

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* MYSORE SRIRAM

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Appeal 2008-3834  
Application 10/610,855<sup>1</sup>  
Technology Center 2800

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Decided: October 30, 2008

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Before KENNETH W. HAIRSTON, SCOTT R. BOALICK,  
and JOHN A. JEFFERY, *Administrative Patent Judges*.

HAIRSTON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from a final rejection of claims 1 to 29. We have jurisdiction under 35 U.S.C. § 6(b).

We will sustain the rejection.

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<sup>1</sup> Application filed June 30, 2003. The real party in interest is Intel Corporation.

## THE INVENTION

Appellant's claimed invention is directed to a system and method of designing integrated circuits with an electronic design automation ("EDA") tool (Spec. 2). The system and method re-route circuit design signal paths to allow for product changes and circuit upgrades using two different approaches (Spec. 2). In the first approach, alternative signal path routing is performed using a "topologically equivalent path" which is enumerated by "sliding" path segments of the signal path by offset amounts in one or more directions to produce a replacement path (*see* claim 1 on appeal; Fig. 2; Spec. 7-9). In the second approach, alternative signal path routing is performed by generating a "topologically morphed version of the signal path" which is selected as the replacement path (*see* claim 9 on appeal; Fig. 3; Spec. 9-10).

Claims 1 and 9 are representative of the claims on appeal, and they read as follows:

1. A signal routing method comprising:

enumerating for a signal path of a circuit design, one or more alternate paths that are topological equivalent to the signal path, by sliding each of a plurality path segments of the signal path by one or more offset amounts in each of one or more directions; and

selecting a replacement path for the signal path from the one or more enumerated topological equivalent alternate paths.

9. A signal routing method comprising:

generating a first topologically morphed version of a signal path of a circuit design; and

selecting a replacement path for the signal path using the first topologically morphed version of the signal path.

### THE REJECTION

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Nitta et al. (“Nitta”)                      US 6,415,527 B2                      July 2, 2002

The Examiner rejected claims 1 to 29 under 35 U.S.C. § 102(e) as being anticipated based upon the teachings of Nitta.<sup>2</sup>

### ISSUES

1. Appellant contends that the applied reference to Nitta does not teach the first signal routing approach of “enumerating for a signal path of a circuit design, one or more alternate paths that are topological equivalent to the signal path, by sliding each of a plurality path segments of the signal path by one or more offset amounts in each of one or more directions” as recited in independent claims 1, 16, and 23 (App. Br. 5-7; Reply Br. 2-9).

2. Appellant also contends that Nitta does not teach the second signal routing approach of “generating a first topologically morphed version of a signal path of a circuit design” as recited in independent claims 9, 19, and 26 (App. Br. 7; Reply Br. 9-10).

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<sup>2</sup> Although not made by the Examiner in the Final Rejection, we note that a rejection would also have been appropriate under 35 U.S.C. § 102(a) based on the July 2, 2002, publication date of Nitta, which is prior to Appellant’s application filing date of June 30, 2003.

Thus, the anticipation issues before us concern whether or not the applied reference to Nitta describes the “enumeration” and the “morphing” signal routing approaches as set forth in the claims on appeal. Rather than repeat the arguments of Appellant or the Examiner, we refer to the Brief<sup>3</sup> and the Answer<sup>4</sup> for their respective details. In this decision, we have considered only those arguments actually made by Appellant. Arguments which Appellant could have made but did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

We note that Appellant has not separately argued the merits of claims 2 to 8 or 10 to 29, and instead Appellant relies on the arguments presented with respect to the patentability of claims 1 and 9 (*see* App. Br. 7; Reply Br. 9-10). We select claim 1 as representative of the group consisting of claims 1 to 8, 16 to 18, and 23 to 25, and select claim 9 as representative of the group consisting of claims 9 to 15, 19 to 22, and 26 to 29. Thus, claims 2 to 8, 16 to 18, and 23 to 25 stand or fall with representative claim 1, and claims 10 to 15, 19 to 22, and 26 to 29 stand or fall with representative claim 9. *See* 37 C.F.R. § 41.37(c)(1)(vii). Accordingly, we confine our discussion to claims 1 and 9, with the other claims standing or falling with their respective representative claim. *See id.*

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<sup>3</sup> We refer to the most recent Appeal Brief filed April 30, 2007, and the Reply Brief filed May 22, 2007, throughout this opinion.

<sup>4</sup> We refer to the Examiner’s Answer mailed May 10, 2007, throughout this opinion.

## FINDINGS OF FACT

1. As indicated *supra*, Appellant describes and claims a system and method of routing alternative signal paths applicable to integrated circuit design, and in particular dealing with “function block changes ... or routing space shrinkages, e.g.[,] due to shrinkage of a design” between successive generations of an integrated circuit design (Spec. 2, *see also* App. Br. 2-3).

2. Appellant describes the term “topological equivalent” at page 7, line 24 to page 8, line 3 of the Specification:

[A] signal path is considered to be topologically equivalent to another signal path, if the two signal paths have a 1:1 correspondence for path segments. That is, the two topologically equivalent signal paths necessarily have the same number of path segments, and the corresponding path segments are necessarily parallel to one another (similarly oriented).

3. Appellant describes the concept of “topology morphing” at page 9, line 24 to page 10, line 2 of the Specification (describing Figure 3):

[T]he topology of signal path **210** may be morphed by breaking path segment **216** into two portions **216a** and **216c** at breakpoint **218**, and sliding them away from each other in the directions of **252** and **254**. The two portions **216a** and **216c** are connected through the addition/insertion of bridge portion **216b**.

4. Nitta teaches a method and system for routing signal paths using computer-aided automatic layout design for integrated circuits (Abstract; col. 1, ll. 11-30).

5. Nitta was cited by the Examiner as teaching a signal routing method and apparatus which enumerates an alternate signal path which is a topological equivalent to the original signal path, and which enumerates the alternate signal path by sliding a plurality of path segments (Ans. 4-6). The Examiner relied upon Figures 9, 10, and 12A through C and the accompanying text.

6. Nitta was also cited by the Examiner as teaching a signal routing method and apparatus that generates a topologically morphed alternate signal path of an original signal path, and then selects a replacement path using the morphed path (Ans. 7).

7. Nitta teaches a signal routing method and apparatus which, for a signal path (Fig. 12A, t1 to t3) enumerates at least one alternate signal path (Fig. 12C, t1 to t3) by sliding a plurality of path segments (segments t1 to s1, s1 to s2, and s2 to t3), wherein the alternate path(s) are topologically equivalent. Nitta also teaches a morphed version of the original signal path (Fig. 12B, dotted line segment starting from s12 and extending down). Nitta teaches that the number of segments in the path (t1 to t3) remains the same in Nitta as between the original path (Fig. 12A) and the alternate path(s) (Figs. 12B and 12C).

#### PRINCIPLES OF LAW

Analysis of whether a claim is patentable over the prior art under 35 U.S.C. § 102 begins with a determination of the scope of the claim. “During examination, ‘claims ... are to be given their broadest reasonable interpretation consistent with the specification, and ... claim language should be read in light of the specification as it would be 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); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc); *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). In interpreting the meaning of claim terms, “[d]ifferences among claims can also be a useful guide in understanding the meaning of particular claim terms. *Phillips*, 415 F.3d at 1314 (citations omitted). “[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.” *Id.* at 1315 (citations omitted).

Anticipation is established when a single prior art reference discloses expressly or under the principles of inherency each and every limitation of the claimed invention. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1347 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79 (Fed. Cir. 1994). “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. Inc., v. Union Oil Co. of Calif.*, 814 F.2d 628, 631 (Fed. Cir. 1987).

## ANALYSIS

### Issue 1: Does Nitta Teach Enumeration of a Topological Equivalent Signal Path By Sliding As Recited in Claim 1 on Appeal?

Appellant contends that Nitta does not teach the “enumeration” by sliding to generate a “topological equivalent” replacement path for an original signal path (App. Br. 5-7). Appellant relies upon the description of “topological equivalent” at pages 7 to 8 of the Specification (App. Br. 5).

We note that claim terms should be given their broadest reasonable meaning in their ordinary usage as such claim terms would be understood by one skilled in the art by way of definitions and the written description. *Morris*, 127 F.3d at 1054. In this case, we find that the term “topologically equivalent” signal paths would be understood by one of ordinary skill in the art to mean “two topologically equivalent signal paths” having “the same number of path segments” with “the corresponding path segments ... necessarily parallel to one another (similarly oriented)” (Finding of Fact 2). In our view, Figures 12A through C and the accompanying text of Nitta teach exactly this.

