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Paper 34
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARRIS GROUP, INC.,
Petitioner,

v.

TQ DELTA, LLC,
Patent Owner.

Case IPR2016-01160
Patent 8,611,404 B2

Before SALLY C. MEDLEY, TREVOR M. JEFFERSON, and MATTHEW R. CLEMENTS, *Administrative Patent Judges*.

CLEMENTS, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, ARRIS Group, Inc. ("Petitioner") challenges claims 1–20 ("the challenged claims") of U.S. Patent No. 8,611,404 B2 (Ex. 1001, "the '404 patent"), owned by TQ Delta, LLC ("Patent Owner"). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, Petitioner has not shown by a preponderance of the evidence that the challenged claims are unpatentable. Patent Owner's Motion to Exclude is *dismissed*.

A. Procedural History

Petitioner filed a Petition requesting an *inter partes* review of claims 1–20 of the '404 patent. Paper 1 ("Pet."). Patent Owner filed a Preliminary Response. Paper 7. On December 14, 2016, we instituted *inter partes* review of claims 1–20 of the '404 patent as unpatentable under 35 U.S.C. § 103(a)[1] over Bowie,[2] Vanzieleghem,[3] and ANSI T1.413.[4] Paper 8 ("Inst. Dec."), 16.

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[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. §§ 102 and 103. Because the '404 patent has an effective filing date before the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of 35 U.S.C. §§ 102 and 103.

[2] U.S. Patent No. 5,956,323; issued Sept. 21, 1999 (Ex. 1005) ("Bowie").

[3] U.S. Patent No. 6,246,725 B1; issued June 12, 2001 (Ex. 1006) ("Vanzieleghem").

[4] *Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface*, AMERICAN NATIONAL STANDARDS INSTITUTION (ANSI) T1.413-1995 STANDARD (Ex. 1009) ("ANSI T1.413").

Thereafter, Patent Owner filed a Patent Owner Response (Paper 16, "PO Resp."), to which Petitioner filed a Reply (Paper 17, "Reply"). Pursuant to an Order (Paper 22), Patent Owner filed a listing of alleged statements and evidence in connection with Petitioner's Reply it deemed to be beyond the proper scope of a reply. Paper 23. Petitioner filed a response to Patent Owner's listing. Paper 29.

We held a hearing on September 7, 2017, and a transcript of the hearing is included in the record. Paper 33 ("Tr.").

B. Related Proceedings

The parties indicate that the '404 patent is the subject of several district court cases. Pet. 1; Paper 6, 2–3; Paper 11.

C. The '404 patent (Ex. 1001)

The '404 patent discloses a method and apparatus for establishing a power management sleep state in a multicarrier system. Ex. 1001, 1:31–33. The '404 patent discloses an asynchronous digital subscriber loop (ADSL) system having a first transceiver located at the site of a customer's premises ("CPE transceiver") and a second transceiver located at the local central telephone office ("CO transceiver"). *Id*. at 3:62–67. The transceivers include a transmitter section for transmitting data over a digital subscriber line and a receiver section for receiving data from the line. *Id*. at 4:14–17. The transceivers further include a clock, controller, frame counter, and a state memory. *Id*. at 4:58–5:15. Typically, data is communicated in the form of a sequence of data frames, sixty-eight frames for ADSL, followed by a synchronization frame. *Id*. The sixty-nine frames comprise a "superframe." *Id*.

The power down operation of the CPE transceiver begins on receipt of a power-down indication. *Id*. at 6:27–30. The CPE transceiver responds to the power down indication by transmitting to the CO transceiver an "Intend to Enter Sleep Mode" notification. *Id*. at 6:39–42. The CO transceiver responds by transmitting an "Acknowledge Sleep Mode" notification to the CPE transceiver, and the CPE transceiver transmits an "Entering Sleep Mode" notification to the CO transceiver. *Id*. at 6:53–65. The CO transceiver detects the notification and transmits its own "Entering Sleep Mode" notification. *Id*. at 6:65–67. The CO transceiver stores its state in its own state memory corresponding to the state memory of the CPE transceiver. *Id*. at 6:67–7:2. The CO transceiver continues to advance the frame count and the superframe count during the period of power-down in order to ensure synchrony with the CPE transceiver when communications are resumed. *Id*. at 7:9–12. The CO transceiver further continues to monitor the subscriber line for an "Exiting Sleep Mode" notification, and the CPE transceiver transmits this signal when it receives an "Awaken" indication. *Id*. at 7:57–64. In response to the "Awaken" signal, CPE transceiver retrieves its stored state from state memory and restores full power to its circuitry. *Id*. at 7:64–66. CO Transmitter detects "Exit Sleep Mode" notification and restores its state and power. *Id*. at 8:1–4.

