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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/918,846	06/14/2013	Charbel Khawand	338780-US-NP	1695
69316	7590	02/03/2020	EXAMINER	
MICROSOFT CORPORATION ONE MICROSOFT WAY REDMOND, WA 98052			SHIUE, DONG-CHANG	
			ART UNIT	PAPER NUMBER
			2648	
			NOTIFICATION DATE	DELIVERY MODE
			02/03/2020	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CHARBEL KHAWAND, SEAN RUSSELL MERCER,
and MAHESH M. PAI

Appeal 2018-005838
Application 13/918,846
Technology Center 2600

Before MAHSHID D. SAADAT, CARL L. SILVERMAN, and
MICHAEL J. ENGLE, *Administrative Patent Judges*.

SILVERMAN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner's Non-Final Rejection of claims 1–10 and 21–31, which constitute all pending claims. We have jurisdiction under 35 U.S.C. § 6(b). An Oral Hearing was held January 9, 2020.

We REVERSE.

¹ Throughout this Decision, we use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies Microsoft Technology Licensing, LLC as the real party in interest. Appeal Br. 2.

STATEMENT OF THE CASE

The invention relates to Radio Frequency (RF) power back-off optimization techniques for intelligently modifying the performance of radio devices (e.g., mobile computing devices) to maintain specific absorption rate (SAR) compliance with regulatory requirements while minimally perturbing antennas/radio operations. Abst.; Spec. ¶¶ 2, 3; Figs. 2, 4. Claim 1, reproduced below, is exemplary of the subject matter on appeal:

1. A method comprising:
detecting a specific absorption rate (SAR) trigger at a mobile computing device indicative of potential for non-compliance with SAR legal limits;
determining current signal conditions of the mobile computing device, the current signal conditions including a current radio-frequency (RF) transmission power of one or more antennas of the mobile computing device for communicating with one or more base stations;
predicting future signal conditions of the mobile computing device using a prediction model, the prediction model including a predicted RF transmission power for maintaining the communication of the one or more antennas of the mobile computing device with the one or more base stations over a future period of time and for satisfying the SAR legal limits over the future period of time, the prediction model configured to derive a predicted change over the future period of time in a received signal strength indicator (RSSI) detectable at the one or more base stations based on analysis of historical usage data for the mobile computing device;
and
adjusting the RF transmission power of the one or more antennas of the mobile computing device a selected amount in response to detecting the SAR trigger, the selected amount based on the determined current signal conditions and the predicted future signal conditions.
- Appeal Br. 15 (Claims App.). (emphases added).

THE REJECTIONS

Claims 1, 4–6, 8, 21, 24–26, 28, and 29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nevermann (“Nevermann”), Thorson et al. (“Thorson”), and Husted et al. (“Husted”). Non-Final Act. 4–18.

Claims 2, 3, 10, 22, 23, and 30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nevermann, Thorson, and Baldemair et al. (“Baldemair”). Non-Final Act. 19–22.

Claims 7 and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nevermann, Thorson, Husted, and Shi (“Shi”). Non-Final Act. 22–23.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Nevermann, Thorson, Husted, and Chakraborty et al. (“Chakraborty”). Non-Final Act. 24.

Claim 31 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Nevermann, Thorson, Husted, and Ali et al. (“Ali”). Non-Final Act. 24–26.

REFERENCES

Name	Reference	Date
Husted	US 8,520,586 B1	Aug. 27, 2013
Nevermann	US 2003/0064761 A1	Apr. 3, 2003
Thorson	US 2014/0274188 A1	Sept. 18, 2014
Shi	US 2013/0169348 A1	July 4, 2013
Chakraborty	US 2012/0071195 A1	Mar. 22, 2012
Ali	US 2013/0122827 A1	May 16, 2013
Baldemair	WO 2012091651 A1	July 5, 2012

ANALYSIS

Appellant argues, *inter alia*, that the Examiner errs in finding the combination of Nevermann, Husted, and Thorson teaches the claim 1² limitations:

predicting future signal conditions of the mobile computing device using a prediction model, the prediction model including a predicted RF transmission power for maintaining the communication of the one or more antennas of the mobile computing device with the one or more base stations over a future period of time and for satisfying the SAR legal limits over the future period of time, the prediction model configured to derive a predicted change over the future period of time in a received signal strength indicator (RSSI) detectable at the one or more base stations based on analysis of historical usage data for the mobile computing device; and

adjusting the RF transmission power of the one or more antennas of the mobile computing device a selected amount in response to detecting the SAR trigger, the selected amount based on the determined current signal conditions and the predicted future signal conditions.

In particular, Appellant argues Husted and Thorson do not teach the claim 1 limitations “*the prediction model configured to derive a predicted change over the future period of time in a received signal strength indicator (RSSI) detectable at the one or more base stations based on analysis of historical usage data for the mobile computing device*” (also referred to as disputed limitations).

Appeal Br. 7–12; Reply Br. 2–4.

² Appellant argues independent claims 1, 21, and 29 as a group, and we choose claim 1 as representative of the group. *See* 37 C.F.R. § 41.37(c)(1)(iv).

In the Non-Final Action, the Examiner finds that Thorson teaches “predicting future signal conditions of the mobile computing device and for satisfying SAR requirements over the future period of time in which a good prediction leading to a greater decrease in power right now could avoid the necessity of drastically cutting power later.” Non-Final Act. 6–7 (citing Thorson ¶ 31; Fig. 3). The Examiner then finds that Husted’s discussion of managing Bluetooth power teaches the disputed limitations:

The Bluetooth transmit power for different combinations of the frequency separation and WLAN *RSSI* can be determined and programmed based on simulations, calculations, *analysis of historical data*, etc. Other factors can also be taken into consideration, such as power regulations defined by power regulatory agencies (e.g., Federal Communications Commission (FCC), power amplification capabilities of the Bluetooth device 106, knowledge of a maximum tolerable power separation between the Bluetooth *RSSI* and the WLAN *RSSI*, etc. *Hence, the current estimation/measurement of RSSI is to be utilized at a future point in time when the next transmission of signals with adjusted transmission power is conducted.*)[[]

Therefore, it would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to implement Husted’s teaching in the method of Nevermann and Thorson so that the mobile device can plan ahead for the transmission power using the *RSSI* value that is based on the analysis of historical data in order to conform to the FCC transmission power regulation.

Id. at 7–8 (citing Husted, 7:1–10) (some emphasis omitted).

In the Appeal Brief, Appellant argues that Husted discloses estimating a current *RSSI* based on recently received frames but does not disclose or suggest a model configured to “derive a predicted change over [a] future period of time in a received signal strength indicator (*RSSI*).” Appeal Br. 2

(emphases omitted). Therefore, Appellant argues Husted does not teach the disputed limitation “*the prediction model configured to derive a predicted change over the future period of time in a received signal strength indicator (RSSI) detectable at the one or more base stations.*” *Id.* at 3 (emphasis added).

Appellant argues:

Husted discloses “Bluetooth discovery operations for collocated Bluetooth and WLAN [wireless local area network] devices,” (Col. 5, lines 4-6). During these discovery operations, a WLAN device determines signal strength of a Bluetooth signal transmitted from a Bluetooth device (*see* FIG. 3, operation 304). In return, the Bluetooth device determines the signal strength of a signal transmitted by the WLAN device (*see* FIG. 3, operation 314). As explained below, these determinations of previously-received signal strength (determined at operations 304 and 314, respectively), are estimates of a current or prior signal strength;

Husted describes various methods for determining a current or prior signal strength indicator (RSSI) (*see also*, Husted’s FIG. 3, element 314). The described methods include estimating the current signal strength indicator (RSSI) using (1) an actual current RSSI value; (2) an average of previously-received RSSI values; or (3) a minimum RSSI of a pre-defined number of previously-received frames. None of these determined RSSI values discloses or suggests a “predict[ed] change over [a] future period of time [in RSSI],” let alone a “predict[ed] change over the *future* time period in a received signal strength indicator (RSSI) . . . based on analysis of historical usage data for the mobile computing device,” as recited in claims 1, 21, and 29 (*emphasis added*).

Appeal Br. 8–10

Appellant refers to the complete Husted paragraph (6:49–7:8) from which the Examiner cites a portion (7:1–10) and argues:

Husted's determination of a current RSSI is rooted in the assumption that the current RSSI can be attained via a measurement (e.g., the RSSI may be the "current RSSI value") or estimated based on a past RSSI value or average of past RSSI values (*see, e.g.*, Col. 6, lines 53-65).

