

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

**SAMSUNG ELECTRONICS CO., LTD. AND SAMSUNG ELECTRONICS
AMERICA, INC.**

Petitioners

v.

MAXELL LTD.

Patent Owner

Inter Partes Review No.: IPR2024-00907

**PETITION FOR INTER PARTES REVIEW OF U.S. PATENT
NO. 10,129,590 UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. §§ 42.1-100, ET
SEQ**

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1007	Declaration of Nathaniel E Frank-White, records request processor at the Internet Archive, attesting authenticity and public availability of EX1010, EX1014, EX1015, EX1018
1008	US 2006/0258289 (“ Dua ”)
1009	US 7,149,508 (“ Herle ”)
1010	Nokia N93 User Guide (“ N93 ”)
1011	US 2006/0128332 (“ Rooyen ”)
1012	US 2006/0274704 (“ Desai ”)
1013	US 2004/0264600 (“ Kao ”)
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1016	Jan 11, 2024, Infringement Contentions for ’241 Patent
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1018	News article published on May 15, 2006, on www.mobiletracker.net
1019	WO 00/48373 (“ Rinne ”)
1020	US 2005/0280471 (“ Matsushita ”)
1021	US 2007/0116292 (“ Kurita ”)
1022	Bluetooth Video Distribution Profile (“ VDP ”)
1023	US 2007/0275704 (“ Terai ”)
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CHART OF CLAIMS	
[1pre]	A video processing apparatus, comprising:
[1a]	a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band, the first radio communication circuit capable of transmitting video information by radio or receiving information by radio using the first transmission frequency band;
[1b]	a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band;
[1c]	a third radio communication circuit capable of transmitting information and using a third transmission frequency band;
[1d]	an imaging circuit capable of receiving video information and still picture information via an optical system;
[1e]	a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method;
[1f]	an input device capable of receiving a user indication;
[1g]	an accumulation circuit capable of accumulating video information received by the imaging circuit after the video information is compressed by the compression circuit; and
[1h]	a controller controlling assignment of connection of each of the first, second, and third radio communication circuits,
[1i]	wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio,
[1j]	wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information,
[1k]	wherein the controller controls each of the first and second radio communication circuit so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously, and

[11] wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the video processing apparatus is available, and the video processing apparatus executes an update process such that an updated operating system of the video processing apparatus is stored in the video processing apparatus after execution of the update process.
[4pre] The video processing apparatus according to claim 1, further comprising a radio interface capable of receiving video information by radio
[4a] