UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., and

SAMSUNG ELECTRONICS AMERICA, INC.,

Petitioners,

v.

ICASHE, INC.,

Patent Owner.

Case IPR2025-00640

Patent No. 9,483,722

PATENT OWNER'S PRELIMINARY RESPONSE

UNDER 35 U.S.C. §313 AND 37 C.F.R. §42.107

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I. PRELIMINARY STATEMENT

Pursuant to 37 C.F.R. § 42.107, Patent Owner iCashe, Inc. ("iCashe") submits this Preliminary Response to the Petition for *Inter Partes* Review ("IPR") of U.S. Patent No. 9,483,722 (the "'722 patent"). Paper 2 ("Petition"). Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, "Petitioners") challenge the validity of claims 1-14 of the '722 patent. For the reasons identified in Patent Owner's Memorandum in Support of Discretionary Denial, institution should be discretionarily denied pursuant to 35 U.S.C. § 314. Paper 7 ("Discretionary Denial Memorandum"). Namely, (1) the district court trial in the related litigation will precede a final written decision by five months; (2) Samsung waited more than nine months to file its petitions for *inter partes* review; (3) the district court denied Samsung's motion to stay and will likely reject a renewed motion; (4) *inter partes* review will not moot the district court proceedings; (5) the petition relies on extensive expert testimony; and (6) Samsung delayed challenging the '722 patent for more than eight years.

In addition to the reasons identified in Patent Owner's Discretionary Denial Memorandum, *inter partes* review should not be instituted because the Petition fails to establish a reasonable likelihood that any of the challenged claims are unpatentable. The references and combinations asserted in the Petition do not disclose all of the limitations of the challenged claims, as discussed below and

confirmed in the Declaration of Marc E. Levitt, Ph.D.—who worked as a POSITA in the field at the time of the inventions. Accordingly, Patent Owner requests that the Board deny institution of *inter partes* review.

II. FACTUAL BACKGROUND OF THE '722 PATENT

A. State of the Art at the Time of Invention

Devices that communicate using RF communications, such as near field communication (NFC) devices, traditionally operate in either a passive mode or an active mode. Ex. 1001 at 1:13-14; Ex. 2031, ¶ 34. A passive RF device is characterized by the fact that it does not generate its own RF field; it relies instead upon an interrogating RF field generated by an active device. Ex. 1001 at 1:22-24; Ex. 2031, ¶ 35. To communicate with the active device, the passive device modulates and reflects back the signal received from the active device. Ex. 1001 at 1:22-27; Ex. 2031, ¶ 35. Passive devices are typically not powered. Ex. 1001 at 1:22; Ex. 2031, ¶ 35. Instead, the passive device builds a charge from the active device's signal in order to modulate and return the active device's signal. Ex. 1001 at 1:22-27; Ex. 2031, ¶ 35.

In contrast to passive devices, active devices are typically connected to a power source and generate an RF signal. Ex. 1001 at 1:14-15; Ex. 2031, ¶ 36. An active device communicates by transmitting its own generated signal to another

device, rather than modulating a received signal. Ex. 1001 at 1:15-17; Ex. 2031, ¶ 36.

Active and passive RF devices communicate differently. Ex. 2031, ¶ 37. When a passive device communicates with an active device, the active device continuously generates an RF signal and the passive device modulates and reflects back the same signal. *Id.* When two active devices communicate, the devices must alternate their transmissions, such that one device receives while the other device transmits. *Id.* A device cannot both listen and transmit simultaneously. *Id.*

B. Overview of the ’722 Patent

The inventors of the ’722 patent claims created a new mechanism for contactless, secure payments that would interface with existing smartcard infrastructure and allow consumers to make smartcard payments using their mobile phones. Ex. 2031, ¶ 38. The inventors of the ’722 patent sought to incorporate smartcard functionality into a mobile device, thereby allowing users to make contactless radio (RF)-based payments without the need to carry a separate smartcard. *Id.* They achieved this by developing, *inter alia*, “performance enhancement circuits” that would allow the phone to operate as an active RF device, but to interface with existing smartcard point-of-sale infrastructure by appearing to the point-of-sale reader as a passive RF device. *Id.*

The ’722 patent, entitled “Amplifier and Transmission Solution for 13.56MHz Radio Coupled to Smartcard Controller,” was filed as U.S. Pat. App. No. 14/517,575 on October 17, 2014. The ’722 patent claims priority to the original patent in the priority chain, U.S. Pat. No. 7,961,101, the application for which was filed on Aug. 8, 2008 as U.S. Pat. App. No. 12/188,346.

The Petition challenges 14 claims of the ’722 patent: three independent claims (claims 1, 5, and 11) and 11 dependent claims (claims 2-4, 6-10, 12-14).

Claim 1 of the ’722 patent recites:

1. [preamble] A mobile device comprising:

[1.a] a smartcard controller that includes load modulation circuitry for half duplex communication by creating at least one frequency sideband about a carrier frequency of an interrogating radio frequency (RF) field;

[1.b] an antenna tuned to operate at 13.56 MHz; and

[1.c.1] at least one active circuit coupled between the smartcard controller and the antenna,

[1.c.2] wherein the at least one active circuit includes an amplifier coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller, and

[1.c.3] the at least one active circuit further includes a transmit circuit coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna.

Ex. 1001 at 19:40-56.

Claim 5 recites:

5. [preamble] A mobile device comprising:

[5.a] a smartcard controller that includes load modulation circuitry for half duplex communication by creating at least one frequency sideband about a carrier frequency of an interrogating radio frequency (RF) field;

[5.b] an antenna tuned to operate at 13.56 MHz;

[5.c] an amplifier coupled between the smartcard controller and the antenna, wherein the amplifier is coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller; and

[5.d] a transmit circuit coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna.

Ex. 1001 at 20:7-22.

Claim 11 recites:

11. [preamble] A mobile device comprising:

[11.a] a smartcard controller that includes load modulation circuitry for half duplex communication by creating at least one frequency sideband about a carrier frequency of an interrogating radio frequency (RF) field;

[11.b] an antenna tuned to operate at 13.56 MHz;

[11.c] an amplifier coupled to be powered by the mobile device, wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller; and

[11.d] an active transmit driver circuit coupled between the smartcard controller and the antenna, wherein the active transmit driver circuit is coupled to be powered by the mobile device.

Ex. 1001 at 20:36-49.

The inventions claimed in the '722 patent improved the process of effectuating smartcard transactions by integrating a smartcard controller into a mobile device, together with a small form factor antenna, by using performance enhancement circuits and other active circuitry coupled between the smartcard controller and the antenna. *See, e.g.*, Ex. 1001 at Abstract, 2:43-47, 19:40-20:6; Ex. 2031, ¶ 39. In developing this improvement, the '722 patent inventors sought to design a system that would interface with existing smartcard infrastructure. Ex. 1001 at 2:43-47; Ex. 2031, ¶ 40. Conventional point-of-sale smartcard readers are

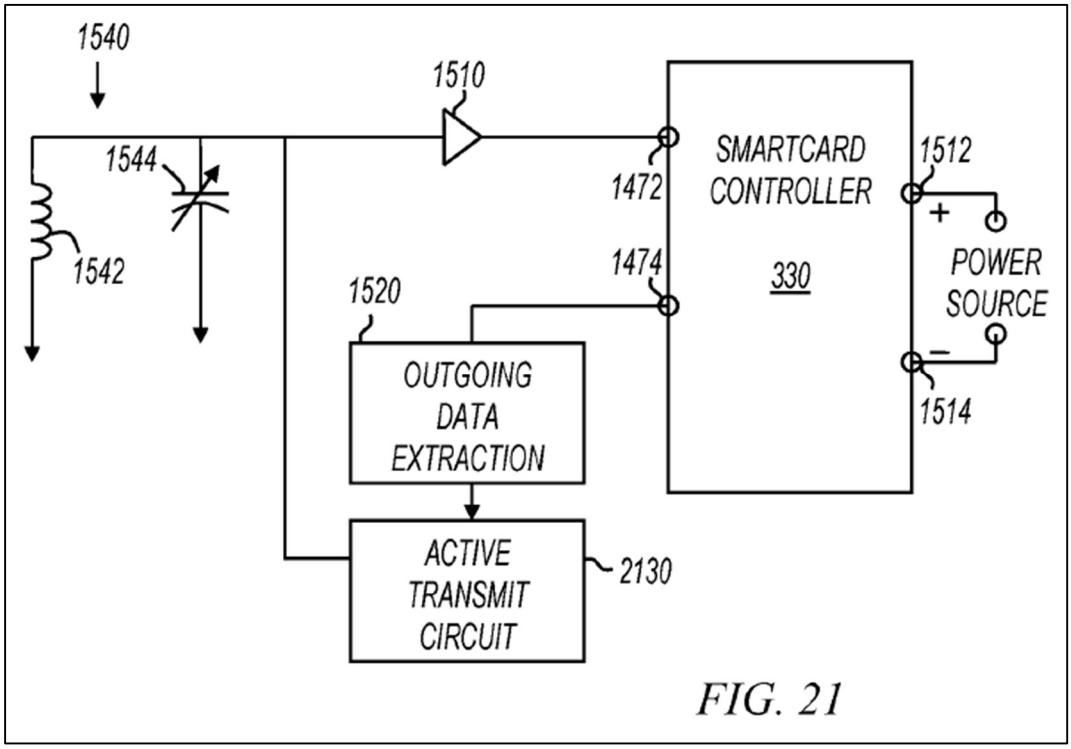
active devices that are configured to communicate with passive devices, such as conventional smartcards in the form of, e.g., credit cards. Ex. 2031, ¶ 40. Therefore, the '722 patent inventors sought to incorporate smartcard circuitry into a mobile device, e.g., a mobile phone, in a manner that could communicate in a passive mode with conventional smartcard readers. Ex. 1001 at 2:43-47; Ex. 2031, ¶ 40.

The '722 patent inventors faced unique challenges in implementing smartcard circuitry into a mobile phone. For example, mobile phones require a relatively small form factor, such that the antennas of traditional passive smartcards were too large. Ex. 1001 at 2:6-8; Ex. 2031, ¶ 41. As the specification of the '722 patent describes, prior to the '722 patent, "[t]here ha[d] been attempts to implement passive [RFID] tags into smaller mobile devices," such as mobile phones. Ex. 1001 at 2:6-8; Ex. 2031, ¶ 41. But those attempts were "met with limited success due in part to the size of the loop antenna" required. Ex. 1001 at 2:6-13; Ex. 2031, ¶ 41.

To overcome this problem, the '722 patent inventors created a device that modulates a received signal to communicate in a passive mode, but that does so by drawing upon an internal power source to ***actively***, rather than ***passively***, load modulate the received signal. Ex. 1001 at 9:8-10, 9:19-22, 10:24-28; Ex. 2031, ¶ 42. By relying on an internal power source and using active load modulation, the

'722 patent device can operate with a smaller antenna than those of traditional passive smartcards. Ex. 2031, ¶ 42.

The '722 patent device achieves this using performance enhancement circuits arranged within the phone between the smartcard controller and the antenna. *See, e.g.*, Ex. 1001 at 15:28-33; Ex. 2031, ¶ 43. The performance enhancement circuits include, e.g., an amplifier, load modulation circuitry, and active transmit driver circuitry, as shown for example in Figures 21 and 25, below. Ex. 1001 at 16:57-17:5, 17:30-36; Ex. 2031, ¶ 43.



Ex. 1001, Fig. 21; Ex. 2031, ¶ 43.

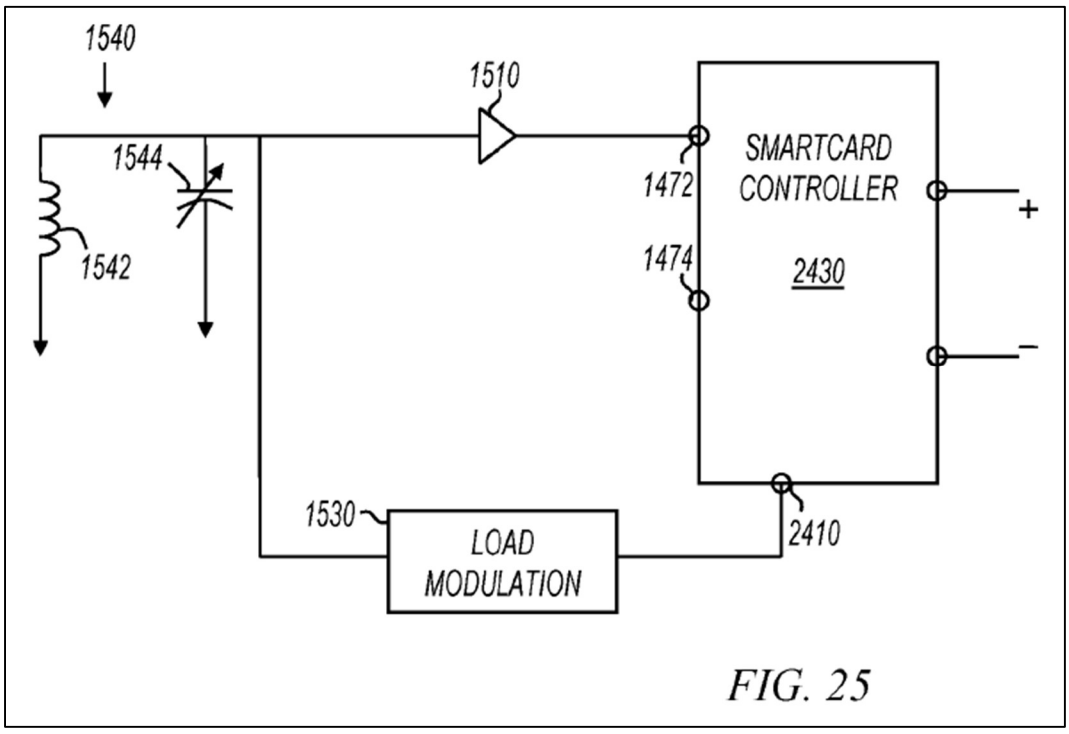


FIG. 25

Ex. 1001, Fig. 25; Ex. 2031, ¶ 43.

The amplifier, such as amplifier 1510 shown above in Figure 25, "amplifies the voltage received at antenna 1542, and the amplified voltage is provided to the smartcard controller." Ex. 1001 at 15:31-33; Ex. 2031, ¶ 44. The amplifier thereby "increases the maximum distance at which the RFID card can operate while receiving data." Ex. 1001 at 15:33-34; Ex. 2031, ¶ 44. Performance enhancement circuits also include an "active transmit driver circuit" or "active transmit circuit," as shown above in Figure 21, which includes "circuits to actively transmit a signal rather than simply load modulate tuned circuit 1540." Ex. 1001 at 16:57-17:2; Ex. 2031, ¶ 45. Additionally, performance enhancement circuits include a load modulating circuit, such as load modulation driver circuit 1530 shown in Figure

25. Ex. 2031, ¶ 46. Load modulation driver circuit 1530 "modulates the impedance of the tuned circuit 1540 to form the outgoing data path." Ex. 1001 at 15:48-50; Ex. 2031, ¶ 46.

Load modulation may be passive or active. Ex. 2031, ¶ 47. As the '722 patent describes, passive load modulation is "generally well known, and may be as simple as a switched transistor that adds and removes a reactive element" from the tuned circuit. Ex. 1001 at 15:67-16:3; Ex. 2031, ¶ 47. However, the '722 patent further discloses an active circuit for actively transmitting data. In particular, as noted above, the '722 patent describes that performance enhancement circuits may include an active transmit driver circuit. Ex. 1001 at 16:60-62, 20:46-49 (claim 11); Ex. 2031, ¶ 47. "Active transmit driver circuit 2130 may include circuits to actively transmit a signal rather than simply load modulate" a tuned circuit. Ex. 1001 at 16:63-65; Ex. 2031, ¶ 47. That is, rather than responding passively by modulating a received signal, the active transmit driver circuit 2130 actively generates a signal for communicating with another device. Ex. 1001 at 16:65-17:2; Ex. 2031, ¶ 47.

For example, Figure 16 illustrates a waveform of an interrogating RF signal, such as a signal produced by a point-of-sale device. Ex. 2031, ¶ 48. The waveform includes both a carrier frequency 1620 and two sidebands 1610 about the carrier frequency. Ex. 1001 at 15:52-55; Ex. 2031, ¶ 48. The '722 patent describes that, in

responding to an interrogating signal, such as that shown in Figure 16, rather than passively load modulating the received signal or actively generating a responsive signal, the active transmit driver circuit "***form[s] a signal that mimics the sidebands*** 1610" of the interrogating frequency "***as if the interrogating RF field experienced load modulation***." Ex. 1001 at 16:65-17:2; Ex. 2031, ¶ 48.

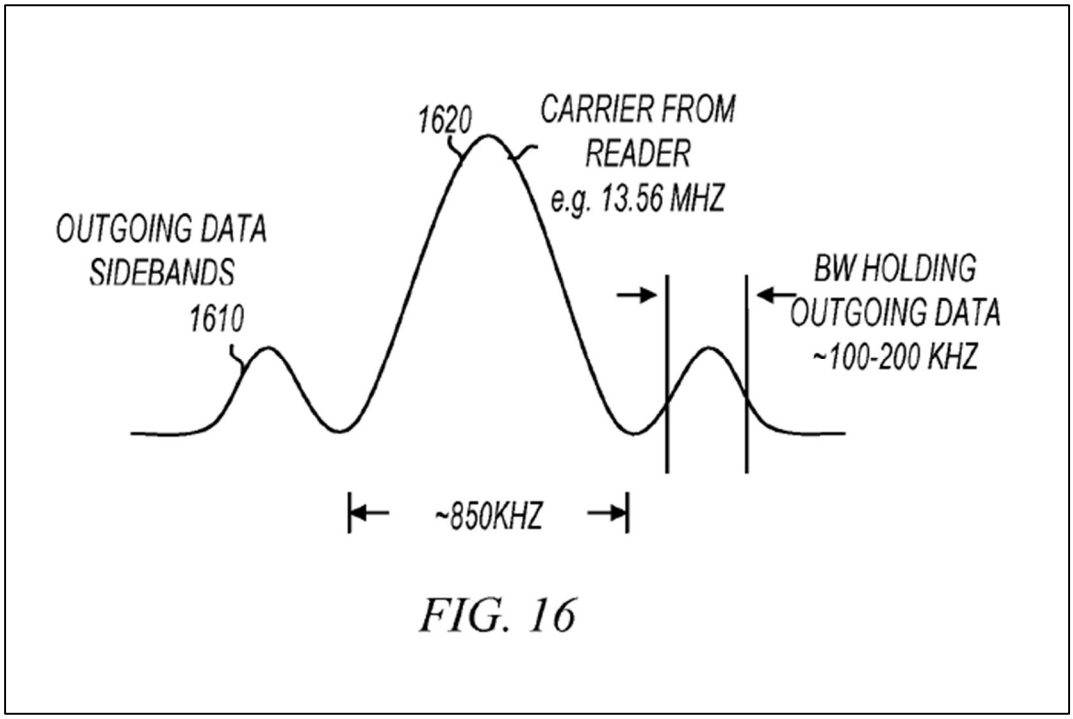


FIG. 16

Ex. 1001, Fig. 16. Thus, the active transmit driver circuit performs an active transmission but, by ***mimicking the sidebands of the interrogating frequency***, the transmission ***appears*** to other devices like a passive transmission. Ex. 2031, ¶ 49. By mimicking the sidebands and appearing to operate as a passive smartcard, the claimed mobile device of the '722 patent could readily interface with then-existing smartcard reader infrastructure, such as point-of-sale devices. *Id.*

The ’722 patent further describes that the smartcard controller and performance enhancement circuits draw power directly from the device’s own power source. Ex. 1001 at 9:8-10, 9:19-22, 10:24-28; Ex. 2031, ¶ 50. By relying on an internal power source, the smartcard controller and performance enhancement circuits can operate without requiring a conventionally large loop antenna that would otherwise be needed to build a high enough charge to power the components. Ex. 1001 at 9:8-10, 9:19-22, 10:24-28; Ex. 2031, ¶ 50. And thus, the circuitry can be provided in a small enough form factor for use in a mobile phone. Ex. 1001 at 9:33-39; *see also* Ex. 1001 at 17:2-5 (“Active transmission can make use of power available on the RFID card and can further increase the usable distance when smartcard controller 330 is transmitting.”); Ex. 2031, ¶ 50.

III. PRIORITY DATE OF THE ’722 PATENT

Patent Owner does not waive any argument regarding the priority date to which the claims are entitled. Pet. at 12-14. Patent Owner further reserves the right to later advance additional arguments.

IV. CLAIM CONSTRUCTION

Petitioners do not request construction of any claim terms from the ’722 patent. Pet. at 20-21. Indeed, none of these claims require express construction to deny institution. Therefore the claims should be given their ordinary and customary meaning in light of the specification and prosecution history, as

understood by a person of ordinary skill in the art. 37 C.F.R. § 100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).

V. PERSON OF ORDINARY SKILL IN THE ART

For the purposes of these preliminary proceedings, Patent Owner does not dispute the level of skill for a person of ordinary skill in the art ("POSITA"), other than Petitioner's assertion that a POSITA must have specific experience in "smartcards and contactless communications" rather than electronic devices more generally. Pet. at 20. But Patent Owner does not waive any argument regarding the proper level of skill.

VI. THE PETITION DOES NOT ESTABLISH A REASONABLE LIKELIHOOD THAT THE APPLIED REFERENCES RENDER THE CHALLENGED CLAIMS UNPATENTABLE

The Petition does not establish a reasonable likelihood that Finkenzeller, alone or in combination with Kerdraon, Koh, and/or Bangs, discloses all of the limitations of any '722 patent claim. Specifically, the Petition does not establish a reasonable likelihood that Finkenzeller alone (Ground 1) or in combination with Kerdraon (Ground 2) or Koh (Ground 3) discloses all of the limitations of any '722 patent claim. Nor does the Petition establish a reasonable likelihood that Finkenzeller in combination with Bangs (Ground 4), Finkenzeller in combination with Kerdraon and Bangs (Ground 5), or Finkenzeller in combination with Koh and Bangs (Ground 6), disclose all of the limitations of claim 8.

The Board should not institute trial because in all of Grounds 1-6, Finkenzeller alone and combined with Kerdraon, Koh, and/or Bangs does not disclose all of the limitations of any '722 patent claim.

The Board should not institute trial on any Ground.

A. The Petition Does Not Establish a Reasonable Likelihood that Finkenzeller With or Without Skill in the Art Renders Unpatentable Claims 1-14 (Ground 1).

The Petition has not demonstrated a reasonable likelihood of success that Petitioner will prevail on any claim challenged in Ground 1 for the reasons described in detail below.

1. Overview of Finkenzeller

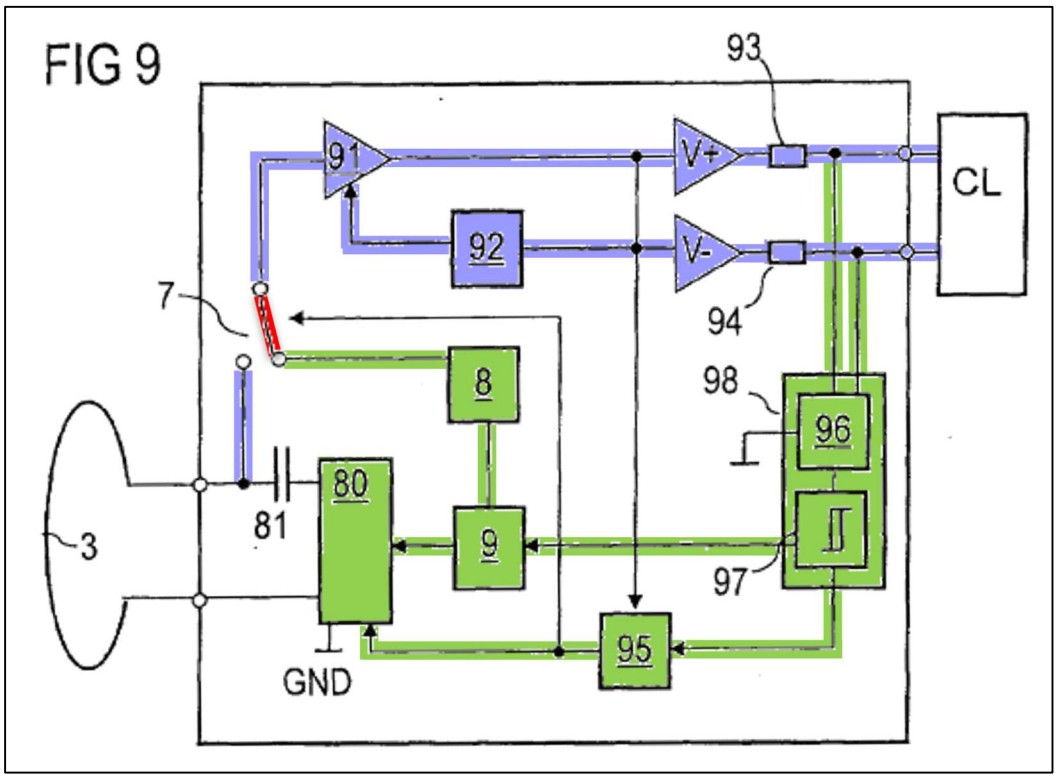
Petitioners primarily rely on U.S. Patent Application Publication 2009/0040022 to Finkenzeller, dated February 12, 2009 and entitled "Transponder Unit." (Ex. 1005, "Finkenzeller"). Finkenzeller is directed to an RFID "transponder unit" with "means integrated therein for actively sending a signal" to a reading device. Ex. 1005 (Finkenzeller), Abstract; Ex. 2031, ¶ 56. The transponder unit of Finkenzeller can operate in either of two modes, i.e., in an active mode or a passive mode: "The transponder unit 1 is operated in a ***first (active) operating mode*** as an actively sending transponder. In a ***second (passive) operating mode***, however, the transponder unit works like an ordinary passive

transponder performing a load modulation on the field of the reading device." Ex. 1005 at [0065] (emphasis added); Ex. 2031, ¶ 56.

Recognizing the limitations of data transfer over increasing distances, "[e]ven with active transponders," (Ex. 1005 at [0007]), the purported object of Finkenzeller is "to extend the range of data transfer in a system comprising a transponder reading device and a transponder unit compared to conventional systems with active or passive transponders." *Id.* at [0008]; Ex. 2031, ¶ 57. Finkenzeller explains, for example, that "a commercially available ISO 14443 reading device which can communicate with an inductively coupled, contactless chip card according to the prior art over a distance of approx. 10 cm could communicate with an inventive transponder unit over many times this distance." Ex. 1005 at [0017]; Ex. 2031, ¶ 58.

To facilitate the goal of communication over greater distances, Finkenzeller's transponder unit includes an energy supply, i.e., a battery: "To supply the active components of the transponder unit at least partly with energy and to increase the energy range between the transponder unit 1 and the reading device 100, the inventive transponder unit has a battery 2." Ex. 1005 at [0060]; *see also id.* at [0048] ("The transponder unit 1 thus uses its own energy for the purpose of data transfer."); Ex. 2031, ¶ 59.

Finkenzeller's transponder unit embodied in Figure 9, which is the embodiment the Petition focuses on, uses two branches of circuitry for providing receive and transmit functionality. Ex. 2031, ¶ 60. "The inventive active transponder unit has a ***receive branch*** and a ***transmit branch***. The ***receive branch*** consists of an antenna 3, an input amplifier 91, an automatic gain control 92 and an amplifier which is preferably designed as a push-pull amplifier (V+, V-). Further, a transponder chip CL is connected via its antenna connections to the push-pull amplifier." Ex. 1005 at [0106] (emphasis added); Ex. 2031, ¶ 60. "The ***transmit branch*** consists of a demodulation circuit 97 [*sic*, 98], a modulator circuit 9, an oscillator 8 (e.g. 13.56 MHz), a controller 95, and a transmitter amplifier 80 connected to the antenna 3. The demodulation circuit 98 can consist for example of a rectifier 96 and a threshold switch 97." Ex. 1005 at [0108] (emphasis added); Ex. 2031, ¶ 60. The ***receive branch*** and the ***transmit branch***, and the subcomponents of each, are depicted in the colorized version of Figure 9 below. Ex. 2031, ¶ 60.



Ex. 1005, Fig. 9 (color added); Ex. 2031, ¶ 60.

Notably, however, as discussed below with regard to the challenged '722 claims, in Finkenzeller's transponder unit embodied in Figure 9, the two discrete receive and transmit branches of circuitry are switched, such that only one branch can be engaged at a time. Ex. 2031, ¶ 61. The ***switch 7***, depicted above in Figure 9, is used to switch the Finkenzeller transponder unit between receive mode and transmit mode, as discussed below. Ex. 2031, ¶ 62; *see also* Ex. 1005 at [0055] (stating, regarding the Figure 2 embodiment, "[a] switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6."). Specifically, receive mode and transmit mode are engaged by respectively toggling the switch between

the antenna 3 (for receive mode) and the oscillator 8 (for transmit mode), as depicted in Figure 9 above. Ex. 2031, ¶ 62; Ex. 1005 at [0114] (to switch to transmit mode, "the switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz).").

Receive mode is the default mode of operation in Finkenzeller's transponder unit. Ex. 2031, ¶ 63. Finkenzeller "provide[s] to switch the inventive circuit to the ***transmit mode only when a modulation signal (amplification modulation) can be detected exclusively on the connections of the RFID chip CL and not in the receive branch***, since only in this case is a load modulation involved." Ex. 1005 at [0118] (emphasis added); Ex. 2031, ¶ 63. "If the controller 95 is no longer supplied a modulation signal for a defined time t, it is provided according to the invention that ***it automatically switches the inventive circuit back to the receive mode***." Ex. 1005 at [0116] (emphasis added); Ex. 2031, ¶ 63.

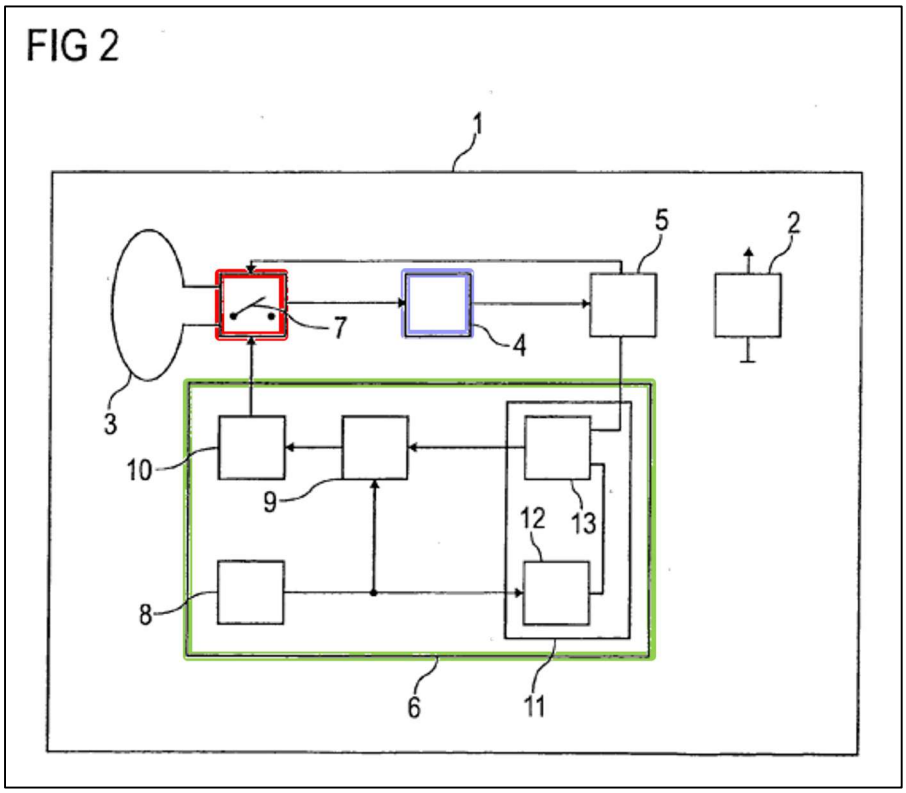
Receive mode is engaged by switching to the receive branch, via switch 7. Ex. 2031, ¶ 64. "In the receive mode a voltage is induced in the antenna 3 by the magnetic field of a remote RFID reading device. Together with the capacitor 81 the antenna 3 forms a parallel-resonant circuit whose resonant frequency corresponds approximately to the transmitting frequency of the RFID reading device. The voltage thus available on the resonant circuit is supplied to the input

amplifier 91 ***via the switch 7***." Ex. 1005 at [0109] (emphasis added); Ex. 2031, ¶ 64.

Regarding transmit mode, Finkenzeller's controller 95 "switches the inventive circuit with the first edge of the modulation signal to a ***transmit mode*** without delay if possible, so that the data generated by the RFID chip CL can also be transferred to the remote reading device. For this purpose, the ***switch 7 is first switched from the antenna 3 to the oscillator 8 (13.56 MHz)***. This is necessary to be able to keep supplying the RFID chip CL with an alternating voltage of the right frequency." Ex. 1005 at [0114] (emphasis added); *see also id.* at [0063] ("The output signal generated by the ring modulator 9 can then be optionally amplified by means of the amplifier 10, and be supplied to the antenna 3 for sending the data to be sent, via the switch 7 which is switched to transmit mode of the transponder unit by a signal of the controller 5."); Ex. 2031, ¶ 65.

Consistent with the Figure 9 embodiment, the Figure 2 embodiment of Finkenzeller also includes fully switched receive and transmit paths. Ex. 1005 at Fig. 2; Ex. 2031, ¶ 66. In Figure 2, "[t]he transponder unit [1] has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists substantially of three functional blocks, a ***receiver 4***, a controller 5 and a ***transmitter 6***. A ***switch 7*** is used for ***switching the antenna 3 between the receiver 4 and the transmitter 6***." Ex. 1005 at [0055] (emphasis added); Ex. 2031, ¶ 66. In

the Figure 2 embodiment, "controller 5 transmits a control signal to the ***switch 7 which switches between receive mode and transmit mode*** of the transponder unit." Ex. 1005 at [0056] (emphasis added); Ex. 2031, ¶ 66.



Ex. 1005 (Finkenzeller), Fig. 2 (color added); Ex. 2031, ¶ 66.

Finkenzeller does not disclose any embodiment in which the receive and transmit branches are not switched. Ex. 2031, ¶ 67.

2. The Petition Does Not Establish that Finkenzeller Discloses All Limitations of the Challenged Claims

The Petition has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses the limitations, similar across all claims and set forth below, reciting circuits coupled in specific configurations,

i.e., "amplifier" and a "transmit circuit" (claims 1, 5) or "active transmit driver circuit" (claim 11).

Claim	Claim Language
1	[1.c.1] "at least one active circuit coupled between the smartcard controller and the antenna, [1.c.2] wherein the ***at least one active circuit includes an amplifier*** coupled to be powered by the mobile device, and ***wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller***, and [1.c.3] the at least one active circuit further includes a ***transmit circuit coupled between the smartcard controller and the antenna*** that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna." Ex. 1001, 19:46-56 (emphasis added).
5	[5.c] "***an amplifier coupled between the smartcard controller and the antenna***, wherein the amplifier is coupled to be powered by the mobile device, and wherein the ***amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller***; and

	[5.d] ***a transmit circuit coupled between the smartcard controller and the antenna*** that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna." Ex. 1001, 20:13-22 (emphasis added).
11	[11.c] "***an amplifier*** coupled to be powered by the mobile device, ***wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller***; and" [11.d] "***an active transmit driver circuit coupled between the smartcard controller and the antenna***, wherein the active transmit driver circuit is coupled to be powered by the mobile device." Ex. 1001, 20:42-49 (emphasis added).

These limitations are addressed in detail below with respect to the challenged claims.

a. Claim 1

i. Finkenzeller alone or in combination with skill in the art does not disclose <u>both</u> [1.c.2] "wherein the at least one active circuit includes an amplifier . . . wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller" <u>and</u> [1.c.3] "the at least one active circuit further includes a transmit circuit coupled between the smartcard controller and the antenna . . . ."

The Petition has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses ***both*** of the limitations "wherein the at least one active circuit includes an amplifier coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller," (*see* Pet. at 36-38), and "the at least one active circuit further includes a transmit circuit coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna" (*see* Pet. at 38-42).

Claim 1 recites, in relevant part:

> [1.c.1] at least one active circuit coupled between the smartcard controller and the antenna, [1.c.2] wherein the at least one active circuit includes an amplifier coupled to be powered by the mobile device, and wherein the amplifier is coupled to

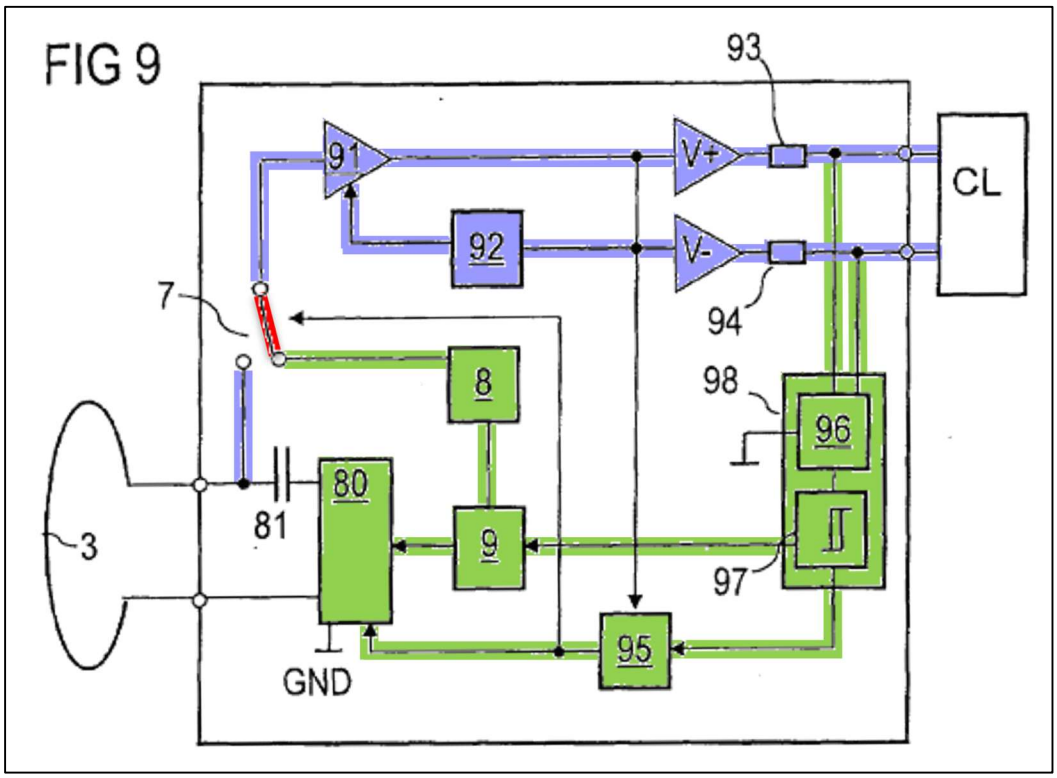
> amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller, and [1.c.3] the at least one active circuit further includes a transmit circuit coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna.

Ex. 1001 ('722), 19:46-56; Ex. 2031, ¶ 68.

Claim 1 of the '722 recites "at least one active circuit coupled between the smartcard controller and the antenna." Ex. 1001 at 19:46-47; Ex. 2031, ¶ 69. The "at least one active circuit" includes two subcomponents, an "amplifier" and a "transmit circuit," for each of which claim 1 recites specific configurations. Ex. 2031, ¶ 69. The claimed ***amplifier*** (of the at least one active circuit) is (1) "coupled to be powered by the mobile device," (Ex. 1001 at 19:48-49), and (2) "coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller" (*id.* at 19:50-52). Ex. 2031, ¶ 69. The claimed ***transmit circuit*** (of the at least one active circuit) is "coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna." Ex. 1001 at 19:53-56; Ex. 2031, ¶ 69.

Claim 1 thus recites a configuration wherein ***both*** the claimed amplifier ***and*** the transmit circuit are continuously coupled between the claimed smartcard controller and antenna. Ex. 2031, ¶ 70. Because both the amplifier and transmit circuit are continuously coupled, the amplifier remains ready to amplify signals and pass them to the controller, and the transmit circuit remains ready to drive the antenna with signals that mimic sidebands. *Id.*

In contrast, Finkenzeller does not disclose an embodiment that includes these two limitations, i.e., amplifier coupled as claimed ***and*** transmit circuit coupled as claimed, in a single configuration. *Id.* at ¶ 71. Instead, because Finkenzeller discloses a ***receive branch*** and a ***transmit branch*** that are ***switched***, as illustrated in Figure 9 and as discussed above in Section V.A.1, at most, Finkenzeller can only disclose either the '722 patent claim 1's claimed amplifier (on the receive branch) ***or*** the claimed transmit circuit (on the transmit branch)—but not both. *Id.* . Finkenzeller therefore does not "disclose a mobile device that includes the claimed arrangement of a smartcard controller, antenna, amplifier, and transmit circuit," as the Petition claims. Pet. at 21; Ex. 2031, ¶ 71.



Ex. 1005 (Finkenzeller), Fig. 9 (color added).

Finkenzeller differs significantly from '722 in that Finkenzeller must be switched back and forth, via a ***physical switch 7***, between receive mode and transmit mode in order to receive and transmit data, respectively. Ex. 2031, ¶ 72. Finkenzeller's amplifier 91 is engaged only when the switch connects it to the antenna during receive mode. Ex. 2031, ¶ 72; Ex. 1005 at [0109]. It is explicitly disconnected when Finkenzeller's transponder is in transmit mode, breaking the reception path. Ex. 2031, ¶ 72; Ex. 1005 at [0109], [0114]. Furthermore, if the path is not disconnected, then the RFID chip CL would be non-operative as it would not receive the necessary alternating voltage of the correct frequency. Ex. 2031, ¶ 72;

Ex. 1005 at [0114]. Likewise, when in receive mode, Finkenzeller's modulator 9 and the components of the transmit path are disconnected when the switch couples the receive path to the antenna. Ex. 2031, ¶ 72; Ex. 1005 at [0114].

Neither the Petition nor Dr. Tentzeris addresses this key distinction. Although the Petition acknowledges the distinct "receive branch" and "transmit branch," (*see, e.g.*, Pet. at 34 ("Finkenzeller discloses at least one active circuit (e.g., 'receive branch' and 'transmit branch' of 'active transponder unit') coupled between the smartcard controller and the antenna . . .")), neither the Petition nor Dr. Tentzeris addresses in any way the significance of Finkenzeller's switch-coupled architecture, or explains why in spite of that architecture Finkenzeller discloses an amplifier and a transmit circuit coupled as claimed. Ex. 2031, ¶ 73. At most, the Petition acknowledges that Finkenzeller "discloses using a switch 7 for 'switch[ing] between the receive mode and transmit mode' according to whether received data is to be provided to the RFID chip CL or data from the RFID chip CL is to be transmitted." Pet. at 28 (citing Ex. 1005 (Finkenzeller), [0056], [0114]) (Petitioners' alterations); *see also* Pet. at 36 (citing Ex. 1005 at [0109]-[0110], Fig. 9; Tentzeris, ¶¶ 100-101); Ex. 2031, ¶ 74. But the Petition is silent as to how Finkenzeller discloses all of the limitations of claim 1 despite Finkenzeller's switched receive/transmit architecture. Ex. 2031, ¶ 74.

Finkenzeller simply discloses a different configuration, as discussed above, chosen based on a different set of design considerations and goals, from that of '722 claim 1. Ex. 2031, ¶ 75.

The Petition therefore has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of claim 1.

b. Claims 2-4

The Petition has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of independent claim 1. The Petition therefore has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of claims 2-4, which depend from independent claim 1.

c. Claim 5

i. Finkenzeller alone or in combination with skill in the art does not disclose <u>both</u> [5.c] "an amplifier coupled between the smartcard controller and the antenna . . . wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller" <u>and</u> [5.d] "a transmit circuit coupled between the smartcard controller and the antenna . . . ."

The Petition has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses ***both*** of the limitations "an

amplifier coupled between the smartcard controller and the antenna, wherein the amplifier is coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller," (*see* Pet. at 47-48), and "a transmit circuit coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna" (*see* Pet. at 48-49). Ex. 1001, 20:13-22 (emphasis added).

Claim 5 recites, in relevant part:

> [5.c] "an ***amplifier*** coupled between the smartcard controller and the antenna, wherein the amplifier is coupled to be powered by the mobile device, and wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller, and"
>
> [5.d] "a ***transmit circuit*** coupled between the smartcard controller and the antenna that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna."

Ex. 1001 ('722), 20:13-22 (emphasis added).

Like '722 claim 1, discussed above, claim 5 recites both an "amplifier" and a "transmit circuit," for each of which claim 5 recites a specific configuration. The claimed ***amplifier*** is (1) "***coupled between the smartcard controller and the antenna***," (*id.* at 20:13-14 (emphasis added)), (2) "wherein the amplifier is coupled to be powered by the mobile device" (*id.* at 20:14-15), (3) "wherein the ***amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller***" (*id.* at 20:15-18 (emphasis added)). The claimed ***transmit circuit*** is "***coupled between the smartcard controller and the antenna*** that in operation forms a signal that mimics the at least one frequency sideband and wherein the signal drives the antenna." *Id.* at 20:19-22 (emphasis added).

Again like '722 claim 1, claim 5 thus recites a configuration wherein ***both*** the claimed amplifier ***and*** the transmit circuit are continuously coupled between the claimed smartcard controller and antenna. Ex. 2031, ¶ 78. Because both the amplifier and transmit circuit are continuously coupled, the amplifier remains ready to amplify signals and pass them to the controller, and the transmit circuit remains ready to drive the antenna with signals that mimic sidebands. *Id.*

As discussed above in Section V.A.2.a.i, which is incorporated herein by reference, Finkenzeller does not disclose an embodiment that includes these two limitations, i.e., amplifier coupled as claimed ***and*** transmit circuit coupled as

claimed, in a single configuration. Instead, as discussed above with respect to claim 1, because Finkenzeller discloses ***switched*** receive and transmit circuitry branches, at most, it can only disclose either the '722 patent claim 5's claimed amplifier (on the receive branch) ***or*** the claimed transmit circuit (on the transmit branch)—but not both. Finkenzeller therefore does not "disclose a mobile device that includes the claimed arrangement of a smartcard controller, antenna, amplifier, and transmit circuit," as the Petition claims. Pet. at 21; *see also* Ex. 2031, ¶ 79.

The Petition therefore has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of claim 5.

d. Claims 6-10

The Petition has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of independent claim 5. The Petition therefore has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of claims 6-8, which depend from independent claim 5.

e. Claim 11

i. Finkenzeller alone or in combination with skill in the art does not disclose <u>both</u> [11.c] "an amplifier . . . wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller" <u>and</u> [11.d] "an active transmit driver circuit coupled between the smartcard controller and the antenna . . . ."

The Petition has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses ***both*** of the limitations "an amplifier coupled to be powered by the mobile device, wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller," (see Pet. at 54), and "an active transmit driver circuit coupled between the smartcard controller and the antenna, wherein the active transmit driver circuit is coupled to be powered by the mobile device" (*see* Pet. at 54-55). Ex. 1001, 20:42-49.

Claim 11 recites, in relevant part:

> [11.c] "***an amplifier*** coupled to be powered by the mobile device, wherein the amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller; and"

> [11.d] "***an active transmit driver circuit*** coupled between the smartcard controller and the antenna, wherein the active transmit driver circuit is coupled to be powered by the mobile device."

Ex. 1001 ('722), 20:42-49 (emphasis added).

Like '722 claims 1 and 5, discussed above, claim 11 recites both an "amplifier" and transmit circuitry (whereas claims 1 and 5 recite a "transmit circuit," claim 11 recites another, more specific term, "active transmit driver circuit"), for each of which claim 11 recites a specific configuration. The claimed ***amplifier*** is (1) "coupled to be powered by the mobile device," (*id.* at 20:42), and (2) "wherein the ***amplifier is coupled to amplify a signal received from the antenna and to provide an amplified signal to the smartcard controller***" (*id.* at 20:43-45 (emphasis added)). The claimed ***active transmit driver circuit*** is "***coupled between the smartcard controller and the antenna***, wherein the active transmit driver circuit is coupled to be powered by the mobile device." *Id.* at 20:46-49 (emphasis added).

Again like '722 claims 1 and 5, claim 11 thus recites a configuration wherein ***both*** the claimed amplifier ***and*** the transmit circuitry (i.e., "active transmit driver circuit") are continuously coupled between the claimed smartcard controller and antenna. Ex. 2031, ¶ 82. Because both the amplifier and active transmit driver

circuit are continuously coupled, the amplifier remains ready to amplify signals and pass them to the controller, and the active transmit driver circuit remains ready to drive the antenna with signals that mimic sidebands. *Id.*

As discussed above in Section V.A.2.a.i, which is incorporated herein by reference, Finkenzeller does not disclose an embodiment that includes these two limitations, i.e., amplifier coupled as claimed ***and*** transmit circuit (i.e., "active transmit driver circuit") coupled as claimed, in a single configuration. Instead, as discussed above with respect to claim 1, because Finkenzeller discloses ***switched*** receive and transmit circuitry branches, at most, it can only disclose either the '722 patent claim 11's claimed amplifier (on the receive branch) ***or*** the claimed active transmit driver circuit (on the transmit branch)—but not both. Finkenzeller therefore does not "disclose a mobile device that includes the claimed arrangement of a smartcard controller, antenna, amplifier, and transmit circuit," as the Petition claims. Pet. at 21.

The Petition therefore has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of claim 11.

f. Claims 12-14

The Petition has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of

independent claim 11. The Petition therefore has not established a reasonable likelihood that Finkenzeller alone or in combination with skill in the art discloses every limitation of claims 12-14, which depend from independent claim 11.

B. The Petition Does Not Establish a Reasonable Likelihood that Finkenzeller in View of Kerdraon Renders Unpatentable Claims 1-14 (Ground 2)

The Petition has not demonstrated a reasonable likelihood of success that Petitioner will prevail on any claim challenged in Ground 2. Ground 2 fails for the same reasons as Ground 1, discussed above.

Ground 2 asserts that Kerdraon supplies only the "smartcard controller" limitation of all challenged claims: "To the extent it is argued that further disclosure of a smartcard controller is required, Kerdraon discloses a smartcard controller (e.g., "smart card controller") as recited in each claim." Pet. at 55 (citing Ex.1006 (Kerdraon), [0070]-[0071]). Neither the Petition nor Dr. Tentzeris asserts that Kerdraon supplies any limitation from any '722 challenged claim other than the "smartcard controller" limitation. *See* Pet. at 55-60; Ex. 1003 (Tentzeris), ¶¶ 169-179.

Thus, even as combined, the combination of Finkenzeller and Kerdraon does not disclose the limitations discussed above regarding Ground 1.

C. The Petition Does Not Establish a Reasonable Likelihood that Finkenzeller in View of Koh Renders Unpatentable Claims 1-14 (Ground 3)

The Petition has not demonstrated a reasonable likelihood of success that Petitioner will prevail on any claim challenged in Ground 3. Ground 3 fails for the same reasons as Ground 1, discussed above.

