

NOTE: This disposition is nonprecedential.

**United States Court of Appeals  
for the Federal Circuit**

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**DALI WIRELESS INC.,**  
*Plaintiff-Appellant*

v.

**COMMSCOPE TECHNOLOGIES LLC,  
COMMSCOPE HOLDING COMPANY, INC.,**  
*Defendants-Appellees*

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2022-1699

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Appeal from the United States District Court for the District of Delaware in No. 1:19-cv-00952-MN, Judge Maryellen Noreika.

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Decided: October 18, 2023

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CRISTOFER LEFFLER, Folio Law Group PLLC, Seattle, WA, argued for plaintiff-appellant. Also represented by ALEXANDRA O. FELLOWES, STEFAN SZPAJDA; JOSEPH ABRAHAM, Austin, TX.

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

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Before PROST, HUGHES, and STOLL, *Circuit Judges*.

STOLL, *Circuit Judge*.

Dali Wireless Inc. appeals from a stipulated judgment of noninfringement of U.S. Patent No. 8,682,338 following an adverse claim construction ruling from the United States District Court for the District of Delaware. For the following reasons, we agree with the district court that the “translating” limitation is not conditional and agree with the district court’s constructions of the “packetizing” and “routing and switching” limitations. We therefore affirm the district court’s noninfringement judgment.

#### BACKGROUND

Dali owns the ’338 patent, which discloses methods of routing and switching signals in a distributed antenna system (DAS). ’338 patent col. 1 ll. 15–19, col. 5 ll. 52–56. A DAS is a cellular communication system that distributes radio signals from a network operator’s signal source to users’ mobile devices. *See id.* Fig. 3, col. 1 l. 15–col. 2 l. 26. This system enhances signal coverage in areas with limited access to cell towers and areas that lack the capacity to support a high density of users, such as office buildings or stadiums. *See id.* The basic DAS architecture includes a central hub—for example, a digital access unit (DAU)—connected via cables to a network of remote radio units (RRUs) placed throughout the building or stadium. *See id.* Fig. 3, col. 4 ll. 39–44, col. 5 ll. 62–64. The DAU provides a wired connection to the operator’s signal source, and the RRUs provide a wireless connection to users’ mobile devices. *See id.* Fig. 3.

In a DAS, RRUs are generally mounted in specific locations that expect a high density of users. *Id.* at col. 1 l. 47–col. 2 l. 10. However, this high concentration of users may move to different locations throughout the day and

physically moving the RRUs as the concentration of users moves is not practical. *Id.* at col. 1 l. 23–col. 2 l. 26. Accordingly, the '338 patent discloses a “dynamic” method for managing and allocating radio resources to particular RRUs where they are most needed. *Id.* at col. 3 l. 51–col 4 l. 8, col. 8 ll. 21–24, col. 11 ll. 40–53.

The claimed system transports signals in two directions: downlink and uplink. Downlink signals are signals traveling from the operator’s signal source to mobile users, and uplink signals are signals traveling from mobile users to the operator’s signal source. *Id.* at col. 5 l. 64–col. 6 l. 9. The claimed system encounters at least two types of signals: baseband (also referred to as “base band”) and radio frequency (RF) signals. Baseband signals are low frequency signals, which are more suitable for wired transmission—for example, between the DAU and RRU. *See id.* at col. 5 l. 64–col. 6 l. 4. RF signals are higher frequency signals, which are more suitable for wireless transmission—for example, between the RRUs and mobile phones. *See id.* at col. 6 ll. 4–9. Depending on the type of transmission, signals can be translated between RF and baseband. *See id.* at col. 5 l. 64–col. 6 l. 9.

Claim 1 is representative and recites:

1. A method for routing and switching RF signals comprising:

providing one or more remote radio units, each remote radio unit configured to transmit one or more downlink RF signals and to receive one or more uplink RF signals;

providing at least one digital access unit configured to communicate with the one or more remote radio units;

*translating the uplink and downlink signals between RF and base band as appropriate;*

*packetizing the uplink and downlink base band signals, wherein the packetized signals correspond to a plurality of carriers;*

configuring each remote radio unit to receive or transmit a respective subset of the plurality of carriers, each respective subset of the plurality of carriers including a number of carriers;

reconfiguring each remote radio unit by:

determining a load percentage for each remote radio unit; and

increasing or decreasing the number of carriers in the respective subset of the plurality of carriers based on the load percentage; and

*routing and switching the packetized signals among the one or more remote radio units via the at least one digital access unit according to a result of the reconfiguring.*

*Id.* at col. 13 ll. 2–25 (emphases added to highlight disputed limitations).

