

United States Court of Appeals  
for the Federal Circuit

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COMMSCOPE TECHNOLOGIES LLC,  
COMMSCOPE CONNECTIVITY LLC,  
*Plaintiffs-Appellants*

v.

DALI WIRELESS INC.,  
*Defendant-Cross-Appellant*

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2020-1817, 2020-1818

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Appeals from the United States District Court for the Northern District of Texas in No. 3:16-cv-00477-M, Chief Judge Barbara M.G. Lynn.

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Decided: August 24, 2021

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PHILIP P. CASPERS, Carlson, Caspers, Vandenburg & Lindquist, P.A., Minneapolis, MN, argued for plaintiffs-appellants. Also represented by WILLIAM F. BULLARD, SAMUEL A. HAMER.

CHARLES HARDY DAVIS, Goldstein & Russell, P.C., Bethesda, MD, argued for defendant-cross-appellant. Also represented by ERIC F. CITRON; CRISTOFER LEFFLER, Folio Law Group PLLC, Lake Forest Park, WA.

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Before REYNA, SCHALL, and STOLL, *Circuit Judges*.  
STOLL, *Circuit Judge*.

CommScope and Dali each appeal from the district court’s entry of judgment after it denied their motions for judgment as a matter of law, for a new trial, and for attorneys’ fees. This appeal and cross-appeal involve several patents and numerous issues regarding infringement and validity, but our opinion focuses on only two: infringement and validity of U.S. Patent No. 9,031,521. Although we have thoroughly considered the other issues raised by both parties, we affirm the district court’s determinations as to those issues without significant discussion. As to the ’521 patent, for the reasons discussed below, we reverse the district court’s denial of JMOL of no infringement and affirm its denial of JMOL of invalidity.

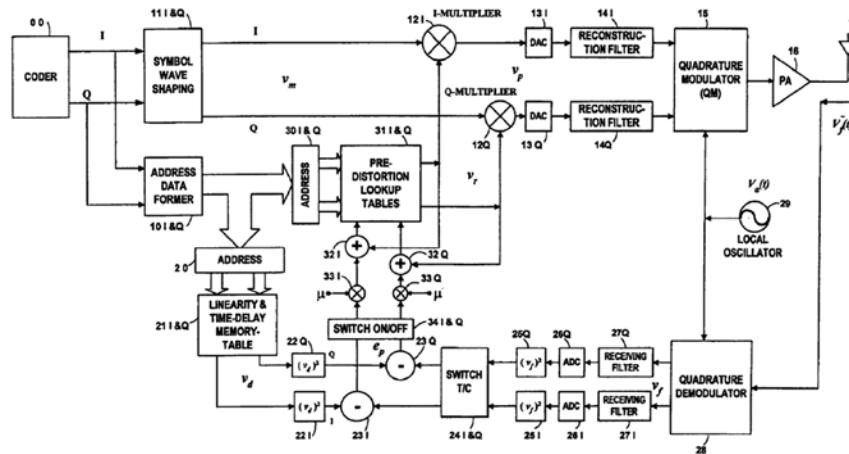
#### BACKGROUND

CommScope Technologies LLC and CommScope Connectivity LLC (collectively, “CommScope”) filed suit against Dali Wireless Inc. (“Dali”) in the United States District Court for the Northern District of Texas alleging infringement of five of CommScope’s patents relating to telecommunications technology. Dali counterclaimed, alleging CommScope infringed two of Dali’s patents also relating to telecommunications technology.

One of those asserted patents, the ’521 patent, is assigned to Dali and is titled “System and Method for Digital Memorized Predistortion for Wireless Communication.” This technology generally relates to wireless communications with portable equipment and handsets, such as mobile phones. ’521 patent col. 1 ll. 19–23; *see also id.* at col. 4 ll. 18–23. Such devices often include a power amplifier to boost the signal. However, amplification can cause unintended distortions to the signal. *Id.* at col. 1 ll. 36–40, 54–67. The ’521 patent resolves this problem through the

use of a feedback loop and lookup tables, as described below.

Specifically, the '521 patent describes a training mode (Fig. 3), in which the feedback loop runs and the lookup tables are updated, and an operating mode (Fig. 4), in which the “switch ON/OFF controllers” are turned off and the lookup table is no longer updated. *Id.* at col. 5 l. 55–col. 7 l. 30. In training mode, the feedback loop on the bottom half of Figure 3 uses the output signal fed back from power amplifier 16 to calculate digital predistortion values that are stored in lookup tables 31 I & Q.



