmentations of what the specification actually says. *See* POR, 11-14. In reality, parts [2] and [3] of Patent Owner's proposed construction lack any written description support in the '356 patent. And, in any case, the LTE carrier aggregation expressly described at column 2, lines 63-67 is merely one example of carrier aggregation in the patent. Ex. 1339, ¶¶17-18.

Indeed, contrary to Patent Owner's assertion that the intrinsic evidence supports its narrowing construction, the applicant chose very broad language to

describe the types of transmissions and communications equipment encompassed by the invention. For example, the written description broadly states that a “carrier” “may also be referred to as a . . . frequency channel, a cell, etc.” Ex. 1301, 1:37-38. *See also* Ex. 1340, 50:14-51:9 (Patent Owner's expert admitting that he did not consider the meaning of this portion of the '356 patent's written description in formulating his opinions). A “frequency channel” or “cell” are far broader than the definition of “carrier” that the Patent Owner currently seeks to embed within its definition of “carrier aggregation,” which is effectively a “component carrier.” Ex. 1301, 1:37-38. Likewise, the '356 patent states that “[w]ireless device 110 may be a cellular phone, a smartphone, a tablet, a wireless modem, a personal digital assistant (PDA), a handheld device, a laptop computer, a smartbook, a netbook, a cordless phone, a wireless local loop (WLL) station, a Bluetooth device, etc. Wireless device 110 may be capable of communicating with wireless system 120. Wireless device 110 may also be capable of receiving signals from broadcast stations (e.g., a broadcast station 134), signals from satellites (e.g., a satellite 150) in one or more global navigation satellite systems (GNSS).” *Id.*, 2:40-50. Thus, the applicant signaled that the invention would cover devices other than those that implement LTE. The patent further states that “[w]ireless device 110 may support one or more radio technologies for wireless communication such as LTE, cdma2000, WCDMA, GSM, 802.11, etc.” *Id.*, 2:50-53. By broadly encompassing all of these devices,

device types, and wireless technologies, the '356 patent's written description expressly broadens the scope of the alleged invention to encompass virtually any wireless device or radio technology. Patent Owner's current attempt to restrict the claim language cannot be squared with the broadening approach taken by the applicant in the written description. Ex. 1339, ¶19.

Indeed, during cross examination, Patent Owner's expert, Dr. Foty, *admitted* that parts two and three of Patent Owner's proposed tripartite claim construction do not find support in the '356 patent's written description. He explained that, while "simultaneous operation on multiple carriers" came from the '356 patent written description, Ex. 1340, 69:12-19, the [2] "that are combined as a single virtual channel" and [3] "to provide higher bandwidth" portions of the proposed claim construction come only from prior art that was cited in the prosecution history. *Id.*, 70:12-71:18; 72:14-74:7. Ex. 1339, ¶20.

Specifically, Dr. Foty testified that WO 2012/008705 (Ex. 2016), GB2472978 (Ex. 2017), and U.S. Pat. No. 8,442,473 (Ex. 1325) are intrinsic evidence that support this portion of the construction. *Id.* However, the phrases "combined as a single virtual channel" or "provide higher bandwidth" do not appear in any of the three references relied upon by Dr. Foty. Even if these references qualify as intrinsic evidence (which is debatable), Patent Owner's arguments about them do not limit the BRI of the term "carrier aggregation" given the clear definition of that term in

the '356 written description. Indeed, the three references' various descriptions of instances of carrier aggregation are all encompassed by the BRI of that term: simultaneous operation on multiple carriers. Ex. 1339, ¶¶20-21. And, none of the evidence on which Patent Owner now relies for parts 2 and 3 of its proposed claim construction was ever discussed during prosecution of the '356 patent. Kaukovuori (Ex. 1325) was cited during prosecution on December 26, 2014, but the prosecution file wrapper does not include the quote reproduced at page 15 of the POR; the Examiner referenced an entirely different passage in the office action. Ex. 1318, 7. Furthermore, Patent Owner's argument that the Examiner found that Kaukovuori *discloses* one specific type of carrier aggregation signifies only that the Examiner thought that Kaukovuori's disclosure fell within the '356 patent's definition of carrier aggregation, not that the Examiner was limiting the Examiner's interpretation of carrier aggregation based on the Kaukovuori reference. The other two pieces of alleged support for parts [2] and [3] of Patent Owner's construction are references selected from among the 350 IDS-cited references and were never discussed during prosecution. Ex. 1339, ¶¶20-21. These references (which collectively amount to less than 1% of the prior art references submitted during prosecution of the '356 patent) cannot properly be used to narrow the express definition of "carrier aggregation" supplied by the '356 patent itself.

2. Prosecution Disclaimer Does Not Limit the Broadest Reasonable Interpretation Here

In the POR, Patent Owner also seeks to invoke the doctrine of prosecution history disclaimer. POR, 24-27. However, Patent Owner's own expert abandoned that theory at his deposition, testifying that there was no disclaimer or disavowal of claim scope with respect to the term "carrier aggregation." Ex. 1340, 32:2-15. Petitioner agrees. Petitioner's expert agrees. Ex. 1339, ¶22.

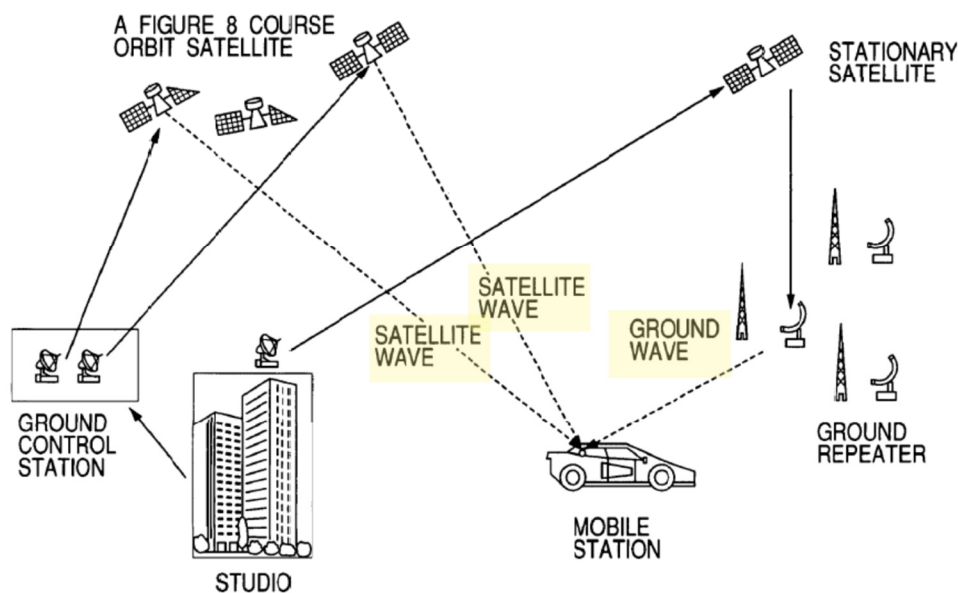
Moreover, the Patent Owner's lack of citation of cases which support its prosecution history disclaimer theory speaks volumes. The Patent Owner is seeking to create new law regarding BRI claim construction. Specifically, the Patent Owner is trying to bring a *Phillips* claim construction principle/canon that was developed to protect alleged infringers from patent owners seeking to recapture surrendered subject matter during litigation into the BRI analysis and use it offensively to artificially limit the scope of claim language the Patent Owner itself drafted. But despite making such an argument, Patent Owner has not provided any, let alone adequate, legal foundation for its position. In the most generous interpretation to the Patent Owner's position, the law is unsettled as to whether, and what extent, prosecution history disclaimer applies under the BRI standard. *See Tempco Lighting, Inc. v. Tivoli, LLC*, 742 F.3d 973, 978 (Fed. Circ. 2014) ("the PTO is under no obligation to accept a claim construction proffered as a prosecution history

disclaimer, which generally only binds the patent owner"). Petitioner submits that the doctrine does not apply where a patent owner seeks to rely upon it to narrow the broadest reasonable interpretation of a claim term.

But even if it could be applied, there was no relevant prosecution history disclaimer because there is no "clear and unequivocal evidence" of disavowal. *See Poly-America, L.P. v. API Indus.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016). Patent Owner's arguments in distinguishing the Hirose (Ex. 1324) reference during prosecution do not even meet the *Phillips* test for a prosecution history disclaimer, and therefore cannot constitute a prosecution history disclaimer under any standard.

During prosecution, the Examiner rejected the claims based on anticipation by U.S. Patent No. 7,317,894 ("Hirose") (Ex. 1324). Ex. 1314, 2-4. In Hirose, **three different carriers** (e.g., both "satellite wave" carriers and the "ground wave" carrier illustrated in Hirose Figure 1, annotated below) containing the **same data** are received simultaneously and synthesized to obtain a single stream of data. *Id.* Ex. 1339, ¶23.

FIG. 1



Patent Owner responded to the Examiner's rejection by amending its claims to require an input RF signal "employing carrier aggregation." Ex. 1314, 2-6. Patent Owner argued that Hirose does not disclose carrier aggregation because it describes receiving "redundant data" over multiple carriers, which Patent Owner contended does not result in an "increased aggregated data rate." *Id.*, 7-8. Ex. 1339, ¶24.

