UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte NAGABHUSHANA T. SINDHUSHAYANA,
and JACK K. WOLF

Appeal 2008-2709
Application 09/965,518
Technology Center 2600

Decided: October 20, 2008

Before JOSEPH F. RUGGIERO, MAHSHID D. SAADAT and KARL D. EASTHOM, *Administrative Patent Judges*.

EASTHOM, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the Final Rejection of claims 1-3, 6-7, 9-18 and 20-24, the only claims pending (*see* App. Br. 4, Final Office Action, mailed March 29, 2006). We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

Appellants' invention relates to a decoding method and apparatus for decoding a sequence of turbo encoded data symbols. The decoding operation triggers various computational nodes essentially concurrently. (*See generally* Spec. 0014, 0029; 0048, 0049).

Claim 1 is illustrative of the invention and reads as follows:

1. In a communication system, a method for decoding a sequence of turbo encoded data symbols transmitted over a channel comprising:

updating channel nodes R_x, R_y and R_z based on a received channel output;

initializing outgoing messages from symbol nodes X_i, Y_i and Z_k, wherein said symbol nodes X_i, Y_i and Z_k are in communication with said channel nodes R_x, R_y and R_z; and

triggering updates of computational nodes C and D, associated with different instances of time, in accordance with a triggering schedule, wherein a computational node C_i is in communication with said symbol nodes X_i and Y_i and a computational node D_k is in communication with said symbol nodes X_i and Z_k;

wherein said triggering schedule includes triggering all said computational nodes C and D at different instances of time essentially concurrently for each decoding iteration.

The Examiner relies on the following prior art reference to show unpatentability:[1]

Hagenauer	US 5,761,248	June 2, 1998
Xu	US 2001/0052104 A1	Dec. 13, 2001

[1] The Examiner also lists US 2003/0058969 to Sindhushayana as prior art but that patent publication corresponds to the instant application before us.

Claims 1-3, 6, 7, 9-14, 17, 18 and 20-24 stand rejected under 35 U.S.C. § 102(a) as Applicant's admitted prior art (APA).[2]

Claims 15 and 16 stand rejected under 35 U.S.C. § 103(a) as being obvious over the collective teachings of the APA and Xu.

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the Brief (filed August 4, 2006), Reply Brief (filed August 17, 2007) and Answer (mailed June 19, 2007) for the respective details. Only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. 37 C.F.R. § 41.37(c) (1) (vii).

FINDINGS OF FACT (FF)

1. Appellants do not dispute the Examiner's finding (Ans. 3) that Figure 5 in Appellants' Specification, and its accompanying description therein (Spec. ¶¶ 0027-0028), constitutes admitted prior art (APA). (*See* App. Br. 13). Appellants also do not dispute the Examiner's finding that Hagenauer discloses such APA (*see* n. 2 *supra*).

2. The APA operates as follows:

> Decoder 501 may decode the noisy version of data symbols X_i and Y_i according to a decoding process such as MAP as explained and shown. Decoder 501 produces estimates of data symbols X_i at an output 550. Decoder 502 decodes the noisy version of data symbols Z_k and X_k according to a decoding

[2] The Examiner rejected the claims as APA under 35 USC 102(a), citing Figure 5 (Ans. 3) and its accompanying discussion in Applicants' Specification (*see* Ans. 3-25). The Examiner also found that Hagenauer discloses the admitted prior art at Hagenauer Figure 1, column 5, line 24 to column 6, line 61. (Ans. 3). We do not rely on Hagenauer.

> process such as MAP as explained and shown. Decoder 502 produces estimates of data symbols X_k at an output 560. The decoding processes in decoders 501 and 502 may be performed sequentially. The information may pass from decoder 501 to decoder 502 after completing each iteration.

(Spec. ¶ 27).

3. Appellants disclose two embodiments. In one embodiment, Appellants state: "In accordance with an embodiment, all the computation nodes 704 and 706 may be triggered essentially concurrently. As such, in one step all the computational nodes are once updated. Each time the computational nodes are updated, the decoding process may have completed on [sic, one] decoding iteration." (Spec. ¶ 48, bracketed information added – such information corresponds to Appellants' insertion thereof in their Brief (App. Br. 15)).

4. In the second embodiment, Appellants state: "In another embodiment, the computational nodes may be triggered in a sequence of C_0, C_1, C_2, …, C_N, CN_{-1}, CN_{-2}, CN_{-3}, …C_2, C_1, C_0, D_0, $_{D1}$, D_2, …, D_N, D_{N-1}, D_{N-2}, D_{N-3}, … D_2, D_1, D_0, to obtain a single iteration of the traditional turbo decoding algorithm with the full MPA decoding. The sequence of computation nodes C_0, C_1, C_2, …, C_N may be divided into several overlapping sub-blocks, and the nodes are triggered sequentially within each sub-block, but concurrently across all sub-blocks." (Spec. ¶ 49).

5. Appellants state: "When all the computational nodes are triggered once, a decoding iteration is defined to take place. . . . After several iterations of triggering the computation nodes of the first constituent code, the computation nodes of the second constituent node may be triggered similarly." (Spec. ¶ 49).

PRINCIPLES OF LAW

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence *of prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet,* 149 F.3d 1350, 1355 (Fed. Cir. 1998)). Appellants may sustain this burden by showing that the prior art reference relied upon by the Examiner fails to disclose an element of the claim. It is axiomatic that anticipation of a claim under § 102 can be found only if the prior art reference discloses every element of the claim. *See In re King*, 801 F.2d 1324, 1326 (Fed. Cir. 1986); *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458 (Fed. Cir. 1984).

ANALYSIS

Appellants' arguments regarding the anticipatory rejection of the claims based on APA Figure 5 focus on the four independent claims 1, 6, 18 and 22 (App. Br. 13-18). Appellants group claims 18 and 22 together. (App. Br. 17-18). Appellants do not present separate patentability arguments for the dependent claims. (App. Br. 18). Therefore, we select claims 1, 6 and 18 as representative respectively of the following groups of claims: 1) 1-3, 14, 17; 2) 6, 9-13; and 3) 18, 20-24.

Regarding claim 1, Appellants and the Examiner disagree over whether APA Figure 5 meets the final step recited: "wherein said triggering schedule includes triggering all said computational nodes C and D at

different instances of time essentially concurrently for each decoding iteration." (App. Br. 13-15, Ans. 16-22).

The Examiner found that the APA meets the triggering step based on Appellants' description of Figure 5, to wit: "The decoding processes in decoders 501 and 502 may be performed sequentially." (Ans. 17, *quoting* Spec. ¶ 27; *see* FF 2). We concur with this finding. As the Examiner reasoned, "sequentially" means different times - the processes (i.e., node) in decoder 501 (i.e., computational nodes C) and the nodes in decoder D (i.e., computational nodes D) process information in a timed sequence.

Appellants do not dispute this aspect of the Examiner's finding. Rather, Appellants contend that since the APA nodes are processed sequentially, they are not triggered essentially concurrently for each decoding iteration as called for in claim 1. (App. Br. 15). Appellants argue: "Indeed, such *concurrent* triggering is not inherent, for the nodes may be triggered sequentially." (App. Br. 16) (emphasis added).

However, we determine that Appellants' argument is not commensurate in scope with claim 1. Claim 1 does not recite concurrent triggering, but rather recites triggering that occurs "essentially concurrently."

We turn to Appellants' related argument that "essentially concurrently" requires triggering to occur *in one step.* (App. Br. 15, citing Spec. ¶ 48 – *see* FF 3). Appellants not only fail to proffer any definition for "one step," the claim does not recite it. Nor does the Specification provide any definition (*see* FF 3 – reciting "one step"). We determine that since the claim recites triggering at different times, and does not recite concurrent triggering, then "one step" (assuming *arguendo* the claim requires it), does not require simultaneous triggering of all the nodes. Rather, "one step"

reasonably can also mean one *programming* step, or one "decoding iteration" – *see* claim 1 - reciting "essentially concurrently for each decoding iteration."

Our determination is consistent with Appellants' Specification which equates "essentially concurrently" with one decoding iteration. (FF 3). A decoding iteration is defined as occurring "[e]ach time the computational nodes are once updated." (FF 3). Therefore, according to Appellants' definition, APA Figure 5 meets the claim, because we find that decoders 501 and 502 are "once updated" during a coding iteration. Even though the decoders can be updated more than once, after one update for each decoder, a decoding iteration occurs – according to Appellants' definition (FF 2, 5). Alternatively, a decoding iteration occurs after decoder 502 processes the decoder 501 information (FF 2). In light of the Specification and the normal usage of the term, the term "iteration" simply means the decoding process repeats itself.

We note that Appellants disclose one embodiment which triggers different nodes within subgroups of group C sequentially, and triggers different subgroups within C *concurrently* (FF 4). But, as we found *supra*, claim 1 does not recite *concurrent* triggering, but rather, recites "*essentially* concurrently" (emphasis added) triggering of two groups of nodes, C and D. Thus, the claim allows for sequential triggering of nodes within and/or between each group. In other words, claim 1 is simply broader than the disclosed embodiments (*see* FF 3-4).