We do not agree with Appellant that the language of claim 1 requires an analysis of Nitta’s path to be from start point s1 to end point s2 instead of from t1 to t3 as asserted by the Examiner. In our view, claim 1 broadly calls for “a signal path of a circuit design.” Claim 1 does not require a particular starting or ending point for an individual path or segment, thus Appellant’s arguments drawn toward whether or not Nitta’s Correction Rules 1 and 2 using various start and end points as listed in Figure 10 are not persuasive (Reply Br. 2-7). We conclude that one of ordinary skill in the art would consider Nitta as teaching many possible signal paths, including a signal path from t1 to t3 (Nitta, Figs. 12A-C), and thus understand that an original signal path (having 3 segments: t1 to s1, s1 to s2, and s2 to t3) is slid (Nitta, Fig. 12B) in order to enumerate and select a replacement path (Nitta, Fig. 12C) that is “topologically equivalent” (note that the replacement path has the same number of segments, three, as does the original path, and that it is similarly oriented). Although the replacement path of Nitta in Figure 12C

has certain segments which are longer than those of the original path, neither claim 1 nor the written description requires length to be a factor in determining topological equivalency (*see* Spec. 7-8).

With respect to whether or not Nitta enumerates “by sliding” (App. Br. 6-7; Reply Br. 7-8), we are not persuaded by Appellant’s arguments that Nitta does not teach “any ‘sliding’ of the segments” (Reply Br. 7), and that “Nitta fails to teach sliding of the path segment with respect to either correction rule 1 or correction rule 2” (Reply Br. 8). As discussed above, it is our view that claim 1 does not require the use of correction rules 1 and 2, nor does it require the signal path start at point s1 and end at point s2. In short, we agree with the Examiner that Nitta teaches the features of claim 1 (Finding of Fact 5).

With respect to Appellant’s arguments that Nitta does not teach “maintaining the topology correspondence between the original and the alternate signal routes” (App. Br. 5-6), and that “Nitta fails to teach an equivalent topology” (Reply Br. 7), we are not persuaded by these arguments since they are based on restricting Nitta’s teachings to a path starting at point s1 and ending at point s2. Although we agree with Appellant that an enumeration of the path from s1 to s2 would result in an alternate path having a different number of segments, and therefore produce an alternate path which is not a topological equivalent to the original signal path, in our view claim 1 is not limited to a particular signal path and is met by Nitta’s original path and alternate paths t1 to t3 in Figures 12A through C as discussed *supra*. Accordingly, we agree with the Examiner’s analysis on this issue (Ans. 5-6; *see also* Finding of Fact 7).

With respect to whether or not Nitta enumerates one or more alternate paths that are topologically equivalent (*see* App. Br. 6; Reply Br. 8-9), we are not persuaded by Appellant's arguments that Nitta does not teach "enumeration" based on plural candidate paths, since claim 1 broadly calls for "one or more" alternate paths. Nitta enumerates at least one alternate path (*see* Fig. 12C, final path from t1 to t3). Nevertheless, we note that Nitta teaches two possible alternate paths (*see* Fig. 12B, path t1 to t3 going through s11 to s2, and path t1 to t3 going through s11, s12, and s2).

Issue 2: Does Nitta Teach Generating a Topologically "Morphed" Version of a Signal Path As Recited in Claim 9 on Appeal?

Appellant contends that Nitta's Figure 12C is not a replacement path for an "intermediate" path that is derived by morphing the original path as shown in Nitta's Figure 12A (App. Br. 7, Reply Br. 9-10). Appellant contends that any analysis of the "signal path" of claim 9 as starting from t1 and ending at t3 is flawed for the same reasons as just discussed above with respect to Appellant's arguments regarding claim 1 (Reply Br. 10). Appellant also contends that "[n]owhere does Nitta disclose breaking a segment into two portions and sliding them in opposite directions" (Reply Br. 10). We note that the language of claim 9 fails to use the term "intermediate" or the term "opposite;" nor does claim 9 describe how a "morphed version" of the signal path is to be obtained.

We agree with the Examiner that Nitta's Figure 12B shows a first dotted line starting at point s12 which is a "first topologically morphed version of a signal path" (Ans. 7; Finding of Fact 6). In addition, we note that the majority of Appellant's arguments with respect to claim 9 are drawn

to the details of the Specification (*see* Finding of Fact 3 for the Specification’s detailed description of topology morphing) and the claim language of claim 10 (*see* claim 10 which further defines the generation of the first topologically morphed version of the signal path as including “sliding the first and second portions ... in opposite direction”),<sup>5</sup> and not representative claim 9 (*see* App. Br. 7; Reply Br. 9-10).

Our analysis of the meaning of the language of claim 9 includes consideration of the doctrine of claim differentiation as recently applied by our reviewing court, the Court of Appeals for the Federal Circuit. *See Saunders Group, Inc. v. Comfortrac, Inc.*, 492 F.3d, 1326, 1331 (Fed. Cir. 2007) (stating that where a dependent claim adds a limitation to an independent claim, the doctrine of claim differentiation supports the

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<sup>5</sup> Claim 10 reads as follows:

10. The signal routing method of claim 9, wherein said generating of the first topologically morphed version of the signal path comprises

selecting a first path segment of the signal path;

selecting a point on the first path segment to break the first path segment into a first and a second portion;

sliding the first and second portions of the first path segment in opposite directions by a first and a second offset amount respectively, the opposite directions being substantially orthogonal to an orientation of the first path segment; and

inserting a bridge portion to connect the first and the second portion of the first path segment.

inference that the independent claim encompasses subject matter which does not include the added limitation). Under the doctrine of claim differentiation, we look to differences between claims to determine the meaning of claim language. *See Phillips*, 415 F.3d at 1314-15 (“[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.”). In this case, we note that dependent claim 10, which depends from independent claim 9, recites and expands upon the morphing process of claim 9 (*i.e.*, dependent claim 10 adds the limitation, *inter alia*, of sliding path segments in opposite directions). Claim 9 broadly calls for generating a “topologically morphed version of a signal path” (*see* claim 9 on appeal), while claim 10 sets forth the details of the morphing process as including breaking a path segment and then sliding the broken portions “in opposite directions.” (*See* claim 10 on appeal *supra* note 5). Thus, the doctrine of claim differentiation supports the inference that the details of dependent claim 10 of generating a topologically morphed version of a signal path by breaking a path segment and then sliding path segments in opposite directions are not necessarily encompassed by independent claim 9 which does not recite these details. *See Saunders Group, Inc.*, 492 F.3d at 1331.

We note that Appellant’s Specification describes morphing as involving breaking a signal path into segments and then sliding the segments away from each other in opposite directions (Spec. 9-10), and this is recited positively in claim 10. We also note that we must be careful not to read a particular embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. *See Superguide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) (“Though

understanding the claim language may be aided by explanations contained in the written description, it is important not to import into a claim limitations that are not part of the claim. For example, a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.”) The challenge is to interpret claims in view of the specification without unnecessarily importing limitations from the specification into the claims. *See E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369 (Fed. Cir. 2003).

In our view, claim 9 recites morphing in a much broader fashion and thus does not require the details of claim 10, and thus claim 9 reads on many other types of topological morphing including sliding or moving segments in directions other than “opposite.” *See Phillips*, 415 F.3d at 1315 (stating that presence of dependent claim adding particular limitation gives rise to presumption that limitation in question is not present in independent claim).

Accordingly, Appellant’s arguments regarding the requirement that “morphing” include sliding path segments in opposite directions is unpersuasive with respect to representative claim 9. Appellant has not convinced us that the Examiner erred in rejecting claim 9 as being anticipated by the teachings of Nitta. Likewise, Appellant’s argument that “any analysis based on the signal path originating from t1 and ending at t3, while focusing on the figures 12A-C is inherently flawed” (Reply Br. 10), is unpersuasive since we conclude that claim 9 does not require a particular starting and/or end point, and merely calls for “a signal path of a circuit design.”

We have considered all the arguments, including those in the Reply Brief filed on May 22, 2007, but find them unpersuasive for reasons given

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above. *Cf. Hartman v. Nicholson*, 483 F.3d 1311, 1315 (Fed. Cir. 2007) (all remaining arguments were considered, but none were found that warrant reversal).

In summary, all of the limitations of claims 1 and 9 on appeal are found, either expressly or inherently, in the teachings of Nitta. Accordingly, we will sustain the Examiner's rejection of those claims, and claims 2 to 8 and 10 to 29 which fall with claims 1 and 9.

#### CONCLUSION OF LAW

For the foregoing reasons, Appellant has not shown that the Examiner erred in rejecting claims 1 to 29 over the disclosure to Nitta under § 102.

#### ORDER

The anticipation rejection of claims 1 to 29 is affirmed.

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).

#### AFFIRMED

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SCHWABE, WILLIAMSON & WYATT, P.C.  
PACWEST CENTER, SUITE 1900  
1211 SW FIFTH AVENUE  
PORTLAND, OR 97204