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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NIRMAL CHINDHU WARKE, SRINATH HOSUR,
MARTIN J. IZZARD, SIRAJ AKHTAR, BAHER S. HAROUN, and
MARCO CORSI

Appeal 2019-003862
Application 15/632,858
Technology Center 2400

BEFORE ALLEN R. MacDONALD, CARL W. WHITEHEAD JR., and
GREGG I. ANDERSON, *Administrative Patent Judges*.

ANDERSON, *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 and 16. Claims 2–15 and 17–20 were previously cancelled. Amendment Under 37 C.F.R. § 41.33(b) dated November 20, 2018; Appeal Br.² 2, 11. We have jurisdiction under 35 U.S.C. § 6(b).

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 Texas Instruments Incorporated. Appeal Br. 2.

² We use “Spec.” to refer to the Specification filed June 26, 2017, “Final Act.” to refer to the Final Action mailed April 20, 2018, “Appeal Br.” to

We affirm.

CLAIMED SUBJECT MATTER

The Specification is directed “to inter- and intra-chip communication using millimeter wave transmissions.” Spec. ¶ 2. Specifically, a router or switch uses millimeter wave transmissions across a waveguide or wireless interface. *Id.*

A beam forming antenna array steers the transmission signal to combine “RF energy in a particular direction while significantly reducing it in all other directions.” *Id.* ¶ 42. The magnitude and phase of the signal transmitted by each antenna is selected to form a beam. *Id.* The antenna beam “may be swept by a variable angle Θ .” *Id.* The radiation pattern from the combined RF energy from the antenna elements “can be pointed electronically in any arbitrary direction without physically moving the antenna array.” *Id.*

Independent claims 1 and 16 are the only pending claims and are reproduced below as illustrative of the claimed subject matter:

1. A networking device, comprising:

an input port circuit having a transmitter circuit coupled one or more transmitter antennas, wherein the input port circuit transmits a data packet to a first output port circuit using millimeter wave signals;

output port circuits including at least the first output port circuit, each of the output port circuits having a receiver circuit coupled to one or more receiver antennas; and

refer to the Appeal Brief filed November 20, 2018, “Ans.” to refer to the Examiner’s Answer mailed February 15, 2019, and “Reply Br.” to refer to the Reply Brief filed April 15, 2019.

a beamforming circuit coupled to the one or more transmitter antennas of the input port circuit, wherein the beamforming circuit causes the one or more transmitter antennas to transmit an antenna beam directed at the one or more receiver antennas of the first output port circuit, wherein the antenna beam is swept by a variable angle.

16. A method for transmitting a data packet, comprising:

identifying, by an input port circuit, a destination output port circuit corresponding to a destination address in the data packet;

retrieving, from stored sets of antenna array coefficients at the input port circuit, a set of antenna array coefficients corresponding to the destination output port circuit; and

transmitting, using an antenna array of the input port circuit, the data packet as a radio frequency (RF) signal over a wireless interface by using the set of antenna array coefficients to create a transmission beam targeting the destination output port circuit; and

sweeping the transmission beam by a variable angle.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Warke	US 9,699,705 B2	Jul. 4, 2017
Rofougaran	US 2009/0125746 A1	May 14, 2009
Yoshida	US 2003/0053412 A1	Mar. 20, 2003
Mehrotra	US 2003/0091043 A1	May 15, 2003
Cleveland	US 2005/0105485 A1	May 19, 2005

REJECTIONS

Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 12–18 of Warke. Final Act. 2–8.

Claim 1 is rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Rofougaran and Yoshida. *Id.* at 9–11.

Claim 16 is rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Mehrotra, Yoshida, and Cleveland. *Id.* at 18–20.

OPINION

I. *Nonstatutory Double Patenting*

Appellant does not appeal the double patenting rejection that claim 1 would have been obvious over claims 12–18 of Warke. Appeal Br. 3. Appellant states, “Appellant is amenable to filing a termina[l] disclaimer” when the claims are indicated as allowable. *Id.* at 3–4. Because Appellant does not argue the double patenting rejection, we sustain the double patenting rejection. *See* 37 C.F.R. § 41.37(c)(iv) (arguments not made are waived).

II. *Does Yoshida teach “transmit an antenna beam directed at the one or more receiver antennas of the first output port circuit, wherein the antenna beam is swept by a variable angle”/“sweeping the transmission beam by a variable angle” (“sweeping limitation”) as recited respectively in claims 1 and 16?*

With respect to the sweeping limitation, Appellant’s arguments are all but the same as between claims 1 and 16. *Compare* Appeal Br. 6–8 (claim 1), *with* Appeal Br. 8–11. We address the Examiner’s findings and Appellant’s arguments regarding claim 1 as representative of the issue.

The Examiner finds that Rofougaran “fails to state[s] about wherein the antenna is swept by a variable,” i.e., the sweeping limitation, but relies on Yoshida. Final Act. 11 (citing Yoshida ¶ 93). A portion of paragraph 93 of Yoshida is reproduced below.

The moving-direction detector 51 switches among the antennas periodically so as to sweep the antenna beam direction over an angle of 360°, calculates the average amount of shift of phase variation and decides that the direction for which the average amount of shift is maximum is the moving direction. Though an antenna changeover unit and a calculation unit for calculating the average amount of shift in variation are required in order to detect the moving direction, the DBF unit 52 and calculation unit 18 can be used for these purposes as well.

Yoshida ¶ 93. Relying on the above disclosure from Yoshida, the Examiner finds the Yoshida teaches “the antenna is swept by a variable angle; greater wa[ve]fading control can be carried out can be carried out in the communication system.” Final Act. 11 (citing Yoshida ¶ 93).

Appellant argues:

The emphasized sentences in the cited passage of Yoshida are the **only** instance in which the term “sweep” appears at all in Yoshida, and it states that the sweep is performed over an angle of 360 degrees. Thus, as best understood, Yoshida teaches sweeping the antenna beam over a **constant angle** (e.g., a full 360 degrees; one full circle). However, Yoshida contains no teaching or suggestion that that such a sweep is performed at a **variable angle** (e.g., an angle that can be varied, i.e., changed), or that such a sweep is performed at an angle *other* than the disclosed 360 degrees.

Appeal Br. 7. Appellant contends Yoshida does not teach “sweeping the antenna beam over any other angular value and, thus, one skilled in the art would logically understand Yoshida to be teaching the sweeping of an antenna beam at a constant angle (always 360 degrees), not a variable angle as claim 1 recites.” *Id.* at 8.

In the Answer, the Examiner emphasizes certain portions of paragraph 93 of Yoshida as follows:

the **moving-direction detector 51 switches among the antennas periodically** so as to **sweep the antenna beam direction over an angle of 360.degree** calculates the average amount of **shift of phase variation** and decides that the direction for which the average amount of shift is maximum is the moving direction.

Ans. 4 (quoting Yoshida ¶ 93). Appellant responds that the emphasized part of paragraph 93 “teaches that the 360 degree sweep is used to determine a moving direction.” Reply Br. 4. Appellant interprets paragraph 93 as meaning that “Yoshida’s detector looks in *all available directions* (e.g., 360 degrees) in order to identify a specific direction as a moving direction based on the phase variation shift information.” *Id.*

Appellant’s argument is not persuasive. Paragraph 93 of Yoshida does not mean that a “sweep” over 360° is limited to a full circle (360°) or that no other angle is taught. *See* Reply Br. 3. As Appellant recognizes Yoshida teaches identifying a specific “direction.” *Id.* at 4. This is consistent with claim 1’s sweeping limitation, “to *transmit an antenna beam directed* at the one or more receiver antennas of the first output port circuit, wherein the antenna beam is *swept by a variable angle.*” In other words, the sweeping limitation requires that the “antenna beam is directed” and is “swept by a variable angle.” Claim 16’s sweeping limitation is similar, substituting “targeting” a transmission beam for a “directed” beam while also requiring “sweeping the transmission beam by a variable angle.”

Yoshida teaches directing or targeting the beam over a sweep angle. Yoshida discloses that a moving direction of the beam is detected by the moving direction detector. Yoshida ¶ 93. A “DBF (Digital Beam Former)” points the beam in the moving direction. *Id.* The direction is not fixed but “switches . . . so as to sweep the antenna beam direction *over an angle of*

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360°.” *Id.* (emphasis added). *See also* Final Act. 10–11 (citing Yoshida ¶ 93). Appellant does not persuasively argue that “over an angle of 360°” means *only* 360° or a “constant angle” of 360°. *See* Appeal Br. 7; Reply Br. 3. Appellant also does not explain why Yoshida’s disclosure of “sweep” in paragraph 93 precludes a sweep by a variable angle.

Further, neither claim 1 nor claim 16 limit the angle over which the beam is “swept.” Nothing in the claim precludes sweeping the beam in a full circle, i.e., 360°. Although the Specification explains that there is a finite variable angle Θ through which the beam is swept, the claims are not so limited. *See* Spec. ¶ 42, Fig. 6.

For the above reasons, we sustain the Examiner’s rejection of claims 1 and 16.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1		Nonstatutory Double Patenting	1	
1	103	Rofougaran, Yoshida	1	
16	103	Mehrotra, Yoshida, Cleveland	16	
Overall Outcome			1, 16	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED