UNITED STATES PATENT AND TRADEMARK OFFICE
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BEFORE THE PATENT TRIAL AND APPEAL BOARD
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INTEL CORPORATION,
Petitioner

v.

QUALCOMM INCORPORATED,
Patent Owner.
_____

Case IPR2019-00048
Patent 9,154,356 B2
_____

Before DANIEL N. FISHMAN, MICHELLE N. WORMMEESTER,
and AARON W. MOORE, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

DECISION
Instituting *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Intel Corporation ("Petitioner") filed a Petition for *inter partes* review of claims 1, 9, 10, 17, and 18 of U.S. Patent No. 9,154,356 B2 (Ex. 1101, "'356 patent").[1] Paper 3 ("Pet."). Qualcomm Incorporated ("Patent Owner") filed a Preliminary Response. Paper 7 ("Prelim. Resp.").

Institution of an *inter partes* review is authorized by statute when "the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a); *see* 37 C.F.R. § 42.108.

Having considered the Petition, the Preliminary Response, and the evidence of record, we conclude there *is* a reasonable likelihood that Petitioner will prevail in establishing the unpatentability of at least one challenged claim of the '356 patent and, therefore, institute *inter partes* review.

A. *Related Matters*

Petitioner filed two petitions in IPR2019-00128 (the "'128 petition") and IPR2019-00129 (the "'129 petition"), seeking *inter partes* review of claims 1–8, 10, 11, 17, and 18 of the '356 patent based on prior art different than that presented in this petition. We instituted reviews in those petitions on May 29, 2019.

Petitioner filed another petition, IPR2019-00047 (the "'047 petition"), seeking *inter partes* review of claims 1, 7, 8, 10, 11, 17, and 18 of the '356

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[1] Petitioner states that the real parties-in-interest are "Intel and Apple Inc." Pet. 1.

patent based on prior art different than that presented in this petition and the '128 and '129 petitions, and filed another petition, IPR2019-00049 (the "'049 petition"), seeking *inter partes* review of claims 2–8 and 11 of the '356 patent based on the same prior art presented in this petition.

The Petition states that Patent Owner "has asserted the '356 patent against Apple in *Certain Mobile Electronic Devices and Radio Frequency and Processing Components Thereof*, Investigation No. 337-ITC-1093, currently pending before the International Trade Commission" and "also has asserted the '356 patent against Apple in another currently pending case, *Qualcomm Inc. v. Apple Inc.*, No. 3:17-cv-02398 (S.D. Cal.)." Pet. 1. In updated mandatory notices filed in IPR2019-00128 on May 24, 2019, Petitioner advised the Board that the private parties to the 1093 ITC investigation have moved to terminate, and that the 17-cv-02398 District Court litigation has been dismissed.

B.   *The '356 Patent*

The '356 Patent is directed to "[l]ow noise amplifiers . . . supporting carrier aggregation." '356 Patent, Abstract. In the embodiment described in the Abstract, an "input RF signal includes transmissions sent on multiple carriers at different frequencies," a "first amplifier stage receives and amplifies [the input signal] and provides a first output RF signal to a first load circuit when the first amplifier stage is enabled," and a "second amplifier stage receives and amplifies the input RF signal and provides a second output RF signal to a second load circuit when the second amplifier stage is enabled." *Id*.

Figure 6A details an example of a low noise amplifier according to the '356 patent:
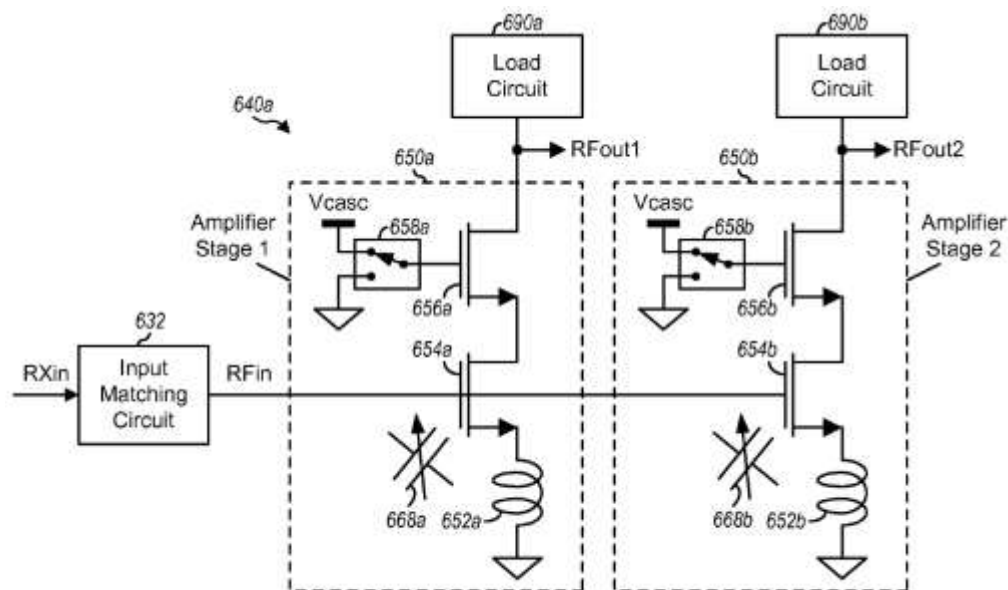

Figure 6A shows "an LNA with inductive degeneration and cascode shutoff." '356 Patent 1:54–55.

Amplifier stage 650a includes source degeneration inductor 652a, gain transistor 654a, cascode transistor 656a, and switch 658a. *See* '356 Patent 7:58–8:4. Similarly, amplifier stage 650b includes source degeneration inductor 652b, gain transistor 654b, cascode transistor 656b, and switch 658b. *See id.* at 8:4–9. Amplifier stages 650a and 650b are both coupled to common input matching circuit 632 and to respective load circuits 690a and 690b. *See id.* at 7:47–49.

In operation, matching circuit 632 receives receiver input signal RXin, performs input matching for low noise amplifier 640a, and provides input RF signal RFin to low noise amplifier 640a. *See* '356 Patent 7:49–52. Input RF signal RFin may include transmissions on one set of carriers or transmissions on two sets of carriers in the same band, with each set

including one or more carriers. *See id.* at 7:55–57, 8:16–18, 8:30–32. An
RF signal with transmissions on multiple sets of carriers is called a carrier
aggregated RF signal. *See id.* at 8:16–18.

Low noise amplifier 640a operates in either a non-carrier aggregation
(non-CA) mode or a carrier aggregation (CA) mode, depending on the type
of input RF signal it receives. *See* '356 Patent 8:24–32, 8:36–44. In the
non-CA mode, low noise amplifier 640a receives transmissions on one set of
carriers and provides one output RF signal to one load circuit. *Id.* at 8:30–
32. Only one amplifier stage is enabled, while the other amplifier stage is
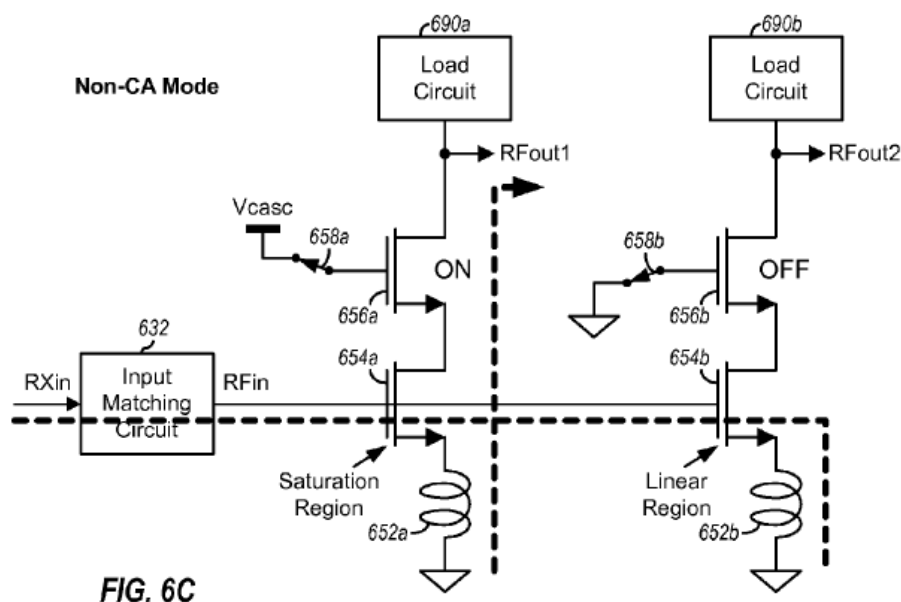disabled. *See id.* at 8:46–47. This is illustrated in Figure 6C:

FIG. 6C

*Figure 6C shows "an LNA with inductive degeneration
and cascode shutoff." '356 Patent 1:54–55.*

Amplifier stage 650a is enabled by connecting the gate of cascode transistor
656a to the Vcasc voltage via switch 658a, and amplifier stage 650b is
disabled by shorting the gate of cascode transistor 656b to circuit ground via
switch 658b. *See* '356 Patent 8:47–52. Amplifier stage 650a amplifies the

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