

NOTE: This disposition is nonprecedential.

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

UNITED ACCESS TECHNOLOGIES, LLC,
Plaintiff-Appellant

v.

**AT&T CORP., AT&T SERVICES, INC., SBC
INTERNET SERVICES, INC., CENTURYTEL
BROADBAND SERVICES LLC, QWEST
CORPORATION, FRONTIER COMMUNICATIONS
CORPORATION,**
Defendants-Cross-Appellants

2017-2614, 2017-2615, 2017-2616, 2018-1030, 2018-1031,
2018-1032

Appeals from the United States District Court for the
District of Delaware in Nos. 1:11-cv-00338-LPS, 1:11-cv-
00339-LPS, 1:11-cv-00341-LPS, Chief Judge Leonard P.
Stark.

Decided: January 24, 2019

ANTHONY MATTHEW GARZA, Charhon Callahan Robson
& Garza, P.C., Dallas, TX, argued for plaintiff-appellant.
Also represented by STEVEN CHASE CALLAHAN.

MICHAEL HAWES, Baker Botts, LLP, Houston, TX, argued for all defendants-cross-appellants. Defendants-cross-appellants AT&T Corp., AT&T Services, Inc., SBC Internet Services, Inc. also represented by ELIZABETH KATHLEEN BOGGS, BRYANT C. BOREN, JR., JASON R. GERMAN, JON SWENSON, Palo Alto, CA.

MATTHEW CHRISTOPHER GAUDET, Duane Morris LLP, Atlanta, GA, for defendants-cross-appellants CenturyTel Broadband Services LLC, Qwest Corporation. Also represented by ALISON HADDOCK HUTTON.

TIMOTHY R. SHANNON, Verrill Dana LLP, Portland, ME, for defendant-cross-appellant Frontier Communications Corporation. Also represented by SETH COBURN, TAYLOR ROSE NEFF.

Before LOURIE, BRYSON, and DYK, *Circuit Judges*.

BRYSON, *Circuit Judge*.

Appellant United Access Technologies, LLC (“UAT”) brought this patent infringement case against a number of telecommunications companies. UAT accused the defendants of infringing U.S. Patent Nos. 5,844,596 (“the ’596 patent”), 6,243,446 (“the ’446 patent”), and 6,542,585 (“the ’585 patent”). In particular, UAT asserted claim 61 of the ’596 patent, claims 1-5 of the ’446 patent, and claims 1, 2, 4, 8, and 9 of the ’585 patent.¹ The defendants filed a joint motion for summary judgment of noninfringement, which the district court granted. For the reasons discussed below, we reverse the grant of sum-

¹ The patents-in-suit share a common specification. References to the common specification will be to the ’596 patent.

mary judgment in part, based on an error in the district court's claim construction.

I

A. The Patents-in-Suit

The technology at issue in this case involves a way of simultaneously transmitting data and voice signals over a single telephone line without causing interference. At the time of the invention, providing data signals such as cable TV transmissions to residences typically required running a coaxial cable from the main cable trunk to each subscriber. In addition, a separate segment of coaxial cable had to be installed for every extra TV hookup within the subscriber's residence. Those installation requirements were costly, as coaxial cabling was typically not included in homes and apartment buildings at that time. *See* '596 patent, col. 2, ll. 15-23; *id.* at col. 3, ll. 46-47.

The inventor's solution was to use pre-existing telephone lines as the means for transmitting data from the main cable trunk to individual subscribers. In order to transfer data signals from the main cable trunk line to the pre-existing telephone lines, the invention employed a "transceiver/switch," which the patents refer to as a "signal interface."² *Id.* at col. 8, ll. 9-10. The specification explains that the signal interface "receives the [data] signal from the source, and transmits the received [data] signal onto at least one of the telephone lines in a selected frequency range that is different from frequencies at which the voice signals are carried on that telephone line." *Id.* at col. 3, line 65, through col. 4, line 2. Those

² The written description nowhere uses the term "signal interface"; the term first appears in the claim language. However, both parties agree that the "transceiver/switch" that is discussed in the written description is the "signal interface" recited in the claims.

telephone lines, which are referred to throughout the patents-in-suit as “extended pairs,” carry both data and voice signals from the signal interface to local networks. *See id.* at Fig. 1a (referring to the telephone wiring between the signal interface and the local network interfaces as “extended pairs”). The patents define local networks as the telephone wiring internal to houses, apartment units, or rooms in commercial buildings. *Id.* at col. 1, ll. 32-34.