In contrast to Husted's estimate of a current RSSI based on a recent RSSI, claims 1, 21, and 29 recite a prediction model "configured to derive a predicted change over the future period of time in a received signal strength indicator (RSSI) detectable at the one or more base stations based on analysis of historical usage data for the mobile computing device." For example, the Applicant's specification explains: "in at least some cases, identified actions may be adjusted based upon predicted conditions ascertained via the prediction model. For instance, the prediction model may indicate an expected reduction in transmission power for a mobile device as the mobile device is transported/relocated closed to a base station, such as when a user of the device travels along a route to work on a daily basis," (paragraph [0046]; *see also* paragraph [0044], discussing RSSI prediction based on historical analysis of connection traffic, usage and travel patterns for individual devices, network topology, base station arrangement and coverage grids, among other factors).

. . . [T]he Office has not provided any rationale with regard to how or where Husted purportedly discloses: "predicting future signal conditions [using a prediction model] . . . to derive a predicted change over the future period of time in a received signal strength indicator (RSSI)." In the Office's "Response to Arguments" section of the Last Office Action, the Office argues that Husted discloses a predicted RSSI but simultaneously fails to acknowledge that claim 1 actually recites a "change" in RSSI over a future period of time (*see, e.g.*, Last Office Action, pg. 3). Rather, the Office only argues that a past RSSI value can, if used in the future, be interpreted as a "predicted RSSI value." Without acquiescing to this statement, the Appellant reminds the Office of its burden to demonstrate that each and every claim feature is shown in the cited art.

. . . [T]he Office has failed to allege (let alone substantiate) its argument that the cited references disclose “a prediction model configured to derive a predicted change over the future period of time in a received signal strength indicator (RSSI),” as recited in claims 1, 21, and 29. Rather, the Office has only argued that a past RSSI value can be a predicted RSSI value in a model that assumes that the RSSI value remains relatively unchanged from a past value. Accordingly, the Office has not substantiated a *prima facie* case of obviousness with respect to claims 1, 21, and 29. For at least these reasons, Husted cannot be reasonably relied on as disclosing or suggesting a “prediction model configured to derive a predicted change over the future period of time in a received signal strength indicator (RSSI) . . .” as recited in claims 1, 21, and 29.

Appeal Br. 8–11

In the Answer, the Examiner refers to the claim language:

[T]he claim limitation, “the prediction model configured to derive a predicted change over the future period of time in a received signal strength indicator (RSSI) detectable at the one or more base stations based on analysis of historical usage data for the mobile computing device”, does not specify what the prediction model actually is. Is it based on averaging the past 10 RSSI values or a special mathematical formula calculating the predicted change? Under broadest reasonable interpretation, the prediction model can be a minimum RSSI of a pre-defined number of previously-received frames, as alleged by Appellant in (3) above and taught by Husted (col. 4, lines 10-12), or can be an average of previously-received RSSI values, such as, but not limited to, $RSSI_2 = (RSSI_1 + RSSI_0) / 2$, where $RSSI_2$ is the predicted value, and $RSSI_1$ and $RSSI_0$ are the two previously measured or detected RSSI values at two previous time instances. Further, time is a relative term. The predicted $RSSI_2$ is a predicted value in a future time instance when $RSSI_1$ and $RSSI_0$ were detected. . . .

The difference between $RSSI_2$ and $RSSI_1$ is a predicted change in RSSI over a future period of time. The predicted value of $RSSI_2$ is based upon for determining the transmission power for maintaining the communication over a

future period of time as recited in claim 1. Moreover, when RSSI₂ is detected, a future period of time is determined from the time when RSSI₂ is detected to the next time instance when the next RSSI is detected, which is RSSI₃, when n=2. This future period of time may encompass several time slots, sub-frames, or super-frames in which RSSI₂ will be relied upon for making certain decisions, such as amount of transmission power to satisfy SAR, until the next RSSI is detected.

Ans. 3–4.

In the Reply Brief, Appellant reiterates arguments presented in the Appeal Brief and argues that the Examiner’s finding that “any estimate for a current period of time is an estimate for a *future* period of time if that time period is viewed in comparison to earlier time periods” leads to “an impermissibly broad interpretation under which the term ‘future’ is rendered without any meaning.” Reply Br. 2 (citing Ans. 3–4). According to Appellant, “an RSSI difference between a current time and a past time is not ‘a predicted change over [a] future period of time,’” because “[a]t the time that Husted’s system estimates RSSI, the estimate is always for a present time.” *Id.* at 3 (citing Husted 6:49–7:10). Appellant argues the “changes” in RSSI that the Office alludes to in the example on page 3 of the Examiner’s Answer (e.g., referencing changes between a current value RSSI₂ and past values RSSI₁ and RSSI₀) are changes that occur over a past time interval relative to the time of the RSSI estimate. *Id.* According to Appellant, in contrast, the prediction model of claims 1, 21, and 29 “derive[s] a predicted change over the future period of time,” and the predicted change is actually a change occurring in the future at the time of the prediction. *Id.*

Appellant additionally argues

even if an RSSI difference between a current time and a past time could be reasonably characterized as a “predicted change over [a] future period of time” (which the Appellant does not concede), Husted’s system never predicts this RSSI change. The Office presumes that the change “could” be calculated but does not point to any predicted change or provide any rationale explaining why it would be desirable or necessary to compute this difference between current RSSI estimate and past RSSI value(s). Rather than “derive a predicted change over [any] period of time in a received signal strength indicator (RSSI),” Husted’s system estimates a current RSSI based on one or more past RSSI values and does so without ever computing an actual difference (a “change”) between the current value and the past value.

Id. at 3.

We are persuaded by Appellant’s arguments because, on the record before us, the Examiner presents insufficient evidence that Husted teaches the disputed limitations.

During prosecution, claims must be given their broadest reasonable interpretation when reading claim language in light of the Specification as it would have been interpreted by one of ordinary skill in the art. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). While we interpret claims broadly but reasonably in light of the Specification, we nonetheless must not import limitations from the Specification into the claims. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). Our reviewing court states that “the words of a claim ‘are generally given their ordinary and customary meaning.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (citations omitted). However, the broadest *reasonable* interpretation differs from the broadest *possible* interpretation. *In re Smith Int’l, Inc.*, 871 F.3d 1375, 1383 (Fed. Cir. 2017). The correct

inquiry in giving a claim term its broadest reasonable interpretation in light of the specification is “an interpretation that corresponds with what and how the inventor describes his invention in the specification, *i.e.*, an interpretation that is ‘consistent with the specification.’” *Id.* at 1382–83 (quoting *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997)).

Here, the Examiner’s claim interpretation of the disputed limitation is unreasonably broad. Instead, we agree with Appellant’s claim interpretation that “a predicted change over the future period of time in a received signal” strength does not include Husted’s estimate of a *current* RSSI value using past RSSI values. Reply Br. 2 (emphasis omitted). As commonly understood, “future” refers to future events, not current events. Moreover, claim 1 recites “determining *current* signal conditions” and the term “future” in this context supports the interpretation that “future” is future, not “current.” Additionally, the term “future” is consistently employed in the Specification to describe a future RSSI event (value), not a current RSSI event (value). *See* Spec. ¶¶ 44, 46.

In view of the above, we do not sustain the rejection of claim 1, independent claims 21 and 29, and dependent claims 2–10, 22–28, 30, and 31. *Cf. In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) (“[D]ependent claims are nonobvious if the independent claims from which they depend are nonobvious . . .”).

Because our decision with regard to the disputed limitations is dispositive of the rejections, we do not address additional arguments raised by Appellant.

DECISION

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 4–6, 8, 21, 24–26, 28, 29	103(a)	Nevermann, Thorson, Husted		1, 4–6, 8, 21, 24–26, 28, 29
2, 3, 10, 22, 23, 30	103(a)	Nevermann, Thorson, Baldemair		2, 3, 10, 22, 23, 30
7, 27	103(a)	Nevermann, Thorson, Husted, Shi		7, 27
9	103(a)	Nevermann, Thorson, Husted, Chakraborty		9
31	103(a)	Nevermann, Thorson, Husted, Ali		31
Overall Outcome				1–10, 21–31

REVERSED