We find that Appellants' reliance on the definition of "time instances" as merely corresponding to state spaces in the trellis (*see* passages spanning Reply Br. 6-7 – *citing* Spec. ¶ 21) fails to distinguish the claims from the APA. Appellants' argument implies that the claim does not require

triggering at different time instances.[3] That is, as indicated above, Appellants attempt to distinguish claim 1 by arguing that the APA decoder nodes 501 and 502 perform triggering sequentially within and between the decoders.[4]

We accept Appellants' argument, and the Examiner's similar position (*see* Ans. 3-4), that the APA decoders perform triggering between and within the decoders. However, even if we accept the argument that the claim does not *require* sequential triggering, we determine, at a minimum, the claim does not *preclude* such triggering. Moreover, Appellants' reliance to mere (un-triggered) "time instances" in state spaces relates to a "MAP" decoding algorithm (Spec. ¶ 21), but Appellants admit that the APA decoder process employs the same "MAP" algorithm (*see* FF 2 – i.e., we construe a process as an algorithm). In any case, regardless of whether the claim *requires* triggering at different times, the APA decoder nodes 501 and 502 are triggered essentially concurrently under our reasoning above (i.e., during one iteration), thereby meeting claim 1.

Accordingly, the Examiner has established a *prima facie* case of anticipation as to claim 1. Appellants' arguments do not convince us of error in such findings. Therefore, we sustain the Examiner's rejection of claim 1. We also sustain the rejection of claims 2-3, 14 and 17 dependent therefrom and not separately argued.

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[3] Appellants also do not tie the different "time instances" in the trellis state spaces to any triggering as called for in the claim. Appellants' argument that the claim calls for *concurrent* triggering (addressed and rebutted *supra*) hinges on the premise that the claim does not require triggering at different time instances. (*See* Reply Br. 6-7).

[4] *See* App. Br. 15 – *compare* lines 8-11 (describing sequential triggering between decoders 501 and 502) *with* lines 3-8 (describing sequential triggering within decoders 501 and 502).

With respect to claims 6 and 18, "essentially concurrently" is not recited. Rather, claims 6, 18 and 22 recite "concurrent" triggering, as Appellants argue (App. Br. 16-18). The Examiner's determination relies on a reading of the claims that calls for triggering to occur "essentially concurrently" (Ans. 6, 10).

While the Examiner also relies on other definitions of "concurrent", including "convergent," "in harmony," or "meeting or tending to meet at the same point," (Ans. 23, *see also* Ans. 18, 25), we find that such definitions are not consistent with the Specification, as Appellants argue (*see* Reply Br. 5-6).[5] The Examiner's findings imply that APA Figure 5 does not trigger a group of nodes at the same time. We determine that "concurrently," as recited in each of independent claims 6 and 18, requires such simultaneous triggering, as Appellants argue, and according to the Examiner's first recited dictionary definition (Ans. 6, Reply Br. 6).

We note that our reviewing court has determined that extrinsic evidence is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence. *Phillips v. AWH Corp*., 415 F.3d 1303, 1319 (Fed. Cir. 2005) (en banc). The court in *Phillips* stated: "different dictionaries may contain somewhat different sets of definitions for the same words. A claim should not rise or fall based upon the preferences of a particular dictionary editor, or the court's independent decision, uninformed by the specification, to rely on one dictionary rather than another." *Id*. at 1322. The court in *Phillips* reaffirmed its view that the specification "is always highly relevant to the claim construction analysis.

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[5] Appellants also argue that the Examiner's dictionary definitions are not consistent with "essentially concurrently" as required by claim 1 (*id*.). We have not relied on such definitions for claim 1.

Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." *Id*. at 1315 (*quoting Vitronics Corp. v. Conceptronic, Inc*., 90 F.3d 1576, 1582 (Fed. Cir. 1996)).

This reasoning is applicable here. When we look to the Specification for context, we find the described concurrent triggering to relate to simultaneous triggering of the nodes (FF 4) - in contradistinction to essentially concurrent triggering (FF 3) – which provides further context and allows for sequential triggering. It is apparent to us that an ordinarily skilled artisan, when reading Appellants' disclosure, would consider concurrent triggering as simultaneous, according to the Examiner's first recited definition, as opposed to other recited definitions mentioned above such as "convergent," "in harmony," or "meeting or tending to meet at the same point."

Accordingly, we will not sustain the rejections of claims 6, 18, nor of claim 22, which also recites "concurrent" triggering and other limitations similar to those in claim 18. We also will not sustain the anticipatory rejections of claims 7, 9-13, 20-21, and 23-24 dependent from claims 6, 18, and 22.

On the other hand, we also will sustain the obviousness rejection of claims 15 and 16, dependent from claim 1. Appellants do not present separate patentability arguments for these claims, and instead rely on arguments presented for claim 1. (App. Br. 18). As indicated *supra*, we have found no deficiencies in the Examiner's rejection of claim 1.

CONCLUSION

The Examiner's decision rejecting claims 1-3 and 14-17 is affirmed. The Examiner's decision rejecting claims 6, 7, 9-13, 18, and 20-24 is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a) (1) (iv) (2006).

AFFIRMED-IN-PART

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