Independent claim 61 of the ’596 patent is generally representative of the asserted claims. It provides as follows:

A system for communicating information between an external source of information and a plurality of destinations of information over a telephone wiring network used for passing telephone signals in a telephone voice band between a plurality of telephone devices and a telephone exchange, comprising:

a plurality of transceivers coupled between the telephone wiring network and corresponding destinations of information, each including

circuitry for accepting signals in a high frequency band of frequencies above the highest frequency of the telephone voice band and rejecting signals in the telephone voice band; and

a signal interface coupled between the external source of information and the telephone wiring network, including

circuitry for receiving a plurality of external signals encoding a plurality of information streams from the external source of information, and

circuitry for transmitting to selected sets of one or more of the plurality of transceivers a corresponding plurality of internal signals in the high frequency band each encoding one of the plurality of information streams over the telephone wiring network;

wherein the telephone wiring network includes a branch network which couples one of the plurality of telephone devices to the telephone exchange telephone exchange [sic], and the branch network includes circuitry for preventing transmission of signals in the high frequency band to the one of the telephone devices on the branch network.

Independent claim 1 of the '446 patent and independent claim 1 of the '585 patent are generally similar, although they use slightly different language to describe the location of the signal interface. Claim 1 of the '446 patent recites "a signal interface coupled between the external source of information and said conductive path," and claim 1 of the '585 patent recites "a signal interface located on the telephone wiring network between the telephone exchange and each of the residences."

B. The Accused Products

UAT alleges that the defendants have infringed the patents-in-suit by providing ADSL (asymmetric digital subscriber line) service to their customers. UAT asserts that each ADSL system meets the "signal interface" claim limitation by the use of a type of DSLAM (digital subscriber line access multiplexer).

The defendants implement ADSL in one of two ways: through a central-office embodiment and a remote-terminal embodiment. Both embodiments feature a DSLAM that transmits data signals onto telephone lines

at a frequency range higher than the frequencies at which voice signals are carried on those lines. The embodiments differ from one another based on the location of the DSLAM.

In the central-office embodiment, the DSLAM is located inside one of the defendants' switching centers. At the switching center, voice and data signals for multiple subscribers are fed into the DSLAM, which directs the signals onto multiple sets of "extended pairs" of telephone wires that serve individual subscribers. In the remote-terminal embodiment, the DSLAM is located at a point on the telephone wiring network downstream of, rather than inside, the defendants' switching center.³

Downstream of the DSLAM, the defendants' remote-terminal embodiments are identical to the central-office embodiments. From that point, telephone wires carrying both voice and data signals, known as "extended pairs," are bundled into a common cable and distributed to serving terminals. Those serving terminals separate the extended pairs of wires into lines running to individual residences.

C. Prior Litigation Involving the Patents-in-Suit

Prior to this litigation, Inline Connection Corporation, a previous owner of the patents, accused Earthlink, Inc., and America Online, Inc., of infringement. *See Inline Connection Corp. v. AOL Time Warner Inc.*, 364 F. Supp. 2d 417 (D. Del. 2005). Like the defendants in this case, Earthlink and AOL provided ADSL service to their customers. *Id.* at 422. As here, Earthlink and AOL implemented ADSL through both a central-office embodiment and a remote-terminal embodiment. The *Inline* court

³ As used here, downstream means closer to the local networks; upstream means closer to the switching centers.

construed the term “signal interface” to mean “[a] device interposed on the opposite end (i.e., the local side) of the public trunk line (as defined by the inventor in the patent) from the telephone exchange that performs the recited functions of the incorporated circuitry.” *Id.* at 427. Subsequently, in considering cross-motions for summary judgment, the court granted summary judgment of non-infringement with regard to the central-office embodiment because that embodiment did not satisfy the “signal interface” claim limitation. *See id.* at 436. However, the court denied summary judgment with regard to the remote-terminal embodiment. *See id.* at 436–48. Following a trial, the jury found no infringement with respect to the remote-terminal embodiments.

On appeal, UAT challenged the *Inline* court’s construction of “signal interface” and sought reversal of the *Inline* court’s summary judgment order as to the central-office embodiment. Earthlink argued for affirmance on two independent grounds: (1) that the district court’s claim construction of “signal interface” was correct, and (2) that the jury’s verdict on the remote-terminal embodiment showed that the court’s construction of signal interface “had no bearing on the jury’s decision that Plaintiff failed to present any credible evidence of infringement.” This court summarily affirmed the district court’s judgment. *United Access Techs., LLC v. Earthlink, Inc.*, 432 F. App’x 976, 977 (Fed. Cir. 2011).

D. Proceedings in the District Court

In the claim construction order in the present case, the district court construed two terms relevant to this appeal. *United Access Techs., LLC v. Centurytel Broadband Servs., LLC*, No. CV 11-338-LPS, 2016 WL 6562059 (D. Del. Nov. 4, 2016). First, the district court construed “signal interface,” as it had been construed in the *Inline* case, to mean “a device interposed on the opposite end (i.e., the local side) of the public trunk line (i.e., the tele-

phone lines comprising the public telephone network) from the telephone exchange that performs the recited functions of the incorporated circuitry.” Second, the court construed the term “high frequency band,” as used in each of the asserted claims, to refer to “frequencies above the telephone voice band between 0.25 MHz [megahertz] and an undetermined upper limit.”

In light of its claim constructions, the district court allowed the defendants to file an early motion for summary judgment of non-infringement. The court then granted summary judgment on all of UAT’s claims. *United Access Techs., LLC v. AT&T Corp.*, 265 F. Supp. 3d 446 (D. Del. 2017). The court determined that the defendants’ systems do not infringe under the court’s claim construction because in both embodiments the defendants’ DSLAMs are located on the public telephone network, not on the local wiring downstream from the public telephone network. The court explained that the telephone company owns the extended pairs that run between the remote-terminal signal interface and the network interface device that sits between the extended pairs and the local networks. *See* ’596 patent, col. 9, ll. 12-15. The fact that telephone companies own the extended pairs, the court concluded, shows that those wires, like the wires upstream of the signal interface, are part of the public telephone network. Because the telephone wires both upstream and downstream of the DSLAMs are part of the public telephone network, as the court applied that term, the court held that neither the central-office nor the remote-terminal embodiments infringe the asserted patents.

II

On appeal, UAT challenges the district court’s construction of the term “signal interface.” UAT advocates a broad definition of “signal interface.” It contends that the district court should not have defined the term with a positional restriction—requiring the signal interface to be

located on the local network side of the public trunk line—or an ownership restriction—defining the boundary of the local network and the public telephone network by the telephone companies’ ownership of the lines. In their cross-appeal, the defendants argue that the term “high frequency,” which is used in all of the asserted claims, is indefinite and that all of the claims are therefore invalid.

A. Signal Interface

UAT argues that the term “signal interface” means “a device interposed at a point of convergence [such as the point of convergence of the extended pairs from local networks] that is downstream from the telephone exchange and performs the recited functions of the incorporated circuitry.” The defendants argue that the district court properly construed the term to mean “a device interposed on the opposite end (i.e., the local side) of the public trunk line (i.e., the telephone lines comprising the public telephone network) from the telephone exchange that performs the recited functions of the incorporated circuitry.”

In support of its construction of “signal interface,” UAT first argues that the term has a plain and ordinary meaning, which is the meaning given to the term “interface” in computer science: a common boundary between two systems, devices, or programs. But neither the specification nor any computer science dictionary to which UAT has directed us contains a definition of “signal interface.” And, as noted by the district court, UAT has not explained why a person of ordinary skill in the art would interpret “signal interface,” as that term is used in the patents, to mean simply an interface.

UAT next points out that the asserted claims contain language identifying the location of the signal interface. *See, e.g.*, ’596 patent, claim 61 (“a signal interface coupled between the external source of information and the telephone wiring network”); ’446 patent, claim 1 (“a signal

interface coupled between the external source of information and said conductive path”); ’585 patent, claim 1 (“a signal interface located on the telephone wiring network between the telephone exchange and each of the residences”).

That language, according to UAT, provides a complete description of the location of the signal interface. But the specification refines the claim language, making it clear that the signal interface must be located where the public trunk line and the lines from the local networks converge. See ’596 patent, col. 1, line 62, through col. 2, line 3 (“The present invention [provides] distribution [of telephonic and non-telephonic signals] from a distribution device [i.e., the signal interface] that connects to the trunk line of a public or private telephone network. That device is located where the telephone lines for multiple local networks converge to meet the public network trunk (or PBX, in the case of office buildings)”); *id.* at col. 4, ll. 53-55 (“The interface is coupled between the telephone lines and corresponding public telephone lines (which carry voice signals at voiceband frequencies) that serve the residences.”).⁴ Those references in the specification clarify where the signal interface must be located. See *GPNE Corp. v. Apple Inc.*, 830 F.3d 1365, 1370 (Fed. Cir. 2016) (“[W]hen a patent ‘repeatedly and consistently’ characterizes a claim term in a particular way, it is proper to construe the claim term in accordance with that characterization.”).

⁴ For the private branch exchange (PBX) embodiment, the PBX and the signal interface are both located between the public trunk line and the local networks. Because the signal interface is located in the same wiring closet as the PBX, the signal interface is effectively located where the local networks converge to meet the public trunk line. See ’596 patent, Fig. 1b.

UAT contends that the term “signal interface” does not provide a textual “hook” in the claim language for the district court’s positional limitations. *See NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1310 (Fed. Cir. 2005). But as the *NTP* court recognized, a textual hook arises when a “claim term [] is susceptible of clarification by the written description,” as is true in this case.⁵ *Id.* We therefore reject UAT’s broad construction of the term “signal interface” in favor of the defendants’ construction of the term as limited to a device located on the local side of the public trunk line.

While we reject UAT’s principal claim construction argument, we agree with UAT in one respect—that the district court improperly imported an ownership limitation in the course of its construction of the term “signal interface,” and in particular in determining how the patents define the required location of the signal inter-

⁵ In its reply brief, UAT proposes a different construction, arguing that the signal interface need only be located where the wiring leading to multiple local networks converges, without reference to its position vis-à-vis the public trunk line. For support, UAT cites Figure 16 of the ’596 patent, arguing that the figure depicts a “signal interface” sitting entirely off the telephone network. That argument, however, has been waived because UAT failed to include the argument in its opening brief. *See, e.g., Aventis Pharma S.A. v. Hospira, Inc.*, 675 F.3d 1324, 1332–33 (Fed. Cir. 2012). In any event, all the claims in the asserted patents that use the term “signal interface” are addressed to a system on a telephone wiring network. Therefore, as noted by the defendants at oral argument and acknowledged by UAT in argument before the district court, Figure 16 does not depict a telephone network and is not an embodiment covered by any of the asserted claims.

face. The district court's construction of "signal interface" included the construction of a second term, "public trunk line." The district court construed the term "public trunk line" to mean "the telephone lines comprising the public telephone network." Then, in the course of its summary judgment opinion, the court further construed the term "public telephone network," as used in the patents, to mean "the telephone lines and other equipment owned by the telephone company."

Based on its iterative claim construction, the court found that the defendants' DSLAMs are located within, rather than downstream of, the public telephone network. The court reached that conclusion because the evidence showed that in all of the defendants' systems, the telephone companies own telephone lines both upstream and downstream of the DSLAMs, including the extended pairs that connect the DSLAMs with the local network interfaces.

UAT contends that the district court's adoption of an ownership requirement as part of its claim construction was error. That error, according to UAT, requires that we reverse the judgment against UAT with respect to the remote-terminal embodiments.⁶

The problem is that the patents-in-suit do not use ownership as the basis for determining the limits of the public telephone network. The patents are silent with regard to who owns the wires that make up the public telephone network and the wires that lead from the signal interface to the individual residences (i.e., the extended pairs). The extended pairs can be quite lengthy and can extend well beyond the limits of the individual subscriber's property, a fact that strongly suggests the patents do

⁶ UAT does not contest the court's summary judgment as to the central-office embodiments on this ground.

not contemplate that the extended pairs are privately owned. For example, the specification states:

There can be a large variation in the lengths of extended pairs **405**. In an apartment building, the telephone wires serving different units may converge at a point **100** feet or less from each apartment unit. An example of the other extreme occurs when distributing signals to separate houses in a neighborhood. In this case, connecting ten houses to the [sic] a single transceiver/switch **400** may mean that some of extended pairs **405** will be longer than, perhaps, 1000 feet.

'596 patent, col. 14, ll. 43-50. In characterizing the patents' description of the wiring on the local side of the signal interfaces, the defendants repeatedly insert the word "private" along with the word "local." The patents, however, provide no support for that characterization.⁷ In sum, the defendants have not convinced us that the patents contemplate that the extended pairs, which are located on the local side of the public trunk line and can extend more than 1000 feet from individual houses, are invariably owned by residents rather than by the telephone company.

The defendants' challenge to literal infringement is based on evidence that in their systems the telephone companies own the extended pairs located between the side of a house or building and the signal interface. In the absence of any intrinsic evidence to the contrary, there is no reason to construe the asserted claims in the opposite fashion, to read only on systems—if any such exist—in

⁷ Although the defendants refer to the extended pairs in the patents as part of the "private, local networks," the specification never uses the term "private" except in connection with private branch exchanges.

which the telephone lines leading from individual residences to the telephone company's remote terminal are owned by individual subscribers.

Instead, the patents make clear that the terms “public telephone network” and “public trunk line” refer to a segment of the telephone wiring network located between the local exchange and a point of convergence, where the pre-existing interface was located. *See* '596 patent, col. 8, ll. 10-13 (“This device [i.e., the signal interface] replaces the existing interface between the public telephone network, i.e., an ordinary telephone trunk line) and the telephone lines that lead to the individual residences.”); *id.* at col. 8, ll. 15-18 (“Typically, the existing interface will be a simple ‘punch-down’ panel that provides electronic connections between the extended pairs and the pairs that are part of the trunk line.”); *id.* at col. 9, ll. 23-25 (“Normal telephone communication on all local networks and between the local networks and the public network (trunk) is preserved”); *id.* at col. 11, ll. 34-35 (“When transceiver/switch **400** is installed, extended pairs **405** are broken near the point of convergence”); *see also* *Inline Connection Corp. v. AOL Time Warner Inc.*, 364 F. Supp. 2d 417, 428–36 (D. Del. 2005). The proper construction does not turn on whether the telephone company or the individual residents own the particular equipment.

In sum, we agree with the district court's construction of “signal interface” in the court's claim construction opinion, which defined “signal interface” as “a device interposed on the opposite end (i.e., the local side) of the public trunk line (i.e., the telephone lines comprising the public telephone network) from the telephone exchange that performs the recited functions of the incorporated circuitry.” But we disagree with the district court's further construction of the term “public telephone network,” in its summary judgment opinion, to mean “the telephone

lines and other equipment owned by the telephone company.”

There is no support for the district court’s conclusion that the telephone company’s ownership of the extended pairs between the network interface device (i.e., the local network interface) and the signal interface makes those lines part of the public telephone network, as that term is used in the patents. We therefore set aside the district court’s summary judgment of non-infringement as to the remote-terminal embodiments.

B. High Frequency

In their cross-appeal, the defendants argue that the term “high frequency” is indefinite and that the asserted claims are therefore invalid for indefiniteness. Claims are invalid for indefiniteness if, when viewed in light of the specification and the prosecution history, they “fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). “Reasonable certainty’ does not require ‘absolute or mathematical precision.’” *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1365 (Fed. Cir. 2017) (quoting *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1381 (Fed. Cir. 2015)). The defendants had the burden of proving indefiniteness by clear and convincing evidence. *BASF Corp.*, 875 F.3d at 1365.

The parties first argue about the standard of review. We review “factual findings about extrinsic evidence relevant to the [indefiniteness] question, such as evidence about knowledge of those skilled in the art . . . for clear error.” *BASF Corp.*, 875 F.3d at 1365. To trigger clear error review, however, “it is not enough that the district court may have heard extrinsic evidence during a claim construction proceeding—rather, the district court must have actually made a factual finding.” *Sonix Tech. Co. v. Publications Int’l, Ltd.*, 844 F.3d 1370, 1376 (Fed. Cir.

2017) (quoting *CardSoft, LLC v. VeriFone, Inc.*, 807 F.3d 1346, 1350 (Fed Cir. 2015)). “A party cannot transform into a factual matter the internal coherence and context assessment of the patent simply by having an expert offer an opinion on it. The internal coherence and context assessment of the patent, and whether it conveys claim meaning with reasonable certainty, are questions of law.” *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1342 (Fed. Cir. 2015); *see also Sonix*, 844 F.3d at 1376.

According to the defendants, the district court relied exclusively on intrinsic evidence to reach its conclusion that the claims were not indefinite, and the court’s conclusion is therefore legal in nature. UAT disagrees, arguing that the district court made a specific factual finding (supported by intrinsic and extrinsic evidence) as to how one of skill in the art would consider the defendants’ cited portions of the specification.

The district court did not explicitly state that it based any of its findings on extrinsic evidence. However, the court’s indefiniteness ruling substantially aligns with the testimony of UAT’s expert, Dr. Krista Jacobsen, regarding the interpretation that one of ordinary skill would give to the term “high frequency.” The court’s determination thus may fairly be characterized as a factual finding invoking clear error review. Even under de novo review, however, we find that the defendants have failed to show that the term “high frequency,” as used in the patents, is indefinite.

Based on the claim language and the specification, the district court concluded that the bottom end of the range of frequencies comprising the “high frequency band” must be higher than the top end of the “voice band,” i.e., the range of frequencies customarily used to carry telephone signals. Looking to the specification, the district court concluded that the minimum frequency at which the high-frequency signal is transmitted is 0.25 MHz.

The specification makes clear that the lower limit of the term “high frequency” is above the voice band; the specification identifies the frequency level for the voice band as going up to .02 MHz and the frequency level for the transmission of data, including control signals, as being centered between 0.5 MHz and 20 MHz. *See* ’596 patent, Figs. 3a, 3b, and 3c. Dr. Jacobsen explained that the frequency band for a control signal centered at 0.5 MHz could range from 0.25 MHz to 0.75 MHz. The specification and the extrinsic evidence thus support the district court’s choice of 0.25 MHz as a reasonable approximation of the lower range of the high frequency band as that term is used in the patents.

The defendants argue that 0.25 MHz cannot be the lower limit of the high frequency range because the specification contains references to high frequency that are inconsistent with that level. The district court rejected that argument on the ground that the specification’s references to particular frequencies as “high” or “low” were used “in a relative sense, characterizing a frequency as ‘low’ or ‘high’ in the context of the preferred embodiment being described, in the context of the technology at issue, or in comparison to other preferred embodiments.” Accordingly, the court found that a person of ordinary skill in the art would understand that the references to “low” or “high” were “not meant to impose numerical limitations on the claims, but rather to distinguish and explain different preferred embodiments and describe the underlying science.” As such, the court concluded, the defendants failed to show by clear and convincing evidence that the references to “high” and “low” frequencies rendered the meaning of the “high frequency” claim terms uncertain to a person of ordinary skill in the art.

More generally, the defendants argue that “high frequency” is not synonymous with “above the voice band.” For support, the defendants point to the difference among three claims of the ’596 patent, each of which includes a

reference to frequency range. Claim 1 refers to “a frequency range that is different from frequencies at which said voice signals are carried on.” Claim 11 refers to a frequency range that “exceeds said voiceband frequencies.” And claim 61 refers to “a high frequency band of frequencies above the highest frequency of the telephone voice band.” The defendants argue that because the claims employ different language to describe the frequency range used in the invention, the term “high frequency band” must mean something different than simply “exceeds said voiceband frequency.”

That argument is not persuasive. The characterizations of the frequency range in claims 1, 11, and 61 all contemplate frequency ranges above the voice band, either explicitly or by context. Moreover, the specification confirms that understanding of the term. *See* '596 patent, col. 53, line 61 (“high-frequency (i.e., non-voiceband) signals”); *id.* at col. 48, ll. 31-32 (“low pass filter 474b passes all voiceband energy”); *id.* at col. 48, ll. 37-39 (“Low pass filters 474 block transmission of the high frequency signals transmitting through signal separators 413 between processor 418 and the local network interfaces 411.”).

As for the upper limit of “high frequency,” the specification explains that “attenuation, radiation, crosstalk interference and reception of external interference all increase as frequency increases.” *Id.* at col. 19, ll. 14-16. Therefore, the specification recommends that the first channel be “placed as close to the voiceband as feasible.” *Id.* at col. 19, ll. 20-22. Yet, depending on the particular embodiment of the invention, the upper limit of the high frequency signals remains variable.

The fact that the upper limit of the term “high frequency” is not defined, however, does not render the term indefinite, at least where the purpose of the limitation is to distinguish between frequencies in a lower range and

those in a higher range. *See Halliburton Energy Servs., Inc. v. M-1 LLC*, 514 F.3d 1244, 1253 n.5 (Fed. Cir. 2008) (“Of course, a claim may contain a limitation that includes no explicit upper bound at all (e.g., a claim limitation that requires ‘at least 5%’ of an element). Since such a limitation does not contemplate an upper bound beyond what is practically required (e.g., the total percentage must be less than 100%), the limitation may not present definiteness concerns.”). The intrinsic evidence defines the lower limit of the high frequency band and thus makes the meaning of the term reasonably clear; the fact that the claim language, at least in theory, covers any frequency higher than that does not render the claim language indefinite, even though the use of very high frequencies would be impractical. We therefore uphold the district court’s conclusion that the defendants failed to show by clear and convincing evidence that the asserted claims are indefinite.

Finally, based on the prosecution history, the defendants argue that “high frequency band” must have a lower limit above 0.5 MHz, rather than above the 0.25 MHz level chosen by the district court. The defendants point to certain prior art references that the applicant distinguished during prosecution. The effect of the applicant’s discussion of those references, according to the defendants, was to disclaim frequencies below 0.5 MHz. That argument, however, does not go to indefiniteness; it goes to a claim construction issue that is not on appeal. If a disclaimer is ultimately found, the consequence may be to restrict the lower limit of “high frequency” covered by the patents-in-suit, but it would not affect the district court’s analysis of the indefiniteness issue.

III

We affirm the district court’s determination that the asserted claims are not indefinite, and we affirm the court’s grant of summary judgment of noninfringement as

to the central-office embodiments. We reverse the court's grant of summary judgment of noninfringement as to the remote-terminal embodiments and remand for further proceedings consistent with this opinion.

Each party shall bear its own costs for these appeals.

**AFFIRMED IN PART, REVERSED IN PART,
AND REMANDED**