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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MING JIA, JIANGLEI MA, PEIYING ZHU, and WEN TONG

Appeal 2018-001465
Application 15/093,924
Technology Center 2600

Before ROBERT L. KINDER, DANIEL J. GALLIGAN, and
JESSICA C. KAISER, *Administrative Patent Judges*.

KINDER, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–20. *See* Final Act. (mailed Apr. 20, 2017); Appeal Br. 7. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Apple Inc. Appeal Br. 2.

CLAIMED SUBJECT MATTER

Appellant’s invention relates to the field of wireless communication and more specifically the “invention relates to Multiple-Input-Multiple-Output (MIMO) wireless transceivers, and more particularly relates to a precoding scheme for high-order MIMO transmitters.” Spec. ¶ 2.

Claims 1, 9, and 15 are the independent claims on appeal. Claim 1 is illustrative of the claimed subject matter:

1. An apparatus, comprising:

one or more processing elements, coupled to a wireless interface, wherein the one or more processing elements are configured to:

determine rank information specifying a number of layers;

transmit the rank information specifying the number of layers;

determine long-term feedback, wherein the long-term feedback comprises a reference to a first element of a data structure associated with the rank information, wherein the long-term feedback relates to a long-term transmit channel correlation between a high-order multiple-input multiple-output (MIMO) transmitter and the apparatus; and

transmit the long-term feedback, wherein the long-term feedback is transmitted substantially less frequently than fast feedback associated with MIMO precoding, wherein the fast feedback is a reference to a precoding matrix based on an estimate of an instance of the transmit channel between the high-order MIMO transmitter and the apparatus.

Appeal Br. 14 (Claims App’x). Claim 9 is a method claim reciting similar requirements. *See id.* at 15. Claim 15 is a device claim that is also similar but adds requirements for one or more antennas, a radio coupled to the antennas, and a processor coupled to the radio. *See id.* at 15–16.

REFERENCES

Name	Reference	Date
Pan	US 2008/0049709 A1	Pub. Date Feb. 28, 2008
Khan	US 2008/0232449 A1	Pub. Date Sept. 25, 2008

REJECTION

The Examiner rejected claims 1–20 under 35 U.S.C. § 103(a) over Pan and Khan. Final Act. 2.

OPINION

Independent Claims 1, 9, and 15 each require “the long-term feedback relates to a long-term transmit channel correlation between a high-order multiple-input multiple-output (MIMO) transmitter,” and “the long-term feedback is transmitted substantially less frequently than fast feedback associated with MIMO precoding.” *See* Appeal Br. 14–17 (Claims App’x).

Appellant argues that the claimed “two frequencies result in different types of feedback (not the same feedback grouped differently).” Reply Br. 3 Appellant contends “[t]he long-term feedback of the claims ‘relates to a long-term transmit channel correlation between a high-order multiple-input multiple-output (MIMO) transmitter and the apparatus’ and the fast feedback ‘is a reference to a precoding matrix based on an estimate of an instance of the transmit channel between the high-order MIMO transmitter and the apparatus.’” *Id.* “Thus,” according to Appellant, “Pan has nothing to do with these two different feedbacks.” *Id.* Based on these specific claim limitations, Appellant argues that “one of skill in the art would not characterize any of the feedback taught in Pan as long-term feedback” because Pan only discloses “different forms of fast feedback.” Appeal Br. 9.

Appellant reasons that “[e]ach of the feedback provided in Pan relates to estimates ‘of an instance of the transmit channel’ and is nowhere described as long-term feedback, which ‘relates to a long-term transmit channel correlation between a high-order multiple-input multiple-output (MIMO) transmitter and the apparatus.’” Appeal Br. 9. Appellant argues that “Pan is focused on dealing with situations where the speed of the mobile affects the type of feedback used, which is applicable to fast feedback and not long-term feedback.” *Id.* Appellant concludes that “Pan does not teach or suggest the long-term feedback recited in claim 1.” *Id.*

The Examiner relies on Pan to teach that “the long-term feedback relates to a long-term transmit channel correlation between a high-order multiple-input multiple-output (MIMO) transmitter and the apparatus.” Final Act. 3 (citing Pan ¶¶ 7, 39, 30). Specifically, the Examiner notes that this limitation is taught “*where Pan describes the precoding matrix V is derived from channel correlation matrix R* ” and “*where Pan describes that the channel is a MIMO channel.*” *Id.* The Examiner equates Pan’s “group-of-subcarriers feedback” to the claimed “long-term feedback.” Ans. 4 (stating that “the group-of-subcarriers feedback has the same inventive concept as the Applicant’s ‘long-term feedback’”).

The Examiner finds that “Pan discloses that during a group-of-subcarriers feedback or a single-subcarrier feedback, a precoding matrix is generated based on a channel estimate where Pan describes a feedback generator 960 that generates precoding matrix based on channel estimation result.” Ans. 6–7 (citing Pan ¶¶ 74–81, Fig. 9A).

In Reply, Appellant counters:

The Examiner asserts that Pan, for both group-of-subcarriers

feedback and single-subcarrier feedback, a precoding matrix is generated based on a channel estimate. Appellant respectfully submits that the Examiner has made Appellant's point. As noted by the Examiner, both of their feedbacks "is a reference to a precoding matrix based on an estimate of an instance of the transmit channel" which can only be interpreted as applying to fast-feedback and not the long-term feedback of the claims which "relates to a long-term transmit channel correlation between a high-order MIMO transmitter and apparatus". There is no hint of such long-term feedback in Pan at all.

Reply Br. 4.

Based on the record and arguments before us, we find Appellant's contentions persuasive. The Examiner has not explained sufficiently how Pan teaches "the long-term feedback relates to a long-term transmit channel correlation between a high-order multiple-input multiple-output," when both the feedbacks identified by the Examiner ("group-of-carrier" and "single-subcarrier") are a reference to a precoding matrix based on an estimate of an instance of the transmit channel. Pan's precoding matrix based on an estimate of an instance of the transmit channel would seemingly relate to only "fast feedback" and not "long-term feedback." For the "long-term feedback" limitations, the Examiner relies on portions of Pan that describe the precoding matrix being derived from the channel correlation matrix (Ans. 6-7). The Examiner does not explain sufficiently how this particular precoding matrix being derived from the channel correlation matrix teaches a distinct long-term feedback that "relates to a long-term transmit channel correlation between a high-order MIMO transmitter and apparatus," as distinguished from the recited "fast feedback," which "is a reference to a precoding matrix based on an estimate of an instance of the transmit channel." Pan provides feedback via single-subcarrier feedback; the

feedback may be provided on a per-subcarrier basis, or, alternatively, the same feedback could be provided on a group basis. Yet, these two feedbacks use different mechanisms for providing the same feedback, and thus the Examiner has not established that Pan teaches the elements of the claimed “long-term feedback.”

CONCLUSION

We REVERSE the Examiner’s decision to reject claims 1–20.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1–20	103	Pan, Khan		1–20
Overall Outcome				1–20

REVERSED