*Id.* Fig. 3 (depicting training mode).<sup>1</sup>

These lookup table values are used in operating mode to intentionally “predistort” the signal before the signal is sent to the power amplifier in a way such that after the signal is amplified, it is not distorted.

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<sup>1</sup> For the '521 patent figures, we have included the versions from CommScope's briefs, which are clearer versions of the figures than those in the '521 patent. Compare Appellants' Br. 9, with '521 patent Fig. 3.

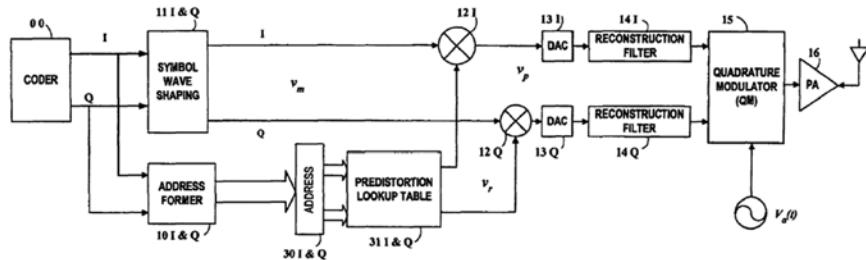


FIG. 4

*Id.* Fig. 4 (depicting operating mode), col. 6 ll. 27–41.

Claim 1 of the '521 patent recites:

1. A method of operating a power amplifier, the method comprising:

initializing the power amplifier;

performing a training phase comprising:

establishing pre-computed distortion contributions based on pre-compensation training feedback signals representative of output of the power amplifier; and

storing the pre-computed distortion contributions in a lookup table; and

performing an operating phase comprising:

*switching a controller off to disconnect signal representative of the output of the power amplifier;*

accepting an original value that reflects information to be communicated;

generating a digital lookup table key based on the original value;

retrieving from the lookup table, using the digital lookup table key, a corresponding pre-

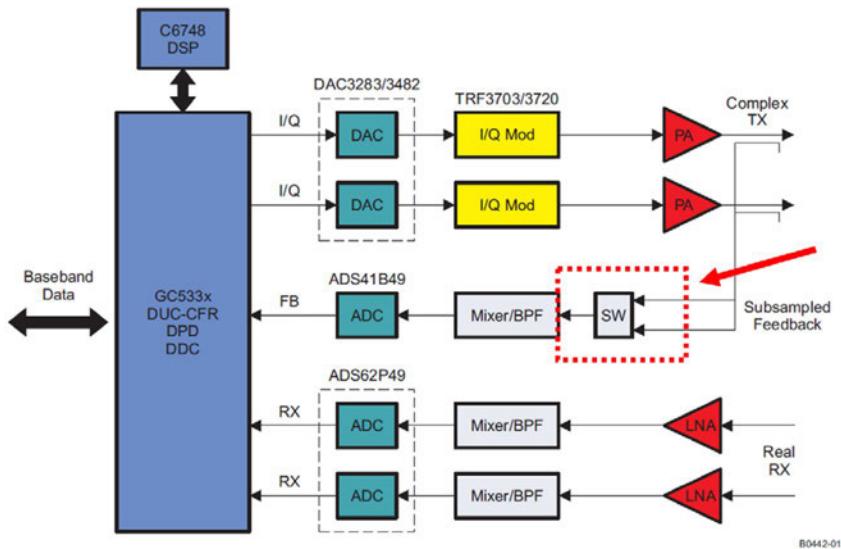
computed distortion contribution for the original value;

distorting the original value based on the corresponding pre-computed distortion contribution to obtain a distorted value to pre-compensate for the nonlinear characteristics of the power amplifier; and

wirelessly transmitting a pre-distorted signal based on the distorted value.

*Id.* at col. 10 l. 47–col. 11 l. 4 (emphasis added to disputed limitation).

Dali accused CommScope's FlexWave Prism distributed antenna system (FlexWave) of infringing the '521 patent. According to CommScope, this system is installed on telephone poles to extend wireless coverage. Appellants' Br. 12. Similar to the '521 patent, the FlexWave system analyzes a feedback signal from a power amplifier to calculate predistortion. Unlike the '521 patent, the FlexWave uses two power amplifiers. The dispute between the parties centers on the FlexWave's selector switch (labeled "SW" in the figure below), which continuously chooses between feedback signals from the two power amplifiers for calculating predistortion values:



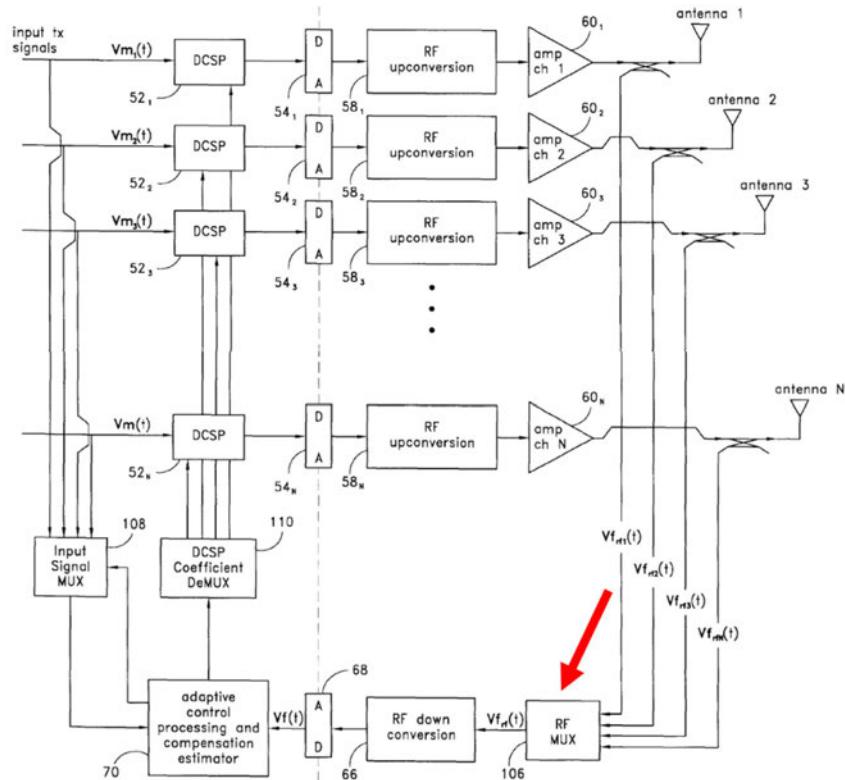
*Id.* at 14 (depicting the accused FlexWave).

The claim limitation at the center of the parties' infringement dispute is the first step in the claimed "operating phase": "*switching a controller off* to disconnect signal representative of the output of the power amplifier." '521 patent col. 10 ll. 57–58 (emphasis added). The district court construed this term to mean "[s]witching a controller to a nonoperating state to disconnect signal representative of the output of the power amplifier." *CommScope Techs. LLC v. Dali Wireless, Inc. (Claim Construction Order)*, No. 3:16-cv-477, 2017 WL 6549933, at \*12 (N.D. Tex. Dec. 19, 2017).

At trial, CommScope argued that three pieces of prior art anticipated the asserted claims of the '521 patent—

Wright,<sup>2</sup> Bauder,<sup>3</sup> and Khan.<sup>4</sup> Wright is particularly relevant to our decision on appeal.

Like the '521 patent, Wright discloses a system for digital predistortion that uses a feedback signal from a power amplifier to calculate predistortion values. Like the accused FlexWave device, Wright's system includes multiple power amplifiers ( $60_{1-N}$ ) and a switch (Multiplexer ("MUX") 106) that selects one of the feedback signals from one of the power amplifiers.



<sup>2</sup> U.S. Patent No. 6,587,514.

<sup>3</sup> U.S. Patent Application Publication No. US 2003/0035494.

<sup>4</sup> U.S. Patent No. 5,959,499.

Appellants' Br. 39 (citing Wright Figs. 33A, 33B).

The jury rendered a verdict of infringement, no invalidity, and damages for both CommScope and Dali. The district court denied both parties' motions for JMOL, denied CommScope's motion for a new trial, denied CommScope's request for attorneys' fees, and entered judgment.

CommScope appeals and Dali cross-appeals. We have jurisdiction under 28 U.S.C. § 1295(a)(1).

#### DISCUSSION

This court reviews the denial of a motion for JMOL under regional circuit law, here, Fifth Circuit law. *Rembrandt Wireless Techs., LP v. Samsung Elecs. Co.*, 853 F.3d 1370, 1378 (Fed. Cir. 2017) (citation omitted). The Fifth Circuit reviews a denial of a motion for JMOL de novo, asking whether a “reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue.” *Id.* (quoting *Cambridge Toxicology Grp. v. Exnicios*, 495 F.3d 169, 179 (5th Cir. 2007)).

#### I

We turn first to the jury's findings of infringement and no anticipation of the '521 patent. Although the questions of infringement and anticipation are separate inquiries, the two are related. As the Supreme Court has stated, “[t]hat which infringes, if later, would anticipate, if earlier.” *Peters v. Active Mfg. Co.*, 129 U.S. 530, 537 (1889); see also *Lewmar Marine, Inc. v. Barent, Inc.*, 827 F.2d 744, 747 (Fed. Cir. 1987); *Dow Chem. Co. v. Astro-Valcour, Inc.*, 267 F.3d 1334, 1339 (Fed. Cir. 2001); *Ecolab, Inc. v. FMC Corp.*, 569 F.3d 1335, 1348 (Fed. Cir. 2009).

“A determination of infringement is a question of fact that is reviewed for substantial evidence when tried to a jury.” *ACCO Brands, Inc. v. ABA Locks Mfr. Co.*, 501 F.3d 1307, 1311 (Fed. Cir. 2007) (citing *TI Grp. Auto. Sys.*

(*N. Am., Inc. v. VDO N. Am., L.L.C.*, 375 F.3d 1126, 1133 (Fed. Cir. 2004)). Whether an accused device infringes requires a two-step analysis—the court first “determines the scope and meaning of the patent claims asserted, and then the properly construed claims are compared to the allegedly infringing device.” *Interactive Pictures Corp. v. Infinite Pictures, Inc.*, 274 F.3d 1371, 1376 (Fed. Cir. 2001) (quoting *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454 (Fed. Cir. 1998) (en banc), abrogated on other grounds by *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335 (Fed. Cir. 2015)).

Anticipation, likewise, is a question of fact that we review for substantial evidence. *Enplas Display Device Corp. v. Seoul Semiconductor Co.*, 909 F.3d 398, 406 (Fed. Cir. 2018). “A determination that a patent is invalid as anticipated under 35 U.S.C. § 102 requires that a prior art reference disclose every limitation of the claimed invention, either explicitly or inherently.” *Liebel-Flarsheim Co. v. Medrad, Inc.*, 481 F.3d 1371, 1381 (Fed. Cir. 2007) (citation omitted).

On appeal, CommScope argues that substantial evidence does not support the jury’s finding that CommScope’s FlexWave infringes Dali’s ’521 patent. Specifically, CommScope argues that Dali failed to present evidence proving that the FlexWave meets the district court’s construction of the claim term “switching a controller off.” We agree and therefore reverse. Following this same logic, we leave undisturbed the jury’s finding that Wright does not anticipate the challenged claims of the ’521 patent.

## A

Looking to the first step of the infringement inquiry (claim construction), Dali argued to the district court that the claim term “switching a controller off” meant “[s]witching a controller to an off status.” *Claim Construction Order*, 2017 WL 6549933, at \*12. Dali asserted that the term “off” did not require further definition. *Id.* CommScope, on

the other hand, proposed that the claim term meant “[s]witching a controller to a nonoperating state.” *Id.* The district court agreed with CommScope, noting that the “underlying dispute over this term is what switching ‘off’ does to the controller.” *Id.* In so holding, the district court drew a distinction between: (1) when the controller is turned off and (2) the effect on the system of turning the controller off. *Id.* The district court determined that this clarification was necessary to resolve the parties’ dispute. *Id.* (citing *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008)).

Dali fails to mount a meaningful appellate challenge to this construction. In a footnote, Dali argues that “CommScope’s premise that the controller *itself* must be turned ‘off’ is . . . literal nonsense,” Cross-Appellant’s Br. 44 n.10, which suggests that the district court’s construction of “switching a controller to a nonoperating state” is also “nonsense.” The reason for this is, in Dali’s view, “because something needs to turn the switch back on each time the system goes back to the training phase, and that something is *the controller*.” *Id.*

There are several reasons to reject this opaque challenge by Dali. First, an argument that is only made in a footnote of an appellant’s brief is forfeited. *SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1319–20 (Fed. Cir. 2006) (citations omitted). Second, even if the argument were in the body of the brief, it is insufficiently developed. See *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1341 (Fed. Cir. 2006) (“In order for this court to reach the merits of an issue on appeal, it must be adequately developed.” (citations omitted)); *Game & Tech. Co. v. Wargaming Grp. Ltd.*, 942 F.3d 1343, 1350 (Fed. Cir. 2019) (determining that an issue was forfeited where appellant raised it “only [in] one paragraph” in which appellant “fail[ed] to address, let alone show, any specific errors in the Board’s findings”). Finally, and most importantly, it is irreconcilable with Dali’s statements in other portions of its brief:

(1) asserting that the district court's construction is "unchallenged," Cross-Appellant's Br. 44; and (2) applying the construction in the context of invalidity, *id.* at 47 ("[c]laim 1 of the '521 Patent requires a controller that . . . places itself . . . in a non-operating state"). Seeing no meaningful challenge, we adopt the district court's construction requiring the controller itself to be turned to a "nonoperating state." We thus consider whether substantial evidence supports the jury's finding that the FlexWave infringes claim 1 under this construction.

## B

We turn next to the second step of the infringement inquiry. The key evidence Dali relies on as supporting its contention that the FlexWave meets the claim as properly construed is the following testimony of its expert, Dr. Kenney:

[A.] . . . So the first step in this operating phase is to switch a controller off. And the [district court] define[d] that [to] mean[] placing the controller in a non-operating state so that you disconnect the signal from the output of the [power amplifier]. So in a sense you turn the feedback off.

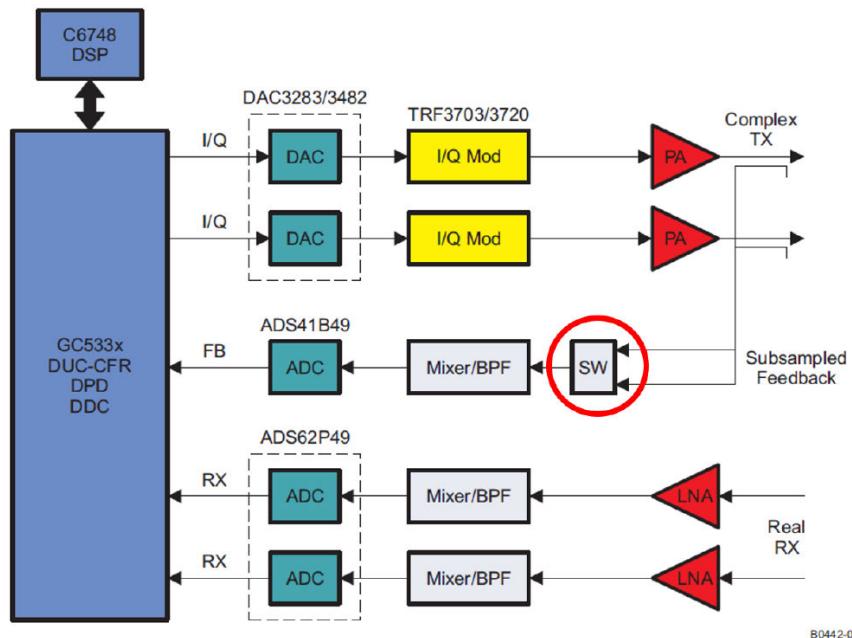
*And the [internal] documents show a switch. This is the simplest schematic I could find. And I have circled it in red there. And various other schematics show that switch as well. So it meets this limitation.*

Q. And what did you identify as the switch?

A. Well, the actual switch circuit is a series of transistors that switch the actual RF signal on and off. And it is also associated with a logic that controls it that is on the [Field Programmable Gate Array], all those things being on the [motherboard].

J.A. 28011 (Trial Tr. 61:4–17 (Vol. 5-B)) (emphases added). The district court also relied principally on this testimony in denying JMOL of noninfringement on this issue. J.A. 14 (quoting J.A. 28011).

The switch that Dr. Kenney circled in red is shown below:



Appellants' Br. 20 (annotating J.A. 30065).

There is some dispute on appeal regarding Dali's mapping of the claimed "controller" to the accused FlexWave device. It is unclear from the key portion of Dr. Kenney's testimony (quoted above) which elements of the accused device he was mapping to the claimed "controller." It seems reasonable to say that he was pointing to the switch "SW" as the controller, as CommScope argues, but it is also possible that he was pointing to the "logic that controls [the switch] on the FGPA," as CommScope also recognizes as a possibility, or some combination of the two, as Dali asserts on appeal. In his cross examination, Dr. Kenney appears

to have supported the combination mapping, stating that “what [he] described [on direct examination was] a switch and a controller.” J.A. 28047–48 (Trial Tr. 27:25–28:15 (Vol. 6-A)).

In any case, we need not decide which mapping was presented below because Dali points to no evidence showing that any of the following are put in a “nonoperating state” in the accused FlexWave: (1) the switch itself, (2) the controller itself, or (3) the combination of the switch and the controller. The key portion of Dr. Kenney’s testimony above never states that either the switch or the controller is rendered “nonoperating.” Rather, the testimony points to the result that “you turn the feedback off” rather than the specific mechanism claimed to achieve that result—“switching a controller off.” This testimony from Dr. Kenney thus does not provide substantial evidence to support the jury’s finding that the FlexWave meets the district court’s claim construction.

Not only was there a lack of evidence to show that the accused product met the proper construction of the claims, there is unrebutted evidence showing the opposite. CommScope points to the testimony of its expert, Dr. Wood, who testified that both the switch and the controller are continuously operating in the accused FlexWave. Appellants’ Br. 29–33 (citing J.A. 28252–53, 28255–56 (Trial Tr. 83:6–24, 84:2–4, 84:13–17, 86:12–18, 87:3–6 (Vol. 6-B))). Critically, Dali did not contest Dr. Wood’s understanding of how the FlexWave operates, stating flatly: “Dr. Kenney did not disagree with how Dr. Wood described the FlexWave and instead explained why that operation *does* infringe.” Cross-Appellant’s Br. 41. Accordingly, substantial evidence does not support the jury’s finding that the FlexWave met the limitation “switching a controller off” as properly construed.

On appeal, Dali labels the distinction described above as “hair-splitting” and argues it is irrelevant in light of the

purpose of the invention, which is focused on calculating digital predistortion for a single power amplifier. Cross-Appellant's Br. 40–43. To focus on this “single power amplifier,” Dali emphasizes the second portion of the key claim limitation—“switching a controller off *to disconnect signal representative of the output of the power amplifier.*” According to Dali, substantial evidence supports the jury’s verdict because Dr. Kenney testified that the FlexWave “controller operated to turn the switch on and off from the perspective of any one [power amplifier].” Cross-Appellant's Br. 39–43 (citing J.A. 28011). We reject this argument.

First, in a literal infringement case, as we have here, the meaning ascribed to the claims is significant. The burden is on a patent owner to show that “the properly construed claim reads on the accused device exactly.” *Engel Indus., Inc. v. Lockformer Co.*, 96 F.3d 1398, 1405 (Fed. Cir. 1996) (citation omitted). CommScope’s reliance on the claim terms as construed by the district court is not “hair-splitting,” as Dali argues, but instead properly shows that Dali failed to meet its burden at the district court and that no reasonable jury could have found otherwise.

Second, regarding Dali’s “single power amplifier” argument, Dali simply ignores the claim requirement that the controller itself is rendered “nonoperating.” Instead, it argues with respect to the FlexWave device that even though “the controller, at a system-wide level, is continuously operating, it goes into a ‘nonoperating’ state for each specific [power amplifier] during *that [power amplifier]’s operating phase.*” Cross-Appellant's Br. 44. Dali’s admission that the FlexWave controller is “continuously operating,” however, is fatal to its argument on appeal. Before the district court, Dali presented only a literal infringement case, and not a doctrine-of-equivalents alternative. J.A. 34018–19. Thus, Dali’s argument that the FlexWave switch/controller is effectively “nonoperating” because it is not passing a feedback signal of the power amplifier of interest is irrelevant

because Dali failed to produce evidence below to show that the accused controller is literally nonoperating, as the district court determined was required by the claim.

Furthermore, we agree with CommScope that this argument cannot stand in light of Dali's arguments of no anticipation by Wright. Dali does not contest that Wright's MUX is a multi-selector switch that can have "N" number of connections. Appellants' Reply Br. 10; *see generally* Cross-Appellant's Br. 46–49. Nor does it contest that when the number of connections is two, Wright's MUX operates exactly like the selector switch in the FlexWave. Appellants' Reply Br. 10; *see generally* Cross-Appellant's Br. 46–49. Instead, in its defense of the jury's no invalidity verdict, Dali amplifies the significance of the "nonoperating" requirement, highlighting Dr. Kenney's testimony that Wright's MUX "also has to have a controller, and you have to put that controller into a non-operating state. That's not . . . disclosed in Wright." J.A. 28358 (Trial Tr. 58:15–18 (Vol. 7)); Cross-Appellant's Br. 47 (quoting this portion of the testimony).<sup>5</sup>

Dali cannot simultaneously argue: (1) that the FlexWave infringes by using a switch that is effectively nonoperating for a single power amplifier when feeding back the signal for the other power amplifier, and (2) that Wright does not anticipate, given it has a switch that operates identically to select feedback from multiple power

<sup>5</sup> Dali also attempts to distinguish Wright on appeal on the basis that Wright's MUX uses "capture buffers." Cross-Appellant's Br. 47. CommScope correctly responds that this "capture buffer" teaching—which only appears in two paragraphs of Wright, J.A. 32309 (col. 51 ll. 20–54)—is an ancillary teaching regarding an "alternative approach" on which CommScope did not rely. Appellants' Reply Br. 9–10. No reasonable jury could have found this to be a proper basis for distinguishing Wright.

amplifiers. This incongruity is most apparent when comparing Dali's description of the claim's requirements for infringement versus invalidity:

Infringement	Invalidity
<p>“CommScope’s premise that the controller <i>itself</i> must be turned ‘off’ is also literal nonsense, because something needs to turn the switch back on each time the system goes back to the training phase, and that something is <i>the controller</i>.<sup>10</sup></p> <p>Cross-Appellant’s Br. 44 n.10.</p>	<p>“Claim 1 of the ’521 Patent requires a controller that controls a switch and <i>places itself</i> and the switch in a non-operating state in order to disconnect the [power amplifier] output from the training circuit.”</p> <p>Cross-Appellant’s Br. 47.</p>

This case falls squarely within the principle that a “patent may not, like a nose of wax, be twisted one way to avoid anticipation and another to find infringement.” *Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) (cleaned up). We therefore reverse the district court’s denial of CommScope’s motion for JMOL of no infringement of the ’521 patent and affirm the denial of CommScope’s motion for JMOL of invalidity of the ’521 patent over Wright.

## II

CommScope’s additional arguments for reversal regarding the ’521 patent are unpersuasive. CommScope argues that Khan and Bauder each anticipate the ’521 patent, but its arguments are based on interpretations of the scope and content of the prior art (a fact-intensive inquiry) that conflict with those given by Dali’s expert at trial. The jury was entitled to consider both parties’

experts' testimony and choose to credit Dali's expert over CommScope's in this regard. We will not disturb this weighing of the evidence on appeal.

We have also considered each of CommScope's arguments regarding U.S. Patent No. 9,531,473, including CommScope's arguments challenging the district court's denial of CommScope's motion for JMOL regarding written description and enablement, anticipation, obviousness, and infringement of the '473 patent, as well as CommScope's motion for a new trial on the '473 patent. Additionally, we have considered Dali's arguments on cross-appeal regarding written description and enablement of CommScope's asserted patents. We discern no error in the district court's rulings on any of these issues.

Finally, regarding attorneys' fees, because the district court's reasoning remains intact on the issue of prevailing party, J.A. 29, we see no need to remand for reconsideration of the district court's denial of attorneys' fees.

#### CONCLUSION

For the reasons stated above, we reverse the district court's denial of CommScope's motion for JMOL of no infringement of the '521 patent and affirm the judgment of the district court in all other respects.

#### **AFFIRMED-IN-PART AND REVERSED-IN-PART**

#### COSTS

No costs.