Similar to Ground 2 and the combination of Finkenzeller and Kerdraon, Ground 3 asserts that Koh supplies only the "smartcard controller" limitation of all challenged claims: "Koh discloses a smartcard controller (e.g., "Smart MX (SMX) module") as recited in each claim." Pet. at 60 (citing Ex.1007 (Koh), [0033]). Neither the Petition nor Dr. Tentzeris asserts that Koh supplies any limitation from any '722 challenged claim other than the "smartcard controller" limitation. *See* Pet. at 60-63; Ex. 1003 (Tentzeris), ¶¶ 180-187.

Thus, even as combined, the combination of Finkenzeller and Koh does not disclose the limitations discussed above regarding Ground 1.

D. The Petition Does Not Establish a Reasonable Likelihood that Finkenzeller in View of Bangs Renders Unpatentable Claim 8 (Ground 4)

The Petition has not demonstrated a reasonable likelihood of success that Petitioner will prevail on challenged claim 8 in Ground 4. Ground 4 fails for the same reasons as Ground 1, discussed above.

Ground 4 applies only to '722 claim 8. *See* Pet. at 6 (summary chart), 63. Ground 4 asserts that Bangs supplies only claim 8's limitation "wherein the transmit circuit comprises a load modulation circuit": "[T]o the extent a load modulation circuit requires load modulating an interrogating field instead of generating a new signal, Bangs discloses a transmit circuit (*e.g.*, circuitry between 'antenna element 309' and 'controller 107') [*sic*] comprises a load modulation circuit (*e.g.*, 'switchable' 'resistor 301 . . . in parallel with capacitor 304')." Pet. at 63 (citing Ex.1004 (Bangs), [0051], [0057]-[0060], [0066]; Ex. 1003 (Tentzeris),¶ 188). Neither the Petition nor Dr. Tentzeris asserts that Bangs supplies any limitation from '722 claim 8 other than the "load modulation circuit" limitation. *See* Pet. at 63-69; Ex. 1003 (Tentzeris), ¶¶ 188-195.

Thus, even as combined, the combination of Finkenzeller and Bangs does not disclose the limitations discussed above regarding Ground 1.

E. The Petition Does Not Establish a Reasonable Likelihood that Finkenzeller in View of Kerdraon and Bangs Renders Unpatentable Claim 8 (Ground 5)

The Petition has not demonstrated a reasonable likelihood of success that Petitioner will prevail on challenged claim 8 in Ground 5. Ground 5 fails for the same reasons as Grounds 2 and 4, discussed above.

Ground 5 asserts that Kerdraon supplies only the "smartcard controller" limitation of claim 1, from which challenged claim 8 depends, stating (in the

context of Ground 2, but later applied to Ground 5): "To the extent it is argued that further disclosure of a smartcard controller is required, Kerdraon discloses a smartcard controller (e.g., "smart card controller") as recited in each claim." Pet. at 55 (citing Ex.1006 (Kerdraon), [0070]-[0071]); *see also* Pet. at 66-69 (discussing asserted combinations including Kerdraon in the context of Grounds 4-6). Neither the Petition nor Dr. Tentzeris asserts that Kerdraon supplies any limitation from '722 claim 8 other than the "smartcard controller" limitation of claim 5, from which claim 8 depends. *See* Pet. at 55-60, 66-69; Ex. 1003 (Tentzeris), ¶¶ 169-179, 188-195.

Further, as discussed above with respect to Ground 4, Ground 5 asserts that Bangs supplies only claim 8's limitation "wherein the transmit circuit comprises a load modulation circuit," stating: "[T]o the extent a load modulation circuit requires load modulating an interrogating field instead of generating a new signal, Bangs discloses a transmit circuit (e.g., circuitry between 'antenna element 309' and 'controller 107') [*sic*] comprises a load modulation circuit (e.g., 'switchable' 'resistor 301 . . . in parallel with capacitor 304')." Pet. at 63 (citing Ex.1004 (Bangs), [0051], [0057]-[0060], [0066]; Ex. 1003 (Tentzeris), ¶ 188). Neither the Petition nor Dr. Tentzeris asserts that Bangs supplies any limitation from '722 claim 8 other than the "load modulation circuit" limitation. *See* Pet. at 63-69; Ex. 1003 (Tentzeris), ¶¶ 188-195.

Thus, even as combined, the combination of Finkenzeller, Kerdraon, and Bangs does not disclose the limitations discussed above regarding Ground 1.

F. The Petition Does Not Establish a Reasonable Likelihood that Finkenzeller in View of Koh and Bangs Renders Unpatentable Claim 8 (Ground 6)

The Petition has not demonstrated a reasonable likelihood of success that Petitioner will prevail on challenged claim 8 in Ground 6. Ground 6 fails for the same reasons as Grounds 3 and 4, discussed above.

Ground 6 asserts that Koh supplies only the "smartcard controller" limitation of claim 1, from which challenged claim 8 depends, stating (in the context of Ground 3, but later applied to Ground 6): "Koh discloses a smartcard controller (e.g., "Smart MX (SMX) module") as recited in each claim." Pet. at 60 (citing Ex.1007 (Koh), [0033]); *see also* Pet. at 66-69 (discussing asserted combinations including Koh in the context of Grounds 4-6). Neither the Petition nor Dr. Tentzeris asserts that Koh supplies any limitation from '722 claim 8 other than the "smartcard controller" limitation of claim 5, from which claim 8 depends. *See* Pet. at 60-63, 66-69; Ex. 1003 (Tentzeris), ¶¶ 180-195.

Further, as discussed above with respect to Ground 4, Ground 6 asserts that Bangs supplies only claim 8's limitation "wherein the transmit circuit comprises a load modulation circuit," stating: "[T]o the extent a load modulation circuit requires load modulating an interrogating field instead of generating a new signal,

Bangs discloses a transmit circuit (e.g., circuitry between 'antenna element 309' and 'controller 107') [*sic*] comprises a load modulation circuit (e.g., 'switchable' 'resistor 301 . . . in parallel with capacitor 304')." Pet. at 63 (citing Ex.1004 (Bangs), [0051], [0057]-[0060], [0066]; Ex. 1003 (Tentzeris) ¶ 188). Neither the Petition nor Dr. Tentzeris asserts that Bangs supplies any limitation from '722 claim 8 other than the "load modulation circuit" limitation. *See* Pet. at 63-69; Ex. 1003 (Tentzeris), ¶¶ 188-195.

Thus, even as combined, the combination of Finkenzeller, Koh, and Bangs does not disclose the limitations discussed above regarding Ground 1.

VII. SECONDARY CONSIDERATIONS

For the foregoing reasons, Petitioners have failed to establish a reasonable likelihood that any challenged claim is unpatentable, and institution should be denied on the basis of those reasons alone. Patent Owner acknowledges that Petitioners have attempted to rebut arguments regarding secondary considerations, also known as objective indicia of nonobviousness. *See* Pet. at 69. Patent Owner does not waive its rights to address objective indicia of nonobviousness later in these proceedings.

VIII. CONCLUSION

For the reasons set forth above, the Petition does not establish a reasonable likelihood that any of the challenged claims is unpatentable. Institution should be denied.

Dated: July 16, 2025

Respectfully Submitted,

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WORD-COUNT CERTIFICATE

The undersigned certifies that the foregoing Patent Owner's Preliminary Response complies with the type-volume limitation of 37 C.F.R. § 42.24(a) and (b) and contains 8,137 words in 14-point Times New Roman font as calculated by the word count feature of Microsoft Office. This word count is inclusive of all text and footnotes but does not include the table of contents, table of authorities, certificates or service or word count, or appendix of exhibits or claim listing.

Dated: July 16, 2025

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CERTIFICATE OF SERVICE

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