Dali sued CommScope Technologies LLC and CommScope Holding Company, Inc. (collectively, “CommScope”), alleging CommScope’s OneCell system infringes, *inter alia*, claims 1–3 of the ’338 patent. After an initial claim construction order, the parties filed cross motions for summary judgment. The district court invited the parties to submit supplemental claim construction briefing relevant to CommScope’s noninfringement arguments. After a hearing, the district construed the “translating . . . as appropriate”; “packetizing”; and “routing and switching” limitations. *Dali Wireless, Inc. v. CommScope Techs. LLC*, No. 19-952, 2022 WL 621547 (D. Del. Mar. 3, 2022) (*Decision*). Following this supplemental claim construction, the parties stipulated to final judgment that, under the district court’s claim constructions, the accused product does not

infringe the asserted claims. The district court entered judgment accordingly. Dali appeals. We have jurisdiction under 28 U.S.C. § 1295(a)(1).

#### DISCUSSION

We review claim construction de novo, except for necessary subsidiary factual findings based on extrinsic evidence, which we review for clear error. *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 331–32 (2015). On appeal, Dali challenges the district court’s constructions of (1) “translating the uplink and downlink signals between RF and base band as appropriate”; (2) “packetizing the uplink and downlink base band signals”; and (3) “routing and switching the packetized signals among the one or more remote radio units via the at least one digital access unit.”

#### I

We address the first two limitations together. The district court held that “translating the uplink and downlink signals between RF and base band as appropriate” is not conditional and requires translation. *Decision*, 2022 WL 621547, at \*3–4. The court also held the subsequent limitation of “packetizing the uplink and downlink base band signals” refers to the “baseband signals *produced by* the prior ‘translating’ step.” *Id.* We adopt these constructions.

Dali’s primary argument is that “translating . . . as appropriate” does not require translation each time the method is performed. According to Dali, the phrase “as appropriate” at the end of the translating limitation means that the translating step is only performed when necessary. In other words, translation from RF to baseband at the DAU is required only when the downlink signal arrives in RF. Appellant’s Br. 30. “[I]f the downlink signal is already in baseband, there is no need to translate it.” *Id.*

We agree with the district court that the claimed translating step is not conditional. Like the district court, we reject Dali’s interpretation of “as appropriate” as meaning

that translation need not occur. The claim does not recite “translating . . . as needed.” Nor does the claim recite “translating unless not needed.”

The specification further supports that “as appropriate” does not make the translation conditional. The specification explains:

For the downlink (DL) path, RF signals received from the BTS *are* separately down-converted, digitized, and *converted to baseband* . . . . For the uplink (UL) path optical signals received from RRUs are de-serialized, deframed, and up-converted digitally using a Digital Up-Converter. Data streams *are* then independently converted to the analog domain and *up-converted to the appropriate RF frequency band*.

’338 patent col. 5 l. 64–col. 6 l. 9 (emphases added). None of this language is conditional or optional. Instead, the specification teaches the uplink and downlink signals “are” converted. *Id.*

The district court interpreted “as appropriate” to mean “the amount of translation necessary to produce a baseband signal from an RF signal.” *Decision*, 2022 WL 621547, at \*1. We think it possible that, instead, “as appropriate” modifies “between RF and base band” such that the claimed translating step covers either translating from RF to baseband or from baseband to RF. However, because we need only construe claim terms as much as necessary to resolve the parties’ dispute, *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999), we need not resolve this aspect of the district court’s construction. We must only resolve whether the translating step is conditional, as Dali’s infringement theory depends on such construction. As discussed above, we agree with the district court that it is not. Under either interpretation of “as appropriate,” translation is required by the claimed method.