Seeking to advance its disclaimer argument, Patent Owner disputes Petitioner's statement that "Patent Owner did not argue during prosecution that carrier aggregation required anything more than non-redundant transmissions." POR, 15 (quoting Pet., 30). As support for its position, Patent Owner points to the same file history quote provided in the Petition, with an emphasis on Patent Owner's argument that "'carrier aggregation' requires an '*increased aggregated* data rate.'"

Id. Those words do not amount to the clear and unmistakable disclaimer that Patent Owner contends. As Petitioner explained in the Petition, the “increased aggregated” here refers to “data rate.” Hirose’s transmission of the “same signals over different paths” does not increase aggregated data rate because it “results in **redundant** data at a **common** data rate.” Ex. 1315, 7 (bold, italics in original). Ex. 1339, ¶25. If Hirose’s simultaneous signals contained non-redundant (*e.g.*, different) data, Patent Owner could not have made the argument that it did, and therefore the most natural reading of the prosecution history is that the applicant was distinguishing Hirose on the basis of its redundant transmissions. Dr. Fay’s initial declaration explains this. Ex. 1302, ¶83. At a minimum, the competing interpretations of the prosecution history set forth in the Petition and in the POR demonstrate that any disclaimer was not “clear and unmistakable.”² Ex. 1339, ¶25.

² Because there was no clear and unmistakable disclaimer, Patent Owner’s argument that Petitioner’s proposed claim construction does not include a carve-out for the prosecution history’s discussion of Hirose, POR, 24-27, misses the mark entirely. But if the Board concludes that prosecution history did result in a disclaimer, then the disclaimer was of systems that receive transmissions of redundant data over multiple channels. A claim construction that included that disclaimer would have no impact on the invalidity issues presented in the Petition,

3. Patent Owner's Citation to Extrinsic Evidence Is Inapposite

Finally, Patent Owner's citations to extrinsic evidence cannot change the broadest reasonable interpretation of carrier aggregation. *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1334 (Fed. Cir. 2013). Particularly in a case such as this, where the intrinsic evidence so clearly supports the definition that Patent Owner included in its specification, a POSITA would assign extrinsic evidence little or no relevance. *See id.* Furthermore, many of the extrinsic references included with Patent Owner's Response were dated or filed *well after* the filing date of the '356 patent, and are not prior art. *See* Exs. 2018 (earliest filing 2013); 2019 (Sep. 2013); 2022 (2014). Ex. 1339, ¶26. They should be accorded no significant weight and, in any event, are not inconsistent with Petitioner's proposed construction of "carrier aggregation," which is broad enough to encompass each of the differing examples of carrier aggregation provided in Patent Owner's extrinsic evidence sources. *Id.*, ¶26.

because Patent Owner's own expert admitted that, in Lee, the transmissions over WiFi and Bluetooth would not ordinarily contain redundant data. Ex. 1337, 2213:22-2214:1; Ex. 1340, 7:17-18:5.

4. **Petitioner's Proposed BRI Construction Does Not Read Out "Aggregation"**

Finally, Patent Owner argues that Petitioner's BRI construction reads out the word "aggregation." POR, 28-29. That is incorrect.

The '356 patent claims require that an "input RF signal" employ "carrier aggregation." When there is "simultaneous operation on multiple carriers," those carriers will be *aggregated* in the input RF signal. Pet., 46-48 ("receiving and processing data on multiple carriers at the same time in a single input RF signal"). Thus, when read in view of the complete claim language, "carrier aggregation" in the context of the challenged claims accounts for aggregation (*i.e.*, collected together, assembled, as defined in the POR, at 29), because the multiple carriers would be present simultaneously in the input RF signal. Ex. 1339, ¶27.

Specifically, because the '356 patent describes "carrier aggregation" as encompassing wireless devices that support "*one or more* radio technologies for wireless communication such as *LTE, cdma2000, WCDMA, GSM, 802.11, etc.*," when two or more carriers in a carrier aggregated signal are received according to "one or more" of these technologies, those carriers are all aggregated in the input RF signal (e.g. "RFin" in FIG. 6A) that enters the amplifier. Ex. 1339, ¶28.