D. Illustrative Claim

Petitioner challenges claims 1–20 of the '404 patent. Pet. 22–58. Claims 1, 6, 11, and 16 are independent claims. Claim 6 is illustrative of the claims at issue and is reproduced below:

6. An apparatus comprising a transceiver operable to:

receive, in a full power mode, a plurality of superframes,

> wherein the superframe comprises a plurality of data frames followed by a synchronization frame;
>
> receive, in the full power mode, a synchronization signal; transmit a message to enter into a low power mode;
>
> store, in a low power mode, at least one parameter associated with the full power mode operation wherein the at least one parameter comprises at least one of a fine gain parameter and a bit allocation parameter;
>
> receive, in the low power mode, a synchronization signal; and
>
> exit from the low power and restore the full power mode by using the at least one parameter and without needing to reinitialize the transceiver.

Ex. 1001, 10:29–43.

II. ANALYSIS

A. Claim Construction

We interpret claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *see Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142–46 (2016). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. "transceiver"

In our Decision on Institution, we construed "transceiver" to mean "a communications device . . . capable of transmitting and receiving." Inst. Dec. 6–7. Neither party addressed this construction in subsequent briefing.

Based on the record developed during this proceeding, we continue to apply this construction.

2. synchronization signal"

Each independent claim recites a "synchronization signal." In our Decision on Institution, we adopted Petitioner's proposed construction of this term to mean "a signal allowing frame synchronization between the transmitter of the signal and the receiver of the signal." Inst. Dec. 6; Pet. 24. In support of this construction, Petitioner argues that the '404 patent discloses a "timing reference signal" that is "the only mechanism disclosed for synchronization (aside from that of the synchronization frame within the superframe)" and "is thus inferred to be representative of this claim limitation." Pet. 24. Petitioner argues that the '404 patent describes this timing reference signal as "synchroniz[ing the] frame counter of the CPE transceiver to the corresponding frame counter of the CO transceiver." *Id*. (quoting Ex. 1001, 5:50–52).

Patent Owner argues that our construction is incorrect, and proposes to construe this term to mean "an indication used to establish or maintain a timing relationship between transceivers." PO Resp. 19–24. Patent Owner agrees with Petitioner's reliance on the timing reference signal disclosed in the '404 patent, but argues that the timing reference signal provides for timing synchronization between two transceivers—i.e., to synchronize their respective clocks—not for frame synchronization—i.e., to detect the boundaries of the transmitted superframe. *Id.* at 20–21. According to Patent Owner, Petitioner's reliance on lines 50 to 52 of column 5 of the '404 patent is misplaced because that passage describes synchronizing the timing of the transceivers' respective frame counters—i.e., timing synchronization—not

detecting superframe boundaries—i.e., frame synchronization. *Id.* at 21–22. Patent Owner also argues that the recited "synchronization signal" cannot encompass frame synchronization because the claims separately recite a "synchronization frame," which provides frame synchronization. *Id.* at 21. Finally, Patent Owner argues that its proposed construction is correct because "signal" means "indication" and the timing reference signal described in the '404 patent establishes or maintains a timing relationship between transceivers. *Id.* at 23–24.

Petitioner, in its Reply, re-emphasizes lines 50 to 52 of column 5 of the '404 patent, and argues that "even if [Patent Owner's] construction is adopted, . . . such a signal is expressly disclosed by Vanzieleghem and the 1995 ADSL Standard." Pet. Reply 8–9.

Having considered the arguments and evidence, we agree with Patent Owner that our construction in the Decision to Institute is overly broad to the extent it encompasses a synchronization frame. Petitioner relies heavily on column 5, lines 50 to 52 of the '404 patent, but that disclosure does not unambiguously support Petitioner's proposed construction. The paragraph, which we reproduce below for context, describes "normal (non-sleep mode) operation":

> During normal (non-sleep mode) operation, a phase-lock loop (PLL) 62 receives from the FFT 56 a timing reference signal 62a (see FIG. 1A) via a line 62b. The timing reference signal 62a is transmitted from the transmitter with which the receiver 16 communicates (e.g., the CO transmitter). This signal is advantageously a pure tone of fixed frequency and phase which is synchronized with the Master Clock in the transmitter; its frequency defines the frame rate of the transceivers. Other forms of timing signal may, of course, be used, but use of a pure tone has the advantage of simplicity and reliability even when

> portions of the transceiver are powered down in accordance with the invention. The PLL 62 locks itself to this signal and drives clock 30 in synchronism with the Master Clock in the driving transmitter. *This also synchronizes frame counter 34 of the CPE transceiver to the corresponding frame counter of the CO transceiver.* Control of the receiver section is provided by the controller 32.

Ex. 1001, 5:37–53 (emphasis added to 5:50–52). Rather than read "this" as referring to timing reference signal 62a, as Petitioner contends, we read "this" as referring to what is disclosed in the preceding sentence—i.e., driving clock 30 in synchronism with the Master Clock in the driving transmitter. The synchronism of clock 30 with the Master Clock in the driving transmitter is what "synchronizes frame counter 34 of the CPE transceiver to the corresponding frame counter of the CO transceiver." Ex. 1001, 5:50–52.

We also agree with Patent Owner that a "synchronization signal" should not be construed to encompass a synchronization frame because the claims separately recite a "synchronization frame." Claim 6, for example, recites:

> receive, in a full power mode, a plurality of superframes, wherein the superframe comprises a plurality of data frames followed by a *synchronization frame*;
>
> receive, in the full power mode, *a synchronization signal*;

Ex. 1001, 10:30–33 (emphases added). If we were to construe "synchronization signal" to encompass a synchronization frame, the step of "receive, in full power mode, a synchronization signal" would be duplicative because a synchronization frame would have been received, in full power mode, when "receiv[ing], in full power mode, a plurality of superframes." *Id*. "A claim construction that gives meaning to all the terms of the claim is

preferred over one that does not do so." *Merck & Co. v. Teva Pharms. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Circ. 2005).

Notwithstanding our agreement with Patent Owner that "synchronization signal" should not encompass a synchronization frame, we are not persuaded that Patent Owner's proposed construction is correct because it also is overly broad. Whereas our preliminary construction preserved "signal," Patent Owner's proposed construction replaces "signal" with the more general "indication." And whereas our preliminary construction required "allowing frame synchronization between the transmitter of the signal and the receiver of the signal," Patent Owner's proposed construction replaces that with the more general "used to establish or maintain a timing relationship between transceivers." Patent Owner does not even attempt to find support in the '404 patent for "timing relationship," relying instead upon the testimony of its declarant. PO Resp. 23–24 (citing Ex. 2001 ¶ 55). Moreover, "timing relationship" is arguably broad enough to encompass the timing of superframe boundaries and, therefore, encompass the very frame synchronization that Patent Owner tries to distinguish. Because Patent Owner's construction lacks support in the Specification and would encompass the very synchronization frame that we are persuaded should be excluded, we determine that Patent Owner's proposed construction also is overly broad.

Because both parties agree that timing reference signal 62a corresponds to the recited "synchronization signal" and because the only purpose disclosed for timing reference signal 62a is being used, by PLL 62, to "drive[] clock 30 in synchronism with the Master Clock in the driving transmitter," we determine that "synchronization signal" means "a signal

allowing synchronization between the clock of the transmitter of the signal and the clock of the receiver of the signal."

3. "parameter associated with the full power mode operation"

Patent Owner proposes construing this term to mean "parameter associated with the transmission and/or reception of data during normal operation." PO Resp. 24. The '404 patent describes storing a list of parameters comprising the "state" of transceiver. Ex. 1001, 6:67–7:9. Patent Owner argues that this list "includes only communication protocol-specific parameters that are used for the transmission of data and does not include loop characteristics." PO Resp. 25.

Petitioner counters that the term should have its ordinary and customary meaning. Pet. Reply 10. Petitioner also argues that this phrase is not limited to "communication protocol-specific parameters that are used for the transmission of data" as Patent Owner contends because the portion of the '404 patent on which Patent Owner relies is merely illustrative. *Id.* Petitioner further argues that Patent Owner's proposal to limit this term to transmission parameters is inconsistent with arguments elsewhere in its Patent Owner Response. *Id.* at 10–11.

Having considered the arguments and evidence, we are not persuaded that this term requires an express construction. Patent Owner's proposed construction merely replaces "full power mode operation" with "transmission and/or reception of data during normal operation." The parties, however, do not dispute the meaning of "full power mode operation." As a result, an express construction of this term is not necessary in order to resolve the parties' dispute.

B. Level of Ordinary Skill in the Art

Petitioner contends that a hypothetical person of ordinary skill in the art, with respect to and at the time of the'404 patent, would have (1) "a bachelor's degree to a master's degree in electrical engineering or a related field, or an equivalent educational experience;" (2) "experience working in a relevant field ranging from at least three years with a bachelor's degree to fewer years of experience for with a more advanced degree;" and (3) "would have been familiar with the ANSI T1E1 standards and bodies and would have monitored their discussions to ensure that new products or services could comply with their mandates." Pet. 26.

Patent Owner contends that such a person would have had "a bachelor's degree in electrical engineering (or a similar technical degree or equivalent work experience) and at least 3 years of experience working with such multicarrier communication systems." PO Resp. 18–19.

We determine that no express finding on a specific corresponding level of technical education and experience is necessary. Here, the level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

C. Obviousness over Bowie, Vanzieleghem, and ANSI T1.413

Petitioner contends that claims 1–20 of the '404 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Bowie, Vanzieleghem, and ANSI T1.413. Pet. 27–46.

1. Principles of Law

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a

whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations). *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We analyze this asserted ground based on obviousness with the principles identified above in mind.

2. Bowie Overview

Bowie discloses a power conservation system for transmission systems in which data is modulated over a communications loop from a central office location to a customer premise. Ex. 1005, 1:4–8. Bowie discloses that to provision ADSL service, ADSL units are located at each end of a wire loop, a first ADSL unit at the customer premises (CPE) and a second ADSL unit at the telephone company central office (COT). *Id.* at 3:51–58. Data is arranged in a structure known as a "frame" prior to transmission. *Id.* at 3:66–67.

ADSL units enter a low power mode to reduce power requirements. *Id.* at 5:6–8. CPE unit initiates low power mode by sending a "shut-down" signal to the COT unit. *Id.* at 5:8–10. Both the CPE unit and COT unit may store loop characteristics that enable rapid resumption of user data transmission when units return to full power mode. *Id.* at 5:18–25. Each unit then enters low power mode by shutting off the now unnecessary

sections of the signal processing, transmitting, and receiving circuitry. *Id.* at 5:26–28. After shutdown, the loop is in an inactive state. *Id.* at 5:28–29.

The units return to full power mode after the CPE unit transmits to the COT unit a resume signal. *Id.* at 5:48–59. The stored loop characteristics are used to restore the loop parameters. *Id.* at 5:60–66.

3. Vanzieleghem Overview

Vanzieleghem discloses a transmitter that modulates a plurality of carriers with data received by the transmitter to derive symbols. Ex. 1006, 1:13–19. Vanzieleghem discloses an Asymmetrical Digital Subscriber Line (ADSL) transceiver unit located in the central office ATU-C. *Id.* at 4:46–52. Bits of data received are grouped into frames and the frames are transferred to coding circuit MMC. *Id.* at 5:39–44. Coding circuit MMC maps the frames to carriers and modulates the carriers to Discrete Multi-tone (DMT) symbols. *Id.* at 5:44–47. For every 68 DMT symbols transmitted on the communication line, a synchronization symbol is also transmitted. *Id.* at 5:53–54. The combination of the synchronization symbol and the 68 DMT symbols is considered a superframe. *Id.* at 5:62–65. After generating 256 superframes, coding circuit MMC generates a "line-monitoring superframe" that contains information used to measure the quality of transmission on the communication line. *Id.* at 5:66–6:4. The combination of 256 superframes and a line-monitoring superframe is considered a hyper-frame. *Id.* at 6:4–6.

4. ANSI T1.413 Overview

ANSI T1.413 discloses electrical characteristics of Asymmetric Digital Subscriber Line (ADSL) signals appearing at a network interface. Ex. 1009, Abstract. ADSL allows for the provision of Plain Old Telephone Service (POTS) and a variety of digital channels. *Id.* at 1. Digital channels

consist of full duplex low-speed channels and simplex high-speed channels in the direction from the network to the customer premises, and low-speed channels in the opposite direction. *Id.*

5. Analysis

Petitioner contends that a combination of Bowie, Vanzieleghem, and ANSI T1.413 would have rendered obvious claims 1–20 of the '404 patent. Pet. 27–46. We have reviewed the Petition, Patent Owner's Response, and Petitioner's Reply, as well as the relevant evidence discussed in those papers and other record papers, and are not persuaded that the record establishes Petitioner's contentions for claims 1–20.

Each independent claim recites a "synchronization signal." Claim 1 recites "transmit, in the full power mode, a synchronization signal." Claim 6 recites "receive, in the full power mode, a synchronization signal." Claim 11 recites "transmitting, in the full power mode, a synchronization signal." Claim 16 recites "receiving, in the full power mode, a synchronization signal."

For these limitations, the Petition relies upon Vanzieleghem's and ANSI T1.413's teachings of a synchronization frame within a superframe:

> Both Vanzieleghem and the 1995 ADSL Standard disclose signals for the purpose of providing frame synchronization. Ex. 1003 at ¶ 58, Ex. 1006 at 5:55-65, Ex. 1009 at 46-47, 113.

Pet. 37–38. The cited portion of Vanzieleghem discloses

> [t]o this end, at the occurrence of the 69th symbol, the data selector DS selects its second input SYNC to get the synchronization signals instead of the data from its first input DATA. As for the data, the synchronization signals are also grouped into frames by the data selector DS. The synchronization symbol derived from such a frame is used for performing framing synchronization between the transmitter TU

> and the receiver at the other end of the line. A set of N=68 DMT symbols (numbered from 0 to 67) and one synchronization symbol SS (numbered 68) form together a so-called "super-frame" SF as shown in FIG. 2.

Ex. 1006, 5:55–65. The cited portion of ANSI T1.413 discloses

> 6.9.3 Synchronization symbol
>
> The synchronization symbol permits recovery of the frame boundary after micro-interruptions that might otherwise force retraining.
>
> . . .
>
> Synchronization of the corresponding transmitter and receiver superframe counters is maintained using the synch symbol in the ADSL frame structure.

Ex. 1009, 46, 113.

Patent Owner argues that the synchronization frames of Vanzieleghem and of ANSI T1.413 do not teach a "synchronization signal." PO Resp. 45–48.

In the Reply, Petitioner relies upon the teaching of a pilot tone in Vanzieleghem and in ANSI T1.413. Pet. Reply 18–19. Patent Owner contends, in a paper filed with our authorization, that Petitioner's reliance upon a pilot tone in Vanzieleghem and in ANSI T1.413 is beyond the proper scope of a reply. Paper 23, 3. Petitioner counters that this is proper rebuttal to Patent Owner's argument that the synchronization frames of Vanzieleghem and in ANSI T1.413 do not teach the recited "synchronization symbol." Paper 29.

We agree with Patent Owner. The contentions in the Petition are based upon Petitioner's proposed construction of "synchronization signal" as encompassing a synchronization frame—i.e., "allowing for frame

synchronization." *See, e.g.*, Pet. 24, 37–38. We have not adopted that construction, however, for the reasons discussed above. Because our construction of "synchronization signal" excludes a synchronization frame, we are not persuaded that the argument and evidence in the Petition shows that the combination of Bowie, Vanzieleghem, and ANSI T1.413 teaches transmitting/receiving, in full power mode, a "synchronization signal." Moreover, we agree with Patent Owner that Petitioner's reliance, in the Reply, upon the teachings of a pilot tone in Vanzieleghem and ANSI T1.413 constitutes a change in theory and, therefore, is beyond the scope of a proper reply. Notwithstanding the mention of "a pilot tone" in paragraph 58 of Dr. McNally's declaration, the Petition itself unambiguously identifies the synchronization frame, not a pilot tone, as the recited "synchronization symbol." *See, e.g.*, Pet. 37–38 (citing Bowie's and ANSI T1.413's teachings of synchronization frame). We, therefore, do not address whether the pilot tone taught in Vanzieleghem and in ANSI T1.413 teaches the recited "synchronization signal."

As a result, Petitioner has not shown, by a preponderance of the evidence, that claims 1–20 would have been obvious over Bowie, Vanzieleghem, and ANSI T1.413.

D. Patent Owner's Motion to Exclude

Patent Owner filed a Motion to Exclude (Paper 25, "Motion"). Petitioner filed an Opposition to Patent Owner's Motion (Paper 30, "Opp."), and Patent Owner filed a Reply in support of its Motion (Paper 31). As movant, Patent Owner has the burden of proof to establish that it is entitled to the requested relief. *See* 37 C.F.R. § 42.20(c).

We decline to assess the merits of Patent Owner's Motion to Exclude. Even without excluding the identified evidence, we have concluded that Petitioner has not demonstrated, by a preponderance of the evidence, that the challenged claims are unpatentable. Accordingly, Patent Owner's Motion to Exclude is *dismissed* as moot.

III. CONCLUSION

Petitioner has not demonstrated, by a preponderance of the evidence, that claims 1–20 of the '404 patent are unpatentable under 35 U.S.C. § 103(a) over Bowie, Vanzieleghem, and ANSI T1.413.

IV. ORDER

Accordingly, it is

ORDERED that claims 1–20 of the '404 patent are not held *unpatentable*;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed*; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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