We also agree with the district court that “packetizing *the* uplink and downlink base band signals” refers to the baseband signals produced by the previous “translating” step. The antecedent basis for “the uplink and downlink base band signals” is the “base band” signals referred to in the required “translating” step. *See* ’338 patent col. 13 ll. 9–13. That is, the downlink RF signals must be translated to baseband before the packetizing step.

Dali argues claim 1 does not require downlink signals be translated from RF to baseband because the claim is not limited to receiving downlink signals in RF. Appellant’s Br. 32–35. In support, Dali points to claim 6, which depends from claim 1. Claim 6 adds the limitation that “the first digital access unit is configured to communicate with a first base station, and the second digital access unit is configured to communicate with a second base station.” ’338 patent col. 14 ll. 8–11. According to Dali, claim 6 limits the source of the downlink signals to a base station and requires the DAU to receive downlink signals in RF. Appellant’s Br. 33. Based on this, Dali argues that independent claim 1 is not limited to receiving downlink RF signals at the DAU. *Id.*

We are unpersuaded by Dali’s claim differentiation argument. Claim 6 simply adds the limitation that two DAUs are “configured to communicate” with two base stations. This limitation does not require that the downlink signals are in RF. More importantly, we do not think the district court’s construction requires that downlink signals are always received in RF at the DAU. It simply requires that downlink signals be translated from RF to baseband at some point before the packetizing step. In other words, under the district court’s construction, claim 1 does not cover a purely baseband system where no translation from RF to baseband is required. This construction is consistent with the specification, which states an object of the “present invention” is “to *facilitate conversion* and transport of several discrete relatively narrow *RF* bandwidths.” ’338 patent

col. 4 ll. 20–22 (emphases added); *see also id.* at col. 7 ll. 5–6 (“The present invention *facilitates conversion* and transport of several discrete relatively narrow *RF* bandwidths.” (emphases added)).

In sum, we adopt the district court’s construction of the “translating” limitation to the extent it held translation is not conditional. We also adopt the district court’s construction of the “packetizing” limitation.

## II

We next address the “routing and switching” limitation. The district court held that “‘routing and switching the packetized signals among the one or more remote radio units via the at least one digital access unit’ refers to ‘the packetized signals’ produced by the ‘packetizing’ step and includes both uplink baseband signals and downlink baseband signals that were previously packetized.” *Decision*, 2022 WL 621547, at \*1, \*5. Dali argues this construction is erroneous because the plain language of the claim limits this term to *downlink* signals. Appellant’s Br. 52–54.

We agree with the district court that this limitation includes both uplink and downlink signals. The claim language recites “routing and switching *the packetized signals*.” ’338 patent col. 13 l. 23 (emphasis added). The antecedent basis for “the packetized signals” is the signals produced in the previous packetizing step, which recites both “uplink and downlink base band signals.” *Id.* at col. 13 l. 11. Moreover, the specification depicts routing and switching in both the uplink and downlink directions. *See id.* Fig. 1 (downlink), Fig. 2 (uplink). In describing Figure 2, which depicts the claimed invention operating in the uplink direction, the specification explains the uplink “signals resulting from processing performed within each of the four RRU are routed to the two DAUs.” *Id.* at col. 9 ll. 27–31.



Dali nevertheless argues the district court’s construction is “nonsensical” because the claim language “among the one or more remote radio units via the at least one digital access unit” inherently means the signal is flowing in the downlink direction—i.e., from the DAU towards the RRUs. Appellant’s Br. 54–57. We disagree. Instead, this claim language encompasses the embodiment in Figure 2, which depicts *uplink* signals coming from “among” the RRUs and flowing “through” the DAU. ’338 patent Fig. 2; *see also Decision*, 2022 WL 621547, at \*5 (construing “via” as “through”). We therefore adopt the district court’s construction of the “routing and switching” limitation.

#### CONCLUSION

We have considered the parties’ remaining arguments and find them unpersuasive. For the reasons discussed above, we agree with the district court that the “translating” limitation is not conditional. We also agree with the district court’s constructions of the “packetizing” and “routing and switching” limitations. Accordingly, we affirm the district court’s judgment of noninfringement.

**AFFIRMED**