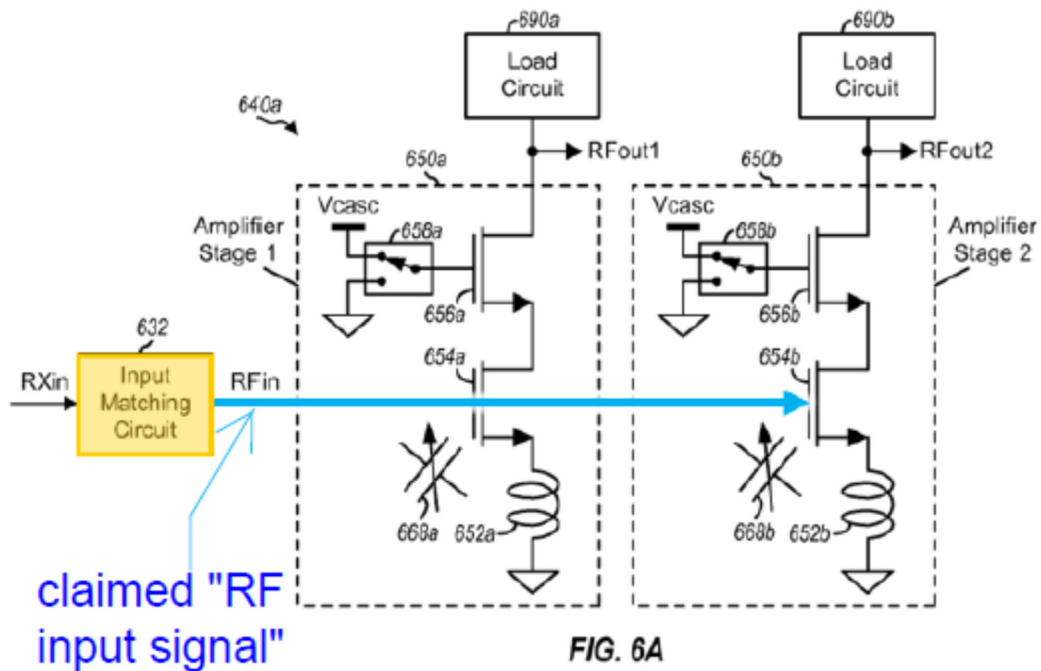


FIG. 6A

'356 patent

This RFin is one wire with one input, and whether two carriers received are two LTE carriers, or two WiFi carriers, or one Bluetooth and one WiFi carrier, the input RF signal RFin will be a signal that includes all of these carriers. The *only* difference would be the numerical values of frequencies of these carriers present simultaneously on the input. Thus, any two or more carriers received simultaneously are aggregated at RFin, which is the claimed “input RF signal.” Ex. 1339, ¶29.

In short, the '356 patent challenged claims relate to “*receiv[ing]* an input radio frequency (RF) signal” or “*amplifying* a first *input* radio frequency (RF) signal.” Ex. 1301, Claims 1, 17. To the extent Patent Owner's arguments about “aggregation” suggest a singular *transmission* node or a single logical *transmission*

channel, these narrow interpretations are inconsistent with the '356 patent, and find no support in evidence. Ex. 1339, ¶29.

III. GROUND I: PATENT OWNER'S ARGUMENTS FAIL TO REFUTE THE EVIDENCE SET FORTH IN THE PETITION

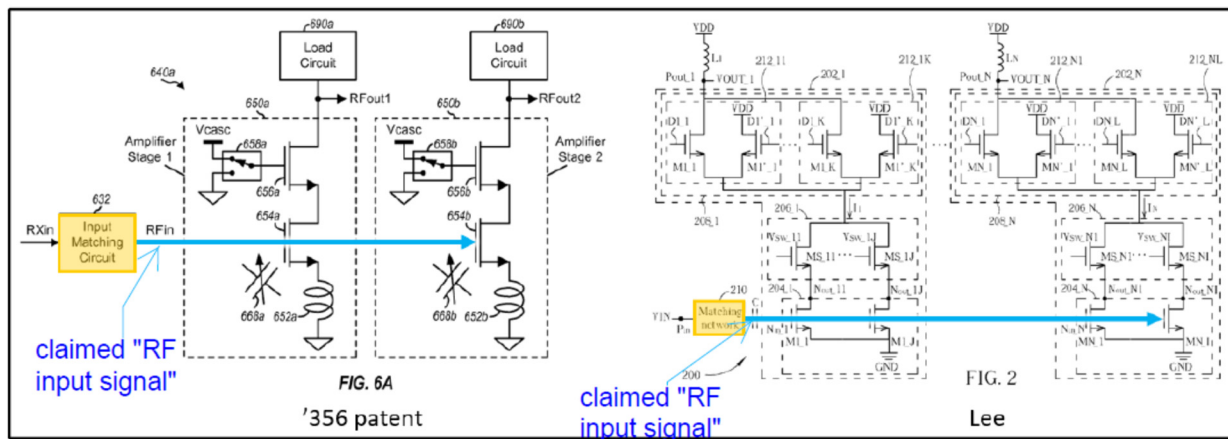
A. Applying the Correct Claim Construction, Lee Anticipates Claims 1, 7, 8, 11, 17, and 18

With respect to anticipation grounds for the Lee reference (Ex. 1335), Patent Owner's *only* argument in favor of patentability for claims 1, 11, 17, and 18 is that Lee does not disclose the "input RF signal employing carrier aggregation" under Patent Owner's proposed construction. POR, 32-34. Patent Owner is incorrect for multiple reasons. Ex. 1339, ¶30.

Lee discloses that its input RF signal (VIN) employs carrier aggregation (*i.e.*, simultaneous operation on multiple carriers (*e.g.*, WiFi and Bluetooth)). This is explained in the Petition. Pet., 46. Patent Owner's expert agrees that the Bluetooth and WiFi signals in Lee are separate signals that can be received simultaneously. Ex. 1337, 2205:12-22; Ex. 1340, 7:17-18:5. Ex. 1339, ¶31.

Lee also teaches that the two carriers, *e.g.* Bluetooth and WiFi, are aggregated at VIN just as the carriers in the '356 patent are aggregated at the radio frequency (RF) input RFin. Pet., 47-48. As also explained, above, at Section II.B.4, when a Bluetooth carrier is received simultaneously with a WiFi carrier in Lee, those carriers are aggregated at VIN – because VIN goes along a single wire, and is a

single input that is the claimed “input RF signal,” the Bluetooth and WiFi carriers are aggregated, *e.g.*, collected together, assembled at VIN. *See* POR, 29 (“Aggregate means ‘to collect together, assemble.’”). Ex. 1339, ¶32.



While Patent Owner's expert refers to them as “separate signals,” Bluetooth and WiFi carriers would be present simultaneously at VIN in the same manner as two LTE carriers would be present simultaneously at VIN, the only difference being the numerical values of their carrier frequencies. This is true regardless of whether or not the two carriers originate from a common source, or whether or not they are logically related to one another (*e.g.*, at the baseband level). The two carriers do not somehow travel down separate sides of the wire or avoid one another along VIN. Calling the simultaneously-received Bluetooth and WiFi carriers of Lee a single signal, or labeling them as separate carriers or separate signals does not change the fact that their physical presence and behavior is the same – they are aggregated along VIN as they are received by the amplifier stages of Lee. Ex. 1339, ¶33.

The Patent Owner's Response does not identify any arguments in favor of patentability for claims 1, 7, 8, 11, 17, or 18 under Petitioner's proposed construction. POR, 32-34. For the reasons identified in the Petition, claims 1, 7, 8, 11, 17, or 18 are thus anticipated by Lee. Ex. 1339, ¶34.

To the extent the Board construes carrier aggregation to require "non-redundant data" or its logically equivalent synonym "increased aggregated data rate" (though neither party proposes this construction), Lee also includes these teachings. Pet., 48-49. Lee uses multiple carriers to send different data, not redundant data. *Id.*, 49. Patent Owner's expert admits that typically, the two "radio streams" in Lee are not redundant. Ex. 1337, 2213:22-2214:1; Ex. 1340, 7:17-18:5. The Patent Owner's Response fails to identify any additional arguments for patentability of claims 11, 17, or 18. For at least these reasons, Patent Owner has failed to rebut Petitioner's showing that Lee teaches "input RF signal employing carrier aggregation." Ex. 1339, ¶35.

B. Patent Owner's Additional Argument with Respect to Claim 7 Lacks Merit

Claims 7 and 8 are anticipated by Lee for the reasons identified in the Petition. Pet., 56-61. In addition to advancing the same argument about the "input RF signal employing carrier aggregation" made for claims 1, 11, 17, and 18, which is incorrect for the reasons set forth, above, in Section III.A, Patent Owner's Response makes

additional arguments distinguishing claim 7 on the anticipation grounds. POR, 35-38. However, these arguments are incorrect, and fail to rebut Petitioner's showing of anticipation based on Lee. Ex. 1339, ¶36.

Patent Owner's additional arguments distinguishing claim 7 from the Lee anticipation ground argue that Lee "does not disclose circuit 400 operating in both ['shared' and 'combo'] modes in a single embodiment." POR, 35. Patent Owner further relies on language in Lee paragraph [0036] about a capability to enable output stages 304_1-304_N in a "time-division manner" in shared mode. POR, 35-36. However, as described in the Petition, Lee does disclose circuit 400 operating in both a combo mode and a shared mode; hence, the disclosure of Lee with respect to Figure 4 fully supports Petitioner's grounds for anticipation of claims 7 and 8, and the Patent Owner's Response fails to rebut these anticipation grounds for several reasons. Pet., 56-62. Ex. 1339, ¶37.

As set forth in the Petition, a POSITA would understand that the circuit 400 of Lee operates in combo mode, in addition to shared mode. Ex. 1335, ¶41 ("In an alternative design, the signal amplification *circuit 400 shown in FIG. 4 may operate under a combo mode*"), ¶38 (describing exemplary operation "under the shared mode"), ¶¶42, 33; Pet., 57; Ex. 1302, ¶92. A POSITA would understand that operation in the shared mode described in paragraph [0038] and elsewhere in Lee would apply in "the alternative design" of Lee paragraph [0041], and that the Petition

does not “mix[] different embodiments” for its anticipation grounds. Ex. 1339, ¶38. Instead of disputing the anticipatory grounds set forth in the Petition for claims 7 and 8 based on Lee, Patent Owner alleges that *some other* embodiments fail to anticipate those claims. POR, 35-37. Nothing in paragraphs [0036] or [0037] of Lee is inconsistent with Petitioner's anticipation grounds for claims 7 and 8, and thus Patent Owner fails to rebut Petitioner's showing of anticipation. Ex. 1339, ¶38.

IV. GROUND II: THE PETITION DEMONSTRATES THAT LEE RENDERS CLAIMS 7 AND 8 OBVIOUS

Patent Owner first argues against the obviousness of claims 7 and 8 based on “the input RF signal employing carrier aggregation.” POR, 38. This is incorrect for the reasons set forth, above, in Section III.A. Patent Owner's only other argument against the obviousness of claims 7 and 8 is the allegation that Petitioner “fails to sufficiently articulate” / “fails to sufficiently explain” and has “conclusory assertions [that] lack sufficient support” for its stated reasons to combine the teachings of Lee FIG. 2 with Lee FIG. 4. POR, 38-39. The Board disagreed for purposes of its Decision on Institution: “[w]e also are persuaded that Petitioner's proffered reasoning for modifying the signal amplification circuit of Figure 2 of Lee to include the feedback elements of Figure 4 of Lee, namely, to improve input matching performance, is sufficient to support the legal conclusion of obviousness.” DOI, 29. Ex. 1339, ¶39.

The Patent Owner's Response, however, does not state anywhere that Petitioner's reasons to combine for the obviousness of claims 7 or 8 are incorrect, or that Patent Owner disagrees with them. See POR, 38-39. Petitioner reiterates that claims 7 and 8 are obvious over Lee for the reasons set forth in the Petition. Pet., 68-72. Ex. 1339, ¶40.

V. GROUND III: THE PETITION DEMONSTRATES THAT CLAIMS 1, 7, 8, 11, 17, AND 18 ARE OBVIOUS

Patent Owner's Response does not identify any claim elements missing from the combination of Lee and Feasibility Study for claims 1, 7, 8, 11, 17, and 18, but instead attacks Petitioner's reasons to combine the references. POR, 40-47. The Patent Owner's expert did not dispute that the Feasibility Study discloses carrier aggregation, even under its proposed construction. See Ex. 1340, 75:20-76:6, 7:17-18:5. Patent Owner argues that the Feasibility Study does not disclose an amplifier circuit, but the Petition does not rely upon Feasibility Study for such a teaching in the obviousness combination, and in any case the Feasibility Study does disclose amplifiers. POR, 40; Pet., 72-75. Ex. 1339, ¶41.

A. The Petition Establishes that the Feasibility Study is Analogous Art

Patent Owner argues that Petitioner has not shown that the Feasibility Study is analogous art. POR, 41. This argument fails. Ex. 1339, ¶42.

“Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011) (quoting *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004)). Lee and the Feasibility Study are highly analogous art to the '356 patent under either test. In addition to all of the content within the Lee reference itself that demonstrates that it falls within the same field of endeavor of the '356 patent, Lee was considered so materially related to the '356 patent disclosure by an independent, international search authority that the search authority designated “Lee as an ‘X’ reference, meaning that Lee is ‘of particular relevance’ and ‘the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone.’” DOI, 15 (quoting Ex. 2005, 3). In addition to all of the content within the Feasibility Study reference itself that demonstrates that it falls within the same field of endeavor of the '356 patent (including its broad “Keywords” of “LTE, Radio,” Ex. 1304, 2, 7, *see also*, Ex. 1340, 77:9-12), the Feasibility Study was considered so materially related to the '356 patent disclosure that Patent Owner itself relies upon it as extrinsic evidence in support of its proposed “carrier aggregation” construction

in the same Patent Owner Response where it attempts to argue that the Feasibility Study is non-analogous art. POR, 19, 41. Ex. 1339, ¶43.

B. The Petition Establishes the Reasons to Combine Lee and the Feasibility Study

As set forth in the Petition, Pet. 73-75, a POSITA would have found it obvious to turn to the amplification circuit of Lee in order to process the carrier aggregated input RF signal of the Feasibility Study and would have been motivated to combine those references. The Feasibility Study recognizes that wireless mobile devices can be configured to operate with input RF signals employing carrier aggregation. *See* Ex. 1304, 9. The Feasibility Study further suggests that an ideal receiver for noncontiguous intra-band and inter-band carrier aggregation³ would have multiple RF front-ends. *See id.*, 26. The Feasibility Study characterizes an “RF front end” as having its own gain control (amplifier), mixer, and analog-to-digital conversion. *See id.* Lee teaches multiple amplifier blocks providing output to different receivers. *See* Ex. 1335, ¶29. Lee thus teaches the exact type of receiver that the Feasibility Study recognizes would work with signals employing carrier aggregation. The motivation to combine Lee with the teachings of the Feasibility Study arises from the references themselves and requires nothing more than substitution of the “plurality of radio frequency signals” of Lee for the “Carrier

³ *See* Ex. 1302, ¶41.

Aggregation” signals described in the Feasibility Study. Ex. 1302, ¶134. Ex. 1339, ¶44.

Patent Owner dedicates page 42 of its Patent Owner Response to identifying and then criticizing reasons to combine Lee and Feasibility Study which are not in the Petition and upon which Petitioner does not actually rely. POR, 42. This fails to rebut Petitioner's showing in the Petition. Patent Owner's arguments include “different kinds of radio connections” vs. “same type of radio connections,” as well as “Bluetooth and Wifi” vs. “LTE cellular communications.” *Id.* Even applying Patent Owner's proposed construction of “carrier aggregation,” however, there is no language in the '356 patent's claims upon which these distinctions can be made – the challenged claims encompass both different kinds of radio connections as well as the same type of radio connections. The POR also argues that the Feasibility Study would not be combined with Lee because Feasibility Study allegedly does not “disclose an amplifier circuit.” POR, 42. However, Petitioner's reasons to combine Feasibility Study with Lee do not rely upon the presence of an amplifier circuit in Feasibility Study, but rather simply apply the input RF *signal* of Feasibility Study to the amplifier stages of Lee. *See* Pet., 73-75. Furthermore, Feasibility Study does disclose an amplifier circuit in the form of automatic gain control. *See* Ex. 1304, 26 (“RF front end (i.e., mixer, AGC [***Automatic Gain Control***], ADC [Analog to Digital Conversion]”). Ex. 1339, ¶¶45-47.

Patent Owner further argues that portions of Feasibility Study quoted by Petitioner state a problem rather than provide a motivation. POR, 42-43. This is not correct; these statements in Feasibility Study describe the various types of RF front ends that work with the LTE carrier aggregated signal disclosed in Feasibility Study – the “separate RF front end[s] are necessary” quote is given with respect to “non adjacent Inter band” support, and other RF front ends accommodating carrier aggregation are described. Ex. 1304, 26. Ex. 1339, ¶48.

Patent Owner further argues that Petitioner's “unlock the features of LTE-Advanced” reason to combine “bears no relation to any specific combination of prior art elements.” POR, 43. This is also incorrect – the only prior art element from Feasibility Study in the proposed combination is the input RF signal disclosed in Feasibility Study, which is an LTE carrier aggregated signal. Pet., 73-75. Receiving the LTE carrier aggregated signal of Feasibility Study with the simultaneous multi-carrier RF amplifier stages of Lee would in fact unlock the features of LTE-Advanced. *Id.* The system of Lee would operate the same whether it was receiving Bluetooth and WiFi carriers simultaneously or two LTE carriers simultaneously, and no modifications to Lee would have been involved other than, possibly, well-known receiver tuning and filtering techniques. Pet., 74-75. This is all explained in the Petition. *Id.* Ex. 1339, ¶49.

C. Patent Owner's Additional Arguments are Without Merit

Patent Owner further argues that Lee and Feasibility Study are “too far afield from the technology addressed by the ’356 Patent,” and thus would not have been “selected ... from the sea of prior art.” POR, 44. However, as explained, above, in Section V.A, this is incorrect. Lee placed at the top of an international searcher’s list based on its strong similarity and relevance to the technology of the ’356 patent. DOI, 15. And, as acknowledged by Patent Owner’s expert, Feasibility Study includes “Keywords” of “LTE, Radio” which was “done for purposes of providing terms to make the document findable under searches.” Ex. 1340, 77:10-11. Finally, Patent Owner’s arguments about Feasibility Study are further undercut by the fact that Patent Owner itself considers Feasibility Study to be closely enough related to the technology of the ’356 patent that a POSITA would have identified it as evidence in considering the meaning of “carrier aggregation.” POR, 19. Ex. 1339, ¶50.

