

United States District Court
For the Northern District of California

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN JOSE DIVISION

AERIELLE TECHNOLOGIES, INC.,)	Case No.: 10-CV-01301-LHK
)	
Plaintiff,)	ORDER CONSTRUING DISPUTED
v.)	CLAIM TERMS
)	
BELKIN INT’L, ET AL.,)	
)	
Defendants.)	
)	
)	

Plaintiff Aerielle Technologies, Inc. (“Aerielle”) brings suit against Defendants Belkin International, Inc., Best Buy Co., Inc., Bestbuy.com, LLC, Best Buy Stores, LP, and Radioshack Corporation (collectively “Defendants”) alleging infringement of two patents. The parties seek construction of nine terms used in the claims of those patents. The Court held a tutorial on June 27, 2011, and a claim construction hearing on June 29, 2011. The Court has reviewed the claims, specifications, and other relevant evidence, and considered the briefing, argument, and post-claim construction supplemental authority submitted by the parties. The Court now construes the terms at issue.

I. Background

This case concerns allegations of infringement of two United States patents: 1) U.S. Patent No. 5,777,441 (’441 patent), awarded on June 23, 1998; and 2) U.S. Patent No. 6,671,494 (’494 patent), awarded on December 30, 2003.

1 **A. Parties and Technology**

2 Aerielle was founded in 2001 in California, and markets itself as a leader in wireless audio
3 technology. Based on the five Defendants and the two patents at issue, Aerielle brings suit for ten
4 claims of patent infringement. Defendants have counterclaimed for declaratory relief of non-
5 infringement and invalidity.

6 The technology at issue centers on Aerielle’s patented wireless Radio Frequency (RF)
7 transmitters. Specifically, the ’441 and ’494 patents relate to Frequency Modulation (FM)
8 transmitter technology, which allows music on portable audio devices to be transmitted to a FM
9 radio system. In general, Aerielle’s patents claim a FM transmitter that modulates an audio signal
10 for transmission and receipt by a FM receiver. According to the parties, traditionally, FM
11 transmitters required a long antenna to allow sufficient transmission of audio signals – the antenna,
12 commonly a piece of wire protruding from the transmitter, acts as a conductor of the signal, and
13 thus, longer antennas (wires) would allow for greater radio efficiency.

14 The key insight in the Aerielle patents is to avoid protruding wires by utilizing the existing
15 “ground trace” (e.g., a strip of conducting metal on a circuit board) in the audio device as one part
16 of the antenna and the existing ground trace from the RF transmitter as the second part of the
17 antenna. This creates a dipole antenna with sufficient conductive material to convert RF signals to
18 electromagnetic waves for transmission to an FM receiver. Thus, Aerielle’s invention is a creative
19 engineering fix using existing circuitry to allow one to play music from an audio device (e.g., a CD
20 player or an iPod) onto an FM radio system at a lower frequency of 40 megahertz (MHz), while
21 also allowing one to receive music broadcast from a radio station in the FM broadcast band of 87.5
22 MHz to 108 MHz.

23 **B. Representative Claims**

24 The parties have identified representative claims from each of the ’441 and ’494 patents.
25 Specifically, Aerielle is asserting claim 13 of the ’441 patent, and claims 11 and 22 of ’494 patent.
26 Claim 13 of the ’441 patent reads as follows, with terms to be construed in bold:

27 13. A portable DC powered **RF transmitter unit** for use with an audio unit
28 including an audio circuit which supplies as an output an audio signal and including
an output jack having an audio output terminal for receiving the audio output signal

1 and a ground terminal connected to a ground trace of the audio unit, the **RF transmitter** unit comprising:

2 a housing made of any material including metal;

3 an **input plug** having an audio input terminal and a ground terminal, the **input plug**
4 being sized to mate with the output jack of the audio unit such that the audio output
5 and ground terminals of the output jack contact the audio and input and ground
6 terminals of the **input plug**, respectively, when the **input plug** and output jack are
7 mated;

8 an **RF transmitter** having an input terminal and first and second RF output
9 terminals and having a ground trace, the input terminal of the **RF transmitter** being
10 connected to the audio input terminal of the **input plug** when the **input plug** and
11 output jack are mated, said connection being via a frequency deviation control
12 network comprised of a voltage divider which divides and presents the reduced
13 voltage audio signal at a node and a preemphasis circuit comprising a resistor and
14 capacitor in parallel couple to said node and functioning to limit excursions of said
15 audio signal such that said input terminal of said **RF transmitter** receives an audio
16 signal which has been suitably conditioned to limit the resulting deviation of the FM
17 signal generated by said **RF transmitter** to the standard 75 kHz peak deviation used
18 by FM broadcast receivers so as to prevent distortion of the transmitted audio in a
19 standard broadcast band FM receiver, the first RF output terminal of said transmitter
20 being connected to the ground terminal of said **input plug** such that when said
21 **input plug** and output jack are mated, **the ground trace of the audio unit acts as**
22 **one radiating element of an antenna**, the second RF output terminal being
23 connected to the ground trace of the **RF transmitter unit**, the ground trace of the
24 **RF transmitter** acting as the other radiating elements of the antenna; and

25 an RF choke connected so as to isolate the two radiating elements of the **antenna**
26 from each other at the transmitting frequency of the **RF transmitter** but to act as a
27 low impedance path between the ground traces at audio frequencies.

18 Claim 11 of the '494 patent reads as follows, with terms to be construed in bold:

19 11. A system for use with an audio source for supplying audio signals at an output
20 jack, said output jack having a least first and second terminals, said audio source
21 having a signal ground conductor coupled to said first terminal, said audio signals
22 couple to said second terminal, comprising:

23 (a) an FM stereo **RF transmitter** having an RF output at which said **RF**
24 **transmitter** supplies as an output a modulated RF carrier and having an audio
25 plug sized to mate with said output jack, said RF transmitter having a signal
26 ground conductor and having left and right stereo audio inputs coupled to left
27 and right stereo audio outputs of said audio source by RF chokes and terminals
28 of said audio plug and said output jack when said audio plug is mated with said
output jack, said audio plug having a first terminal which makes electrical
contact with said first terminal of said output jack when said audio plug is mated
with said output jack, said first terminal of said audio plug coupled to said RF
output;

(b) a **dipole antenna** comprising said signal ground conductor of said audio source
as one element of said dipole and said signal ground conductor of said **RF**
transmitter as another element of said **dipole antenna**, said **dipole antenna**

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having a complex impedance which has a real component and an imaginary component;

- (c) **isolation means coupled between said first terminal of said audio plug of said RF transmitter and said signal ground conductor of said RF transmitter for electrically isolating the signal ground conductors of said RF transmitter and said audio source from each other at the frequency of said RF carrier but for electrically coupling said signal ground conductors of said RF transmitter and said audio source via a low impedance path at audio frequencies, and for canceling at least part of said reactive component of said antenna impedance so as to transform the impedance of said dipole antenna closer to a purely real impedance with a smaller reactive component;**
- (d) impedance transformation means coupled to said RF output for transforming said impedance of said **dipole antenna**, as modified by said isolation means, to an impedance which is a closer match to the complex conjugate of the output impedance of said **RF transmitter** at said RF output; and
- (e) **means for locking the frequency of transmission in the approximate middle of a stereo transmission band using a crystal controlled reference frequency such that enough of the energy in the Fourier spectrum of the FM stereo modulated carrier generated by the transmitter is within the IF filter passband of any receiver being used to receive the signal so as to reduce distortion to negligible levels.**

Claim 22 of the '494 patent reads as follows, with terms to be construed in bold:

22. A portable DC powered **RF transmitter unit** for use with an audio unit including an audio circuit which supplies as an output an audio signal and an output jack having an output terminal for receiving said audio signal and a ground terminal connected to a ground trace of said audio unit, said **RF transmitter unit** comprising:

- (a) a housing;
- (b) an **input plug** attached to said housing and having an input terminal and a ground terminal, said **input plug** being sized to mate with the output jack of the audio unit such that said output terminal and said ground terminals of said output jack contact with said input and said ground terminals of said **input plug**, respectively, when the **input plug** and output jack are mated;
- (c) a printed circuit board within said housing;
- (d) an **RF transmitter** mounted on said printed circuit board and having an input terminal and a first and a second RF output terminal, said input terminal of said **RF transmitter** being connected to said input terminal of said **input plug** for receiving said audio signal when said **input plug** and said output jack are mated;
 - (i) said first RF output terminal being connected to said ground terminal of said input jack are mated with **the ground trace of said audio unit acts as a radiating element of an antenna;**

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(ii) said second RF output terminal being connected to a ground trace of the **RF transmitter unit**, the ground trace of said **RF transmitter** acting as the other radiating elements of the **antenna**, said **RF transmitter** including a **phase lock loop for controlling the frequency of the transmitted signal so as to remain in the approximate center of a channel of limited bandwidth in which said transmitter transmits**; and

(e) an RF choke connected between said first and said second Rf output terminals and operable to isolate said two radiating elements of said **antenna** from each other at the transmitting frequency of said **RF transmitter**.

C. Agreed-Upon Constructions

The parties have agreed upon constructions for the following five terms:

- (1) “output jack:” a connector having at least one audio signal terminal and at least one ground terminal
- (2) “coupled:” joined to allow electric current to flow
- (3) “ground trace:” a printed circuit board conductor that acts as a ground
- (4) “voltage divider:” two or more impedances connected in series, to which a voltage is applied, and from which one or more voltages reduced by a known factor can be obtained
- (5) “connected:” in electrical contact.

D. Disputed Constructions

The case is currently before the Court for construction of the following nine¹ disputed claim terms:

- (1) “RF transmitter/RF transmitter unit” – ’441 patent, claim 13 and ’494 patent, claims 11 and 22
- (2) “input plug” – ’441 patent, claim 13
- (3) “antenna” – ’441 patent, claim 13 and ’494 patent, claim 22
- (4) “dipole antenna” – ’494 patent, claim 11

¹ The parties originally had ten disputed claim terms, but, in their claim construction briefing, informed the Court that they agreed upon a construction for the term “connected” as “in electrical contact.”

- 1 (5) “the ground trace of the audio unit acts as one radiating element of an antenna” and “the
2 ground trace of said audio unit acts as a radiating element of an antenna” – ’441 patent,
3 claim 13 and ’494 patent, claim 22
- 4 (6) “said signal ground conductor of said audio source as one [radiating] element of said
5 dipole [antenna]” – ’494 patent, claim 11
- 6 (7) “isolation means coupled between said first terminal of said audio plug of said audio
7 transmitter and said signal ground conductor of said RF transmitter for electrically
8 isolating the signal ground conductors of said RF transmitter and said audio source from
9 each other at the frequency of said RF carrier but for electrically coupling said signal
10 ground conductors of said RF transmitter and said audio source via a low impedance
11 path at audio frequencies, and for canceling at least a part of said reactive component of
12 said antenna impedance so as to transform the impedance of said dipole antenna closer
13 to a purely real impedance with a smaller reactive component” – ’494 patent, claim 11
- 14 (8) “means for locking the frequency of transmission in the approximate middle of a stereo
15 transmission band using a crystal controlled reference frequency such that enough of the
16 energy in the Fourier spectrum of the FM stereo modulated carrier generated by the
17 transmitter is within the IF filter passband of any receiver being used to receive the
18 signal so as to reduce the distortion to negligible levels” – ’494 patent, claim 11
- 19 (9) “phase lock loop for controlling the frequency of the transmitted signal so as to remain
20 in the approximate center of a channel of limited bandwidth in which said transmitter
21 transmits” – ’494 patent, claim 22

22 II. Legal Standards

23 A. Claim Construction

24 Claim construction is a question of law to be determined by the Court. *Markman v.*
25 *Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc), *aff’d* 517 U.S. 370 (1996).
26 “Ultimately, the interpretation to be given a term can only be determined and confirmed with a full
27 understanding of what the inventors actually invented and intended to envelop with the claim.”
28 *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (quoting *Renishaw PLC v. Marposs*

1 *Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)). Accordingly, a claim should be
2 construed in a manner that “stays true to the claim language and most naturally aligns with the
3 patent’s description of the invention.” *Id.*

4 In construing disputed terms, the court looks first to the claims themselves. “It is a
5 ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the
6 patentee is entitled the right to exclude.’” *Id.* at 1312 (quoting *Innova/Pure Water, Inc. v. Safari*
7 *Water Filtration Systems, Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). Generally, the words of a
8 claim should be given their “ordinary and customary meaning,” which is “the meaning that the
9 term would have to a person of ordinary skill in the art in question at the time of the invention.” *Id.*
10 at 1312-13. In some instances, the ordinary meaning to a person of skill in the art is clear, and
11 claims construction may involve “little more than the application of the widely accepted meaning
12 of commonly understood words.” *Id.* at 1314. In many cases, however, the meaning of a term to a
13 person skilled in the art will not be readily apparent, and the court must look to other sources to
14 determine the meaning of the term. *Id.*

15 The meaning of a term may be illuminated by the context in which it is used in an asserted
16 claim, or by usage of the term in related claims. *Id.* Importantly, however, “the person of ordinary
17 skill in the art is deemed to read the claim term not only in the context of the particular claim in
18 which the disputed term appears, but in the context of the entire patent, including the
19 specification.” *Id.* at 1313. Accordingly, claims “must be read in view of the specification, of
20 which they are a part.” *Id.* at 1315 (quoting *Markman*, 52 F.3d at 979). Indeed, the specification is
21 “always highly relevant” and “the single best guide to the meaning of a disputed term.” *Phillips*,
22 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir.
23 1996)). At the same time, the Federal Circuit has cautioned against limiting claims to the specific
24 embodiments of the invention. *Phillips*, 415 F.3d at 1323. A court “should also consider the
25 patent’s prosecution history, if it is in evidence.” *Id.* (quoting *Markman*, 52 F.3d at 980).

26 In addition to such intrinsic evidence, a court may rely on extrinsic evidence, such as
27 dictionaries and treatises, to shed light on the claimed technology. *Phillips*, 415 F.3d at 1317.
28 However, such evidence is considered “less significant than the intrinsic record” and “less reliable

1 than the patent and its prosecution history in determining how to read claim terms.” *Id.* at 1317-18
 2 (quotation marks and citation omitted). Ultimately, while extrinsic evidence may be useful in
 3 claim construction, “it is unlikely to result in a reliable interpretation of patent claim scope unless
 4 considered in the context of the intrinsic evidence.” *Id.* at 1319.

5 **B. Means-Plus-Functions Limitations**

6 A claim may be drafted in a “means-plus-function” format. *See* 35 U.S.C. § 112, ¶6 (“An
 7 element in a claim for a combination may be expressed as a means or step for performing a
 8 specified function without the recital of structure, material, or acts in support thereof, and such
 9 claim shall be construed to cover the corresponding structure, material, or acts described in the
 10 specification and equivalents thereof.”). Federal Circuit “precedent has established that ‘[a] claim
 11 limitation that actually uses the word ‘means’ will invoke a rebuttable presumption that § 112 P 6
 12 applies. By contrast, a claim term that does not use ‘means’ will trigger the rebuttable presumption
 13 that § 112 P 6 does not apply.’” *Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1319
 14 (Fed. Cir. 2004). “The party alleging that § 112, P 6 applies in the absence of a ‘means’ claim term
 15 can rebut this presumption if it demonstrates that the claim term fails to recite sufficiently definite
 16 structure or else recites a function without reciting sufficient structure for performing that
 17 function.” *See Apex Inc. v. Raritan Computer, Inc.*, 325 F.3d 1364, 1371-72 (Fed. Cir. 2003).

18 **III. Discussion**

19 **A. “RF transmitter/RF transmitter unit”**

Aerielle’s Construction	Defendants’ Construction
“a device which emits radio frequency signals”	“an RF transmitter unit with no <i>external</i> antenna” (emphasis on “external” added)

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 23 The first claim term in dispute is the phrase “RF transmitter/RF transmitter unit,” which
 24 appears in claim 13 of the ’441 patent and in claims 11 and 22 of the ’494 patent. The parties’
 25 argument over this term centers on whether “RF transmitter” should be construed to include only
 26 those RF transmitters having no external antenna. The parties, in both their extensive briefing and
 27 claim construction presentations, focused on the “no external antenna” limitation. Accordingly, the
 28 Court’s analysis focuses on construction of this central term.

1 Aerielle contends that the term should not have the “no external antenna” restriction, and
2 that its proposed construction is consistent with the understanding of a person of ordinary skill in
3 the art and with the patent specifications. For example, Aerielle cites to this language in the patent
4 abstracts: “The portable RF transmitter modulates audio signals from the audio source onto an FM
5 carrier and transmits them to an FM receiver mounted on a headset worn by a user.” *See* ’441
6 Patent Abstract; ’494 Patent Abstract. Moreover, Aerielle argues that part of the antenna in its
7 preferred embodiment is “external” to the FM transmitter because one part of the antenna is the
8 ground trace in the audio device, and such audio device is obviously “external” to the FM
9 transmitter. Thus, Aerielle contends that including a limitation for “no external antenna” would
10 improperly exclude its preferred embodiment.

11 Finally, Aerielle argues that the concept of having no external antenna is an “additional
12 benefit” of its claimed invention, but argues that the patents do not “clearly disavow” external
13 antennas in the specification or prosecution history. *See Conoco, Inc. v. Energy & Env’tl. Int’l,*
14 *L.C.*, 460 F.3d 1349, 1357-58 (Fed. Cir. 2006) (“an inventor may use the specification to
15 intentionally disclaim or disavow the broad scope of a claim. . . . However, this intention must be
16 clear.”). According to Aerielle, the patents’ specifications do not clearly and expressly disavow
17 transmitters with external antennas, but merely “eliminate the need for an external antenna.”
18 Similarly, Aerielle argues that the relevant prosecution history, an April 11, 1996 Petition to Make
19 Special in the file history of the ’441 patent and a Notice of Allowability from the prosecution
20 history of the ’441 patent, merely note an “added benefit” of “eliminating the need for an external
21 antenna,” but do not expressly or impliedly disavow external antenna altogether. *See* April 11,
22 1996 Petition to Make Special at 40, attached as Exh. C. to Gamal Decl. (describing the invention
23 as “eliminating the need for an external antenna”); *see also* December 16, 1997 Notice of
24 Allowability at 4-6, attached as Exh. 1 to Williamson Decl. in Support of Aerielle Reply (under
25 section “Reasons for Allowance,” noting that prior art fails to teach a RF transmitter with the
26 elements of the ’441 patent, but not mentioning the elimination of an external antenna as a factor in
27 the decision to allow the patent).

1 Defendants contend that the term should be limited to RF transmitters with no external
2 antenna based on a doctrine of implied disavowal or implied disclaimer. Unsurprisingly,
3 Defendants read the patent specifications differently than Aerielle. According to Defendants: (1)
4 the Patent Abstracts characterize the invention as “having no external antenna;” (2) the patent
5 specifications criticize prior art for having “large external antennas,” as distinguished from the
6 claimed inventions; and (3) the preferred embodiment of both patents also mentions “eliminating
7 the need for an external antenna.”

8 The Federal Circuit identified this dispute well when it wrote: “There is a fine line between
9 construing the claims in light of the specification and improperly importing a limitation from the
10 specification into the claims.” *See Retractable Techs., Inc. v. Becton*, 2011 U.S. App. LEXIS
11 13925, *20 (Fed. Cir. July 8, 2011). Here, the Court draws that fine line in Aerielle’s favor. There
12 is no dispute that the claims themselves do not disclaim, either expressly or impliedly, external
13 antennas. And, according to the experts for each side, RF transmitters, with and without external
14 antennas, are well-known in the field. Moreover, Aerielle’s construction is more consistent with
15 the use of “RF transmitters” in the two specifications, which refer to transmitters with and without
16 external antennas. *See Motorola, Inc. v. Nonin Med., Inc.*, 632 F. Supp. 2d 804, 809-812 (N.D. Ill.
17 2008) (in a circuit-design case, construing the term “electrode” as not being limited to “wireless
18 electrodes” where claims terms did not refer to “wireless electrodes” and criticism of prior art for
19 having wired electrodes did not amount to clear disavowal); *see also Phillips*, 415 F.3d at 1327
20 (“although the specification often describes very specific embodiments of the invention, we [the
21 Federal Circuit] have repeatedly warned against confining the claims to those embodiments.”).

22 The Federal Circuit has emphasized that a disavowal must be “clear and unmistakable” in
23 order for it to limit a term’s ordinary meaning, and that there is no such “clear and unmistakable”
24 disclaimer where the prosecution argument is subject to another reasonable interpretation. *See*
25 *Sandisk Corp. v. Memorex Prods.*, 415 F.3d 1278, 1287 (Fed. Cir. 2005) (“An ambiguous
26 disclaimer, however, does not advance the patent’s notice function or justify public reliance, and
27 the court will not use it to limit a claim term’s ordinary meaning. There is no ‘clear and
28 unmistakable’ disclaimer if a prosecution argument is subject to more than one reasonable

1 interpretation, one of which is consistent with a proffered meaning of the disputed term.”). Here,
2 the specification and prosecution history language regarding “no antenna” is ambiguous, and can
3 be read as announcing an added benefit of the invention rather than an implicit disclaimer. *See i4i*
4 *Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 844 (Fed. Cir. 2010) (refusing to import a limitation
5 where “[a]n examination of the prosecution history similarly reveals no statements that
6 unequivocally narrow the claims” and finding that “not every benefit flowing from an invention is
7 a claim limitation.”). In addition, criticism of prior art for “large external antennas” contains
8 similar ambiguity. Alleged disavowals in both the specifications and the prosecution history are
9 plausibly read to criticize prior art for the *size* of their external antenna.

10 Defendants, in a post-claim construction supplemental brief, point to the Federal Circuit’s
11 recent decision in *Retractable Technologies* as supporting its construction. Not so. In that case, a
12 2-1 decision with Chief Judge Rader in dissent, the Federal Circuit held that the district court erred
13 when it ruled that the claim term “body” was not limited to a “one-piece body” in light of the
14 specifications. *See Retractable Techs., Inc.*, 2011 U.S. App. LEXIS 13925, *19. The court
15 reasoned that: (1) the Summary of the Invention distinguished the claimed invention from the prior
16 art based on the prior art failing to recognize a one-piece body; (2) the patent specifications, in
17 describing the invention, expressly stated that the invention “features a one-piece body;” and (3)
18 each embodiment of the invention had only a one-piece body. *Id.* at *20. Here, however, the
19 Aerielle patents did not claim that the prior art failed to recognize wireless RF Transmitters, and, in
20 fact, cite to prior art that do have wireless antennas. *See, e.g.*, ’441 Patent at 2:28-29 (“U.S. Pat.
21 No. 4,344,184 teaches a wireless microphone not requiring external antenna.”); ’494 Patent at
22 3:10-11 (“A wireless headphone system is taught by in U.S. Pat. No. 4,845,751.”). In addition, the
23 Aerielle patents speak of “eliminating the need for an external antenna,” which is different, even if
24 only slightly different, than describing a “feature” of the invention as opposed to a benefit. Finally,
25 one embodiment of the ’494 patent, seen in Figure 14, contains a connecting “three conductor
26 cable” between the RF transmitter and the audio unit, a cable which is “external” to the RF
27 transmitter. These distinctions, combined with the patent claims, specifications, and prosecution
28 history, guide the Court toward Aerielle’s construction.

1 Accordingly, the Court construes “RF transmitter/RF transmitter unit” to mean **“a device**
2 **which emits radio frequency signals.”**

3 **B. “antenna”**

Aerielle’s Construction	Defendants’ Construction
Plain and ordinary meaning, or “a device used to radiate or receive electromagnetic waves”	“that part of a transmitting system that is <i>designed</i> to radiate electromagnetic waves” (emphasis on “designed” added)

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7 With respect to the term “antenna,” the main dispute is whether an antenna must be
8 “designed” to radiate. Aerielle claims that an antenna need not be designed to radiate, as, in fact,
9 the main thrust of the patented invention was to use wires not necessarily designed to radiate
10 electromagnetic waves (e.g., the ground traces) as antenna features. Aerielle also points to the
11 specification of the ’441 patent, which refers to “an antenna for radiation” to a headphone receiver
12 and to a headphone receiver set with a “small rod antenna.” ’441 Patent at 4:40-48. Finally,
13 Aerielle contends that its construction is consistent with the definition of “antenna” in the 1996
14 IEEE Standard Dictionary of Electrical and Electronic Terms (“IEEE Standard Dictionary”). *See*
15 *Exh. E*, attached to 1st Short Decl.

16 In Defendants’ view, Aerielle’s definition is inappropriate and overbroad because it could
17 include any conductive metal piece that happens to radiate electromagnetic waves. Instead,
18 Defendants contend that an antenna must be “designed to radiate electromagnetic waves,” or
19 otherwise, any piece of metal wire, even a necklace, could be claimed as an “antenna feature.”
20 Defendants have no intrinsic support for their construction. Rather, Defendants’ definition comes
21 from one, of many, definitions of “antenna” in the 1993 edition of the IEEE Standard Dictionary.
22 *See Exh. H*, attached to Defs.’ Claim Construction Brief.

23 The Court finds that Aerielle’s proposed construction of antenna as a “device used to
24 radiate or receive electromagnetic waves” is more persuasive in light of the patent specifications,
25 dueling dictionary definitions, and ordinary understanding of one skilled in the art. Defendants’
26 own expert concedes that, in his opinion, “one skilled in the art would have understood than an
27 ‘antenna’ should have a plain and ordinary meaning.” *See Decl. of H. Clark Bell, Ph.D, I/S/O*
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1 Defs.’ Claim Construction Brief (“Bell Decl.”) at ¶ 36. As Aerielle argues, the claim terms contain
2 absolutely no mention or reference to a “designed to” limitation with respect to antenna.
3 Moreover, the patents do refer to antennas that both radiate and receive electromagnetic waves.
4 For example, the patent specifications discuss antennas that radiate or receive electromagnetic
5 waves. *See* ’441 Patent at 4:40-45 and ’494 Patent at 4:22-28. And, as Aerielle’s expert, Dr. Short,
6 explains, the preferred embodiment of the devices described in the patent uses as its antenna
7 ground traces that were not “designed to” radiate electromagnetic waves. *See* Second Declaration
8 of Robert Short, Ph.D (“2nd Short Decl.”) at ¶¶ 17-18.

9 Significantly, the crux of the invention is that the device uses something that was clearly
10 not designed to be an antenna – the ground trace of an audio device – and uses it as an antenna for
11 design and efficiency purposes. The Defendants’ definition would thus improperly exclude the
12 preferred embodiment of the device as described in the specification. *See Phillips*, 415 F.3d at
13 1323 (cautioning against limiting claims to specific embodiments of the invention). In addition,
14 Defendants’ “designed-to” construction would complicate, and not illuminate, matters by adding
15 the unnecessary step of analyzing the designer’s intent with respect to the antenna features.
16 Nowhere do the patents mention design or designer’s intent in connection with an antenna.
17 Defendants’ concern that Aerielle’s definition is overbroad is unfounded. Aerielle’s definition still
18 requires that the antenna be “used to radiate.” Pieces of metal that happen to coincidentally be
19 radiating are not being “used to radiate” and so Aerielle’s construction would not cover just any
20 conducting metal or wire as part of the antenna.

21 Finally, in similar cases, numerous courts have construed “antenna” without requiring it to
22 be “designed to radiate.” *See, e.g., MHL TEK, LLC v. Nissan Motor Co.*, No. 2:07-CV-0289, 2009
23 U.S. Dist. LEXIS 77578, *38 (E.D. Tex. Aug. 28, 2009) (construing “antenna” as device for
24 radiating or receiving radio waves and rejecting “designed to” limitation); *Alien Tech. Corp. v.*
25 *Intermec, Inc.*, No. 3:06-CV-0051, 2008 U.S. Dist. LEXIS 118859, *24 (D.N.D. June 27, 2008)
26 (same); *Microsoft Corp. v. Commonwealth Scientific & Indus. Research Org.*, 572 F.Supp.2d 786,
27 800 (E.D. Tex., 2008) (same).

1 Accordingly, the Court construes “antenna” to mean **“a device used to radiate or receive**
2 **electromagnetic waves.”**

3 **C. “dipole antenna”**

Aerielle’s Construction	Defendants’ Construction
“an antenna having two radiating elements”	“an antenna having two radiating elements that <i>effectively</i> radiate radio waves” (emphasis added on “effectively”)

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7 As with the term “antenna,” Defendants contend that construction of this term requires use
8 of a modifier, namely that a dipole antenna must “effectively” radiate radio waves. Defendants’
9 proposed limitation is taken from the 1993 edition of the IEEE Standard Dictionary. Bell Decl.
10 ¶ 38. Defendants, however, face the same obstacle as explained by the Court above: the
11 “effectively” limitation appears in neither patent, nor does it appear in the IEEE Standard
12 Dictionary definition of “radiating element” from 1996, the year the ’441 patent was filed. Instead,
13 both patents explicitly define “dipole antenna” as “any antenna having two radiating elements.”
14 ’441 Patent 4:46-47; ’494 Patent 5:28-29. The Court gives greater weight to the definition of
15 dipole antenna in the patents’ specifications than to Defendants’ extrinsic evidence. *See Phillips*,
16 415 F.3d at 1317 (while acknowledging that extrinsic evidence “can shed useful light,” explaining
17 that extrinsic evidence is “less significant than the intrinsic record in determining ‘the legally
18 operative meaning of claim language.’”). Moreover, Defendants’ citation to the 1993 edition of the
19 IEEE Standard Dictionary is rebutted by Aerielle’s own extrinsic evidence of the definition of
20 “dipole antenna” in the 1996 edition.

21 Construction of the terms “antenna” and “dipole antenna” are significantly intertwined. In
22 both cases Defendants’ qualifiers (“designed to” and “effectively”) are less persuasive than the
23 intrinsic evidence. Accordingly, the Court construes “dipole antenna” to mean **“an antenna**
24 **having two radiating elements.”**

D. “the ground trace of the audio unit acts as one radiating element of an antenna” and “the ground trace of said audio unit acts as a radiating element of an antenna”

Aerielle’s Construction	Defendants’ Construction
“the ground trace of the audio unit acts as a conductor that emits radio frequency waves as part of an antenna”	“a ground trace <i>internal to the housing</i> of the audio unit that <i>effectively</i> radiates radio waves and serves as <i>one of only two</i> radiating elements of the antenna” (emphasis added in italics)

The parties agree that a “ground trace” should be construed to mean “a printed circuit board conductor that acts as a ground.” There are three disputes, however, over this claim term: (1) whether the audio unit’s ground trace should be limited to being part of an antenna with only two radiating elements; (2) whether the ground trace must be internal to the audio unit; and (3) whether the ground trace must effectively radiate radio waves. Aerielle contends that none of these limitations are appropriate.

i. One of only two radiating elements

Aerielle points to one reference in Claim 13 of the ’441 patent which states:

the ground trace of the audio unit acts as one radiating element of an antenna, the second RF output terminal being connected to the ground trace of the RF transmitter unit, the ground trace of the RF transmitter acting as the *other radiating elements* of the antenna.

’441 patent at 14:35-38 (italics added). According to Aerielle’s reading, the fact that “other radiating elements” is in the plural establishes that the ground trace may have more than two radiating elements.

The Court finds, however, that Defendants have the better of the argument in this regard. Defendants point to numerous instances in the patents that refer to “one” radiating element followed by “the other” element, a grammatical structure implying that there are only two radiating elements. *See, e.g.*, ’441 patent at 4:46-47 (“A dipole antenna as used herein includes any antenna having two radiating elements.”), at 11:50-53 (“a dipole antenna comprising said signal ground conductor of said audio source as one element of said dipole and said signal ground conductor of said RF transmitter as another element of said dipole antenna”), and at 12:43-46 (same); *see also* ’494 patent at 16:47-50 (“a dipole antenna comprising said ground conductor of said audio source as one element of said dipole and said signal ground conductor of said RF transmitter as another

1 element of said dipole antenna”). In addition, Defendants note that the Disclosure of the Invention
2 of the ’441 patent and the Summary of the Invention of the ’494 patent both specify that the present
3 invention uses a dipole antenna with two radiating elements. ’441 patent at 3:35-41; ’494 patent at
4 3:45-49. Simply put, every time the patents reference the ground traces acting as radiating
5 elements, there are only two radiating elements noted. *See Retractable Techs., Inc.*, 2011 U.S.
6 App. LEXIS 13925, *20 (limiting invention to “one-piece body” where every embodiment only
7 had a “one-piece body”).

8 Thus, the Court will adopt Defendants’ proposed limitation that the ground trace of the
9 audio unit act as one of only two radiating elements of the antenna.

10 **ii. Internal to the housing**

11 The Court parts ways with Defendants when it comes to the proposed limitation that the
12 ground trace should be “internal to the housing” of the audio unit. Even if Defendants are correct
13 that, as a practical matter, ground traces are generally internal to the housing of the audio unit, the
14 patent claims, specifications, or prosecution history do not require that the ground trace be internal
15 to the housing of the audio unit. In fact, there is no use of the language “internal to the housing”
16 anywhere in the patents. Defendants are correct that there is a diagram in which the ground trace
17 appears internal to the housing of the audio unit (e.g., ’441 patent, Figure 1), but that is simply a
18 diagram of the preferred embodiment. *See Phillips*, 415 F.3d at 1323 (cautioning against limiting
19 claims to specific embodiments of the invention).

20 At bottom, Defendants are re-fighting the “no external antenna” battle, which the Court has
21 already concluded in Aerielle’s favor. As analyzed more extensively above, Aerielle did not
22 expressly or impliedly disavow external antennas. Particularly since the design of the audio unit
23 (aside from the ground trace in the audio device) is not part of the patented invention, Defendants
24 have identified no persuasive reason to require, as a matter of claim construction, that the ground
25 trace be “internal” to the housing of the audio unit. Nor have Defendants defined how the term
26 “housing,” a term that is not itself one of the disputed constructions identified by the parties, should
27 be construed.
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iii. Effectively radiates

Both Aerielle and Defendants advance the same arguments with respect to the limitation “effectively radiates radio waves” as they did for the term “dipole antenna.” The Court has already determined that its construction will not include this limitation.

iv. Conclusion

Accordingly, the Court construes the term “the ground trace of the audio unit acts as one radiating element of an antenna” and “the ground trace of said audio unit acts as a radiating element of an antenna” as **“a ground trace of the audio unit that radiates radio waves and serves as one of only two radiating elements of the antenna.”**

E. “said signal ground conductor of said audio source as one [radiating] element of said dipole [antenna]”

Aerielle’s Construction	Defendants’ Construction
“a signal ground conductor of the audio source that emits radio frequency waves as part of a dipole”	“a signal ground conductor <i>internal to the housing</i> of the audio source that <i>effectively</i> radiates radio waves and serves as <i>one of only two</i> elements of the dipole antenna” (emphasis added in italics)

The arguments between the parties for this claim term are nearly identical to the arguments made with respect to the previous term under Section D. The only distinction for this term is that Aerielle concedes that it is appropriate to describe the radiating element as one of only two elements of the dipole antenna. Accordingly, and consistent with its construction of the prior analogous term in Section D, the Court will only adopt the limitation that the radiating element serve as “one of only two elements” of a dipole antenna.

Thus, the Court construes the term “said signal ground conductor of said audio source as one [radiating] element of said dipole [antenna]” to mean **“a signal ground conductor of the audio source that radiates radio waves and serves as one of only two elements of the dipole antenna.”**

F. “input plug”

Aerielle’s Construction	Defendants’ Construction
“a device that can be inserted into a jack to receive audio signals”	“a connector integral to the housing of the RF transmitter, the connector having at least one audio signal terminal and at least one ground terminal”

Aerielle argues that its proposed construction of “input plug” is how one of ordinary skill in the art would understand the term, and that its proposed construction is supported by the specification for the ’441 patent. Aerielle disputes Defendants’ “confusing” limitations that the input plug be “integral to the housing of the RF transmitter” and have at least one audio signal terminal and at least one ground terminal. According to Defendants, the Disclosure of the Invention of the ’441 patent describes the RF transmitter as “integrally formed with an audio input plug,” indicating that the input plug must be integral to the housing of the transmitter. ’441 patent at 3:35-41. Moreover, Defendants point to the April, 11, 1996 Petition to Make Special in the prosecution history of the ’441 patent, which describes a “battery operated transmitter integrally formed with an audio input jack.” See April 11, 1996 Petition to Make Special, attached as Exh. C. to Gamal Decl at 40.

The Court agrees with Aerielle and rejects the “integral to the housing” limitation for the term “input plug.” First, Claim 13 of the ’441 patent only refers to a RF transmitter comprising an input plug that is sized to mate with an output jack, and has no requirement as to whether or not the input plug is integral to the housing of the RF transmitter. See ’441 patent at 14:4-6. Thus, Defendants ask the Court to import a limitation from the preferred embodiment into the claim as a whole. However, the ’494 patent “Summary of the Invention” notes that in “some species, the transmitter is mounted in a casing which is integrally formed with an audio input jack,” but does not say that it is always integrally formed. See ’494 patent at 3:51-54.

Second, the language in the Disclosure of Invention section describing the transmitter as “integrally formed with an audio input plug” does not indicate that the input plug must be integral to the “housing of the transmitter.” Instead, the specification repeatedly describes an “input jack” as a device that plugs into a headphone or output jack. See, e.g., ’441 patent at 4:36-39 (an input plug “which plugs into the headphone or output jack”). In a recent opinion, Judge Ronald Whyte

1 considered how courts have used the terms “integral” and “integrally,” noting that these terms
2 usually relate to connecting (or making “contiguous”) two pieces to form a single unit. *See Sci.*
3 *Specialties Inc. v. Thermo Fisher Sci. Inc.*, 684 F. Supp. 2d 1187, 1191 (N.D. Cal. 2010)
4 (“Depending on the context, courts have construed the term “integral” to broadly mean forming a
5 unit or to narrowly refer to being formed in one piece.”). In the *Thermo Fisher* case, “integrally
6 formed” implied connecting two pieces, which comports more favorably with Aerielle’s proposed
7 construction of being able to insert the “input plug” into an “output jack,” rather than Defendants’
8 construction of requiring that the input be “integral to the housing of the transmitter.”
9 Furthermore, the December 16, 1997 Notice of Allowability for the ’441 patent, in a section
10 entitled “Reasons for Allowance,” only refers to the “transmitter comprising an input plug” which
11 mates with an output jack, without any requirement that input plug must be integrally formed with
12 the housing of the transmitter. *See* December 16, 1997 Notice of Allowability, attached as Exh. C.
13 to El Gamal Decl. at 152-57.

14 The Court, however, agrees with Defendants’ position that an input plug must have at least
15 one audio signal terminal and one ground signal terminal. Claim 13 of the ’441 patent itself
16 includes this express limitation. *See* ’441 patent at 14:6-8 (“an input plug having an audio terminal
17 and a ground terminal, the input plug being sized to mate with the output jack of the audio unit
18 such that the audio output and ground terminals of the output jack contact the audio input and
19 ground terminals of the input plug, respectively, when the input plug and output jack are mated”).
20 Moreover, as Defendants contend, because the input plug mates with the output jack, it is
21 reasonable to construe the term input plug as having at least one audio signal terminal and at least
22 one ground terminal since the parties agree that output jack means “a connector having at least one
23 audio signal terminal and at least one ground terminal.”

24 Accordingly, the Court construes the term “input plug” to mean **“a connector that can be**
25 **inserted into a jack to receive audio signals, the connector having at least one audio signal**
26 **terminal and at least one ground terminal.”**
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1 **G. “isolation means coupled between said first terminal of said audio plug of said**
 2 **audio transmitter and said signal ground conductor of said RF transmitter for**
 3 **electrically isolating the signal ground conductors of said RF transmitter and said**
 4 **audio source from each other at the frequency of said RF carrier but for**
 5 **electrically coupling said signal ground conductors of said RF transmitter and said**
 6 **audio source via a low impedance path at audio frequencies, and for canceling at**
 7 **least a part of said reactive component of said antenna impedance so as to**
 8 **transform the impedance of said dipole antenna closer to a purely real impedance**
 9 **with a smaller reactive component”**

Aerielle’s Proposed Corresponding Structure	Defendants’ Proposed Corresponding Structure
Coil 34	Coil 34 winding of tri-filar, single-core, common mode choke 48 illustrated in Figs. 3 and 4 and described in the ’494 Patents at 8:29-38

10
 11 The parties agree that this is a means-plus-function limitation and that the functions
 12 identified by this limitation are: “(1) electrically isolating the signal ground conductors of the RF
 13 transmitter and the audio source from each other at the frequency of the RF carrier, but electrically
 14 coupling the signal ground conductors of the RF transmitter and the audio source via a low
 15 impedance path at audio frequencies; and (2) canceling at least part of the reactive component of
 16 the antenna impedance so as to transform the impedance of the dipole antenna closer to a purely
 17 real impedance with a smaller reactive component.” The dispute is with respect to the
 18 corresponding structure that performs these two functions, namely, whether it is only one coil of
 19 the RF choke (e.g., Coil 34) or whether it is all three coils of the RF choke.

20 Figures 3 and 4 of the ’494 Patent illustrate an RF choke made up of three coils, identified
 21 in the Figures as Coils 34, 44 and 46. These three coils are all wound together around the same
 22 magnetically permeable core. Coils 44 and 46 couple the audio signal input wires in the RF
 23 transmitter with the ring and tip of the audio input plug. Coil 34 connects the sleeve of the audio
 24 plug to the signal ground wire of the RF transmitter.

25 Aerielle contends that Coil 34 of the RF choke is the only structure that actually performs
 26 the first function (isolating the two signal ground conductors) and is identified as such in the
 27 specification. *See* ’494 Patent at 7:37-53 (“The coil 34 of the RF choke provides a low impedance
 28 path at audio frequencies . . . However, at the 88-108 MHz output frequency . . . coil 34 should be

1 selected to have a high impedance thereby electrically isolating the two ground traces such that
2 they can operate as the two electrically isolated elements of a short dipole antenna.”).
3 According to Aerielle, the other two coils of the RF choke do not perform the first function because
4 they are not connected to the ground traces and thus can neither couple nor isolate them.

5 Aerielle also argues that Coil 34 is the only structure that performs the second identified
6 function (transforming the impedance) and that it is identified as such in the specification. The
7 specification provides that “[b]y addition of the RF choke, the leakage inductance coupled to the
8 sleeve of the audio plug substantially cancels the capacitive reactance of the antenna structure . . .”
9 ’494 Patent at 8:57-61. Aerielle represents that coil 34 is the only part of the RF choke coupled to
10 the sleeve of the audio plug. Thus, Aerielle contends that it is only the leakage inductance of coil
11 34 that performs the second function, and only Coil 34 should be the corresponding structure.
12 Aerielle concedes that the phrase “leakage inductance” does refer to a type of inductance specific
13 to a single coil in settings where there are multiple coils, but it only actually relates to that single
14 coil. The other elements of the RF choke are necessary for coil 34 to operate correctly, but they are
15 better understood as supporting structure, not the structure that actually performs the function.

16 Defendants contend that the RF choke described in the ’494 specification consists of Coils
17 34, 44 and 46, along with a shared magnetic core. Thus, Defendants argue that the corresponding
18 structure is not simply Coil 34, but Coils 34, 44, and 46 together. With regard to the first disclosed
19 function, the specification discloses the RF choke as performing the isolation function, not just Coil
20 34, in discussing “the two ground conductors being connected at audio frequencies by a tri-filar RF
21 choke, but isolated from each other at RF frequencies by the RF choke.” *See* ’494 Patent at 48-50
22 (“Summary of the Invention”). As to the second function, the specification states that the leakage
23 inductance of the RF choke performs the impedance transformation function. *See* ’494 Patent at
24 8:33-37 (“The RF choke functions not only to isolate the two ground traces at RF frequency but
25 also the RF choke leakage inductance helps tune out some of the capacitive reactive impedance of
26 the short antenna structure.”). According to the Defendants, leakage inductance is a concept that
27 only makes sense by discerning the difference between the flux of two wires. Defendants’ expert
28 explains that leakage inductance is “[a] portion of the inductance of a winding that is related to a

1 difference in flux linkages in the two windings’ . . . Leakage inductance is a property of an inductor
2 (e.g. a choke) having multiple windings, but it is not a property of a single lumped inductor or
3 choke having only one winding.” Bell Decl. ¶ 10. Because it takes at least two wires to perform
4 the second function, Defendants argue that Coil 34 alone cannot be the corresponding structure.

5 The Court finds Defendants’ position that Coil 34 alone is insufficient structure to perform
6 the two identified functions more persuasive. Both parties agree that the specification links the
7 leakage inductance of the RF choke in some capacity to the impedance transformation function.
8 The Summary of the Invention clearly links leakage inductance to the second function, explaining
9 that “[o]ne key aspect of all species in the genus of the present invention is . . . to utilize the
10 leakage inductance of the RF choke to neutralize or partially offset the capacitive reactance of the
11 short dipole antenna. This transforms the impedance of the antenna structure into a principally real
12 axis impedance for better power transfer.” See ’494 patent at 3:62-4:3. The specification teaches
13 that it is the leakage inductance of the RF choke that performs this second function. Because the
14 specification identifies the leakage inductance as performing the second identified function, Coil
15 34 alone does not and cannot perform the second function. As Aerielle concedes, leakage
16 inductance is the product of multiple coils.

17 Accordingly, the corresponding structure for this means-plus-function limitation consists
18 of: **“Coils 34, 44, and 46 of the RF choke, made by winding tri-filar wire around a single core,
19 illustrated in Figs. 3 and 4 and described in the ’494 Patent at 8:29-38.”**

20 **H. “means for locking the frequency of transmission in the approximate middle of a**
21 **stereo transmission band using a crystal controlled reference frequency such that**
22 **enough of the energy in the Fourier spectrum of the FM stereo modulated carrier**
23 **generated by the transmitter is within the IF filter passband of any receiver being**
24 **used to receive the signal so as to reduce the distortion to negligible levels”**

Aerielle’s Proposed Corresponding Structure	Defendants’ Proposed Corresponding Structure
a phase locked loop	voltage controlled oscillator, loop filter, phase lock loop chip, processing device, illustrated in Fig. 10B

25 The parties agree that this term also consists of a means-plus-function limitation, where the
26 function identified is “locking the frequency of transmission in the approximate middle of a stereo
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1 transmission band using a crystal controlled reference frequency such that enough of the energy in
2 the Fourier spectrum of the FM stereo modulated carrier generated by the transmitter is within the
3 intermediate frequency filter passband of any receiver being used to receive the signal so as to
4 reduce distortion to negligible levels.” The dispute, as with the prior term, concerns the
5 corresponding structure.

6 Aerielle contends that “a phase locked loop” is the corresponding structure. The
7 description of the preferred embodiment in the specification of the ’494 patent identifies a phase
8 locked loop as the way to accomplish the identified function. *See* ’494 Patent at 11:49-52 (“The
9 solution to this problem is to digitally synthesize the RF carrier frequency using a phase locked
10 loop which is locked in phase to a crystal controlled reference so there is never any drift.”).
11 Aerielle argues that Defendants’ proposed corresponding structure is simply the preferred
12 embodiment for the claimed invention, but is not intended to limit the phase locked loop to a
13 specific design.

14 Defendants respond that the corresponding structure should be the specific embodiment of a
15 phase locked loop disclosed in the specification. Defendants claim that the specification does link
16 these specific elements to the function – the description of the preferred embodiment describes in
17 detail the elements of the specific phase locked loop used immediately after identifying the phase
18 locked loop as performing the identified function. *See* ’494 patent at 11:60-12:12. Therefore, the
19 specific embodiment of the phase locked loop can be identified as the corresponding structure to
20 the means-plus-function limitation. Moreover, Defendants continue, in order to overcome a
21 rejection for obviousness during prosecution of the ’494 Patent, the patentee explicitly
22 distinguished the ’494 Patent from prior art on the basis that its specific embodiment of a phase
23 locked loop differed from those taught by prior patents. According to Defendants, Aerielle thereby
24 limited its claim scope to its specific embodiment of a phase locked loop. Thus, the corresponding
25 structure should also be limited to the specific embodiment of a phase locked loop.

26 The Court agrees with Defendants. Aerielle twice limited the scope of its patent during
27 prosecution based on the specific embodiment of its phase locked loop in order to overcome
28 rejections of all of its claims in light of prior art that used a different phase locked loop. *See* Exh.

1 D to Gamal Decl. at 98 (patentee’s amendment in light of rejection of claims by examiner in
2 connection with ’494 patent). Specifically, Aerielle referenced the preferred embodiment of the
3 phase locked loop when explaining what distinguished the “claimed invention” from prior art.
4 After the first rejection for obviousness based on the disclosure of a phase locked loop in the *Leitch*
5 patent, Aerielle distinguished its phase locked loop from that of *Leitch* as follows:

6 On the other hand, the applicants in the present application teach a stabilizing
7 means that comprises a voltage controlled oscillator, a loop filter and a phase lock
8 loop chip with a microprocessor. The applicants claimed invention thus contains a
9 microprocessor element for signal processing within the phase locked loop . . .
 Additionally, efficiency of the system is achieved by elimination of *Leitch*’s
 product detector **82**, mixer **60** and the crystal filter **80** as part of the loop. Thus, the
 phase locked loop of *Leitch* is not the phase locked loop of the applicants.

10 Exh. D to Gamal Decl. at 98 (emphasis in original). Aerielle renewed these same
11 distinctions after a second rejection for obviousness, adding that “*Leitch* is directed to AM
12 Receivers and ‘systems for receiving single channel amplitude modulated signals
13 representing stereophonic program signals.’” *Id.* at 142 (emphasis in original). The PTO
14 subsequently allowed the ’494 Patent.

15 The statements made by Aerielle to the PTO in order to distinguish the ’494 Patent from the
16 *Leitch* patent constitute a clear disavowal of prior art phase locked loops. *See Cross Med. Prods.*
17 *v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1309 (Fed. Cir. 2005) (a structure disclosed in
18 the specification qualifies as the corresponding structure where “the specification or prosecution
19 history clearly links or associates that structure to the function recited in the claim.”). Aerielle
20 limited the scope of the phase locked loop in the ’494 Patent to one comprising “a voltage
21 controlled oscillator, a loop filter and a phase lock loop chip with a microprocessor” in order to
22 overcome the obviousness rejection. Consequently, Aerielle cannot now claim that the
23 corresponding structure to the means-plus-function limitation is a generic phase locked loop when
24 during prosecution it limited the claim scope to a specific embodiment of a phase locked loop.

25 The Court therefore construes the corresponding structure for this term as “**a voltage**
26 **controlled oscillator, loop filter, phase lock loop chip, processing device, illustrated in Fig.**
27 **10B of the ’494 patent.**”
28

I. “phase lock loop for controlling the frequency of the transmitted signal so as to remain in the approximate center of a channel of limited bandwidth in which said transmitter transmits”

Aerielle’s proposed construction	Defendants’ proposed construction
<p>Not means-plus-function, no construction needed.</p> <p>Alternately, “a circuit for synchronizing a variable local oscillator with the phase of a reference signal”</p>	<p>A means-plus-function limitation with: Function: “controlling the frequency of the transmitted signal so as to remain in the approximate center of a channel of limited bandwidth in which said transmitter transmits” Structure: “voltage controlled oscillator, loop filter, phase lock loop chip, processing device, illustrated in Fig. 10B”.</p> <p>Alternately, “a circuit, including a processing device, for synchronizing a variable local oscillator with the phase of a crystal reference signal”</p>

Aerielle contends that this phrase is not a means-plus-function limitation, and that no construction is necessary. The phrase does not use the word “means,” creating a rebuttable presumption that it is not a means-plus-function limitation. Additionally, a phase lock loop is a specific type of circuit. The Federal Circuit has held that specific types of circuits are presumptively not means-plus-function limitations. *See Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1320 (Fed. Cir. 2004) (“Thus, when the structure-connoting term ‘circuit’ is coupled with a description of the circuit’s operation, sufficient structural meaning generally will be conveyed to persons of ordinary skill in the art, and § 112 ¶ 6 presumptively will not apply.”); *Apex Inc. v. Raritrans Computer, Inc.*, 325 F.3d 1364, 1373 (Fed. Cir. 2003) (“[T]he term ‘circuit’ with an appropriate identifier such as ‘interface,’ ‘programming’ and ‘logic,’ certainly identifies some structural meaning to one of ordinary skill in the art.”) According to Aerielle, a phase lock loop is a well-known type of circuit for one of ordinary skill in the art, and the term thus conveys sufficiently definite structure. The term should therefore have its plain and ordinary meaning. If the term does require construction, Aerielle’s proposed definition comes from the 1996 edition of the IEEE Standard Dictionary.

Defendants claim that “phase lock loop” does not convey a sufficiently definite structure, and should consequently be construed as a means-plus-function limitation. They claim that the

1 term merely recites a function (locking the phase), and that there are multiple different structural
2 configurations that could be deemed a “phase lock loop.” Defendants also claim that, because
3 Aerielle had to distinguish its phase lock loop from prior art during prosecution, “phase lock loop”
4 does not convey sufficient structure. According to Defendants, the term should therefore be
5 considered a means-plus-function limitation, and its corresponding structure should be identified as
6 the specific embodiment of a phase lock loop described in the specification of the ’494 patent.

7 Even if the term is not a means-plus-function limitation, Defendants contend that it should
8 be limited to phase lock loops including a processing device for substantially the same prosecution
9 history reasons that Defendants advanced in the previous section for restricting the corresponding
10 structure. As Defendants reiterate, the ’494 Patent was only allowed because Aerielle
11 distinguished its phase locked loop from prior art, in part on the basis of its microprocessor. *See*
12 *El-Gamal Decl.*, Exh. D at 142 (“On the other hand, Applicant teaches a stabilizing means that
13 comprises a voltage-controlled oscillator, a loop filter and a phase lock loop chip with a
14 microprocessor. The Applicant’s claimed invention thus contains a microprocessor element for
15 signal processing within the phase locked loop.”) Defendants contend that this distinction during
16 prosecution amounted to a disavowal of phase lock loops without processing devices.

17 The Court finds that this is term should not be construed as a means-plus-function
18 limitation. “Means-plus-function claiming applies only to purely functional limitations that do not
19 provide the structure that performs the recited function.” *See Phillips*, 415 F.3d at 1311. Although
20 different configurations are feasible, a phase lock loop is not the “purely functional placeholder”
21 that *Phillips* requires to overcome the presumption against construing it as a means-plus-function
22 limitation. *Id.* As a specific type of circuit, the term conveys sufficient structural information.
23 Moreover, that the PTO initially rejected the ’494 Patent because “[i]t would have been obvious to
24 one of ordinary skill in the art to include a phase lock loop since the use of phase lock loops in RF
25 equipment is widely known for the purpose of locking or stabilizing an incoming frequency,” Exh.
26 D to Gamal Decl. at 123, reaffirms that phase lock loops are well-known structures to those of
27 ordinary skill in the art.
28

1 Nevertheless, as discussed previously, the patentee did limit the scope of the phase lock
2 loop claimed in the '494 patent in order to overcome the USPTO rejection for obviousness.
3 Construction of the term “phase lock loop” must incorporate the distinction from prior art made
4 during prosecution. Although the patentee pointed to all of the component parts of the '494
5 patent’s phase locked loop to distinguish it from prior art, the patentee emphasized the
6 microprocessor in particular as characteristic of the claimed invention. By stating that “claimed
7 invention thus contains a microprocessor element for signal processing within the phase locked
8 loop,” El-Gamal Decl., Exh. D at 142, the patentee unequivocally disclaimed phase lock loops
9 without microprocessors.

10 Therefore, the Court construes “phase lock loop for controlling the frequency of the
11 transmitted signal so as to remain in the approximate center of a channel of limited bandwidth in
12 which said transmitter transmits” to mean “a circuit, including a processing device, for
13 synchronizing a variable local oscillator with the phase of a crystal reference signal.”

14 **IV. Conclusion**

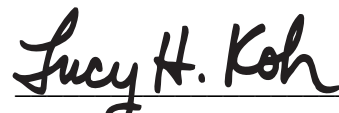
15 For the foregoing reasons, the Court construes the disputed terms as follows:

- 16 (1) “RF transmitter/RF transmitter unit” means “a device which emits radio frequency signals.”
- 17 (2) “antenna” means “a device used to radiate or receive electromagnetic waves.”
- 18 (3) “dipole antenna” means “an antenna having two radiating elements.”
- 19 (4) “the ground trace of the audio unit acts as one radiating element of an antenna” and “the
20 ground trace of said audio unit acts as a radiating element of an antenna” means “a ground
21 trace of the audio unit that radiates radio waves and serves as one of only two radiating
22 elements of the antenna.”
- 23 (5) “said signal ground conductor of said audio source as one [radiating] element of said dipole
24 [antenna]” means “a signal ground conductor of the audio source that radiates radio waves
25 and serves as one of only two elements of the dipole antenna.”
- 26 (6) “input plug” means “a connector that can be inserted into a jack to receive audio signals,
27 the connector having at least one audio signal terminal and at least one ground terminal.”
28

- 1 (7) “isolation means coupled between said first terminal of said audio plug of said audio
2 transmitter and said signal ground conductor of said RF transmitter for electrically isolating
3 the signal ground conductors of said RF transmitter and said audio source from each other
4 at the frequency of said RF carrier but for electrically coupling said signal ground
5 conductors of said RF transmitter and said audio source via a low impedance path at audio
6 frequencies, and for canceling at least a part of said reactive component of said antenna
7 impedance so as to transform the impedance of said dipole antenna closer to a purely real
8 impedance with a smaller reactive component” has a corresponding structure consisting of
9 “Coils 34, 44, and 46 of the RF choke, made by winding tri-filar wire around a single core,
10 illustrated in Figs. 3 and 4 and described in the ’494 Patent at 8:29-38.”
- 11 (8) “means for locking the frequency of transmission in the approximate middle of a stereo
12 transmission band using a crystal controlled reference frequency such that enough of the
13 energy in the Fourier spectrum of the FM stereo modulated carrier generated by the
14 transmitter is within the IF filter passband of any receiver being used to receive the signal
15 so as to reduce the distortion to negligible levels” has a corresponding structure consisting
16 of “a voltage controlled oscillator, loop filter, phase lock loop chip, processing device,
17 illustrated in Fig. 10B of the ’494 patent.”
- 18 (9) “phase lock loop for controlling the frequency of the transmitted signal so as to remain in
19 the approximate center of a channel of limited bandwidth in which said transmitter
20 transmits” means “a circuit, including a processing device, for synchronizing a variable
21 local oscillator with the phase of a crystal reference signal.”

22 **IT IS SO ORDERED.**

23
24 Dated: September 19, 2011



LUCY H. KOH
United States District Judge