VI. CONCLUSION

Based on the foregoing, claims 1, 7, 8, 11, 17, and 18 of the ’356 patent are unpatentable.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on November 27, 2019, I caused a true and correct copy of the foregoing material:

- Petitioner's Reply to Patent Owner's Response
- Exhibits 1339, 1340
- Word Count Certification
- Petitioner's Updated Exhibit List

to be served via electronic mail, as previously agreed by the parties, on the following attorneys of record:

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CERTIFICATE OF COMPLIANCE UNDER 37 CFR § 42.24 (d)

Under the provisions of 37 C.F.R. § 42.24 (d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply totals 5578, which is less than the 5,600 words allowed under 37 C.F.R. § 42.24 (d).

Respectfully submitted,

Dated: November 27, 2019

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PETITIONER'S UPDATED EXHIBIT LIST IPR2019-00128

Exhibit	Description
1301	U.S. Patent No 9,154,356 ("356 patent")
1302	Declaration of Dr. Patrick Fay ("Fay-Decl.")
1303	RESERVED
1304	3GPP Technical Report 36.912 V9.1.0, 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility study for Further Advancements for E-UTRA (LTE-Advanced) (Release 9) ("Feasibility Study")
1305	RESERVED
1306	RESERVED
1307	RESERVED
1308	RESERVED
1309	RESERVED
1310	RESERVED
1311	August 21, 2012, U.S. Application No. 13/590,423 as filed
1312	November 14, 2013 Office Action, U.S. Application No. 13/590,423
1313	Patent Owner's February 6, 2014 Response to Office Action Dated November 14, 2013, U.S. Application No. 13/590,423
1314	April 18, 2014 Office Action, U.S. Application No. 13/590,423
1315	Patent Owner's June 6, 2014 Response to Office Action Dated April 18, 2014, U.S. Application No. 13/590,423
1316	August 1, 2014 Office Action, U.S. Application No. 13/590,423
1317	Patent Owner's October 30, 2014 Response to Office Action Dated August 1, 2014, U.S. Application No. 13/590,423
1318	December 26, 2014 Office Action, U.S. Application No. 13/590,423
1319	February 26, 2015 Applicant-Initiated Interview Summary, U.S. Application No. 13/590,423
1320	Patent Owner's February 25, 2015 Response to Office Action Dated December 26, 2014, U.S. Application No. 13/590,423

Exhibit	Description
1321	March 5, 2015 Notice of Allowability, U.S. Application No. 13/590,423
1322	May 29, 2015 Notice of Allowability, U.S. Application No. 13/590,423
1323	U.S. Patent No. 7,751,513 ("Eisenhut")
1324	U.S. Patent No. 7,317,894 ("Hirose")
1325	U.S. Patent No. 8,442,473 ("Kaukovuori")
1326	Declaration of Patrick Merias ("Merias Decl.")
1327	Declaration of Friedhelm Rodermund ("Rodermund Decl.")
1328	RAN1 TR 36.912 Documents ("TR 36.912 Webpage") http://www.3gpp.org/ftp/Specs/archive/36_series/36.912/
1329	RESERVED
1330	RESERVED
1331	RESERVED
1332	RESERVED
1333	RESERVED
1334	RESERVED
1335	U.S. Patent Application Publication 2012/0056681 ("Lee")
1336	Inv. No. 337-TA-1093 Order No. 38: Construing Certain Terms of the Asserted Claims of the Patents at Issue (<i>Markman</i> Claim Construction), August 28, 2018, Public Version, pgs. cover, 1-19, App'x A 1, 3-9, 11, 12, 14, 15, 17-20, 23-25, 27, 30-41, 43-46, Chart 2, Cert. of Service
1337	Inv. No. 337-TA-1093, "Open Sessions," Public Hearing Transcript, (cover, pages 1953, 2170, 2174, 2189-2216, 2246, & 2270), Sep. 25, 2018 ("ITC")
1338	Declaration Of Gregory H. Lantier In Support Of Motion For Admission <i>Pro Hac Vice</i>
1339	Second Declaration of Dr. Patrick Fay
1340	Transcript of Nov. 8, 2019 Deposition of Dr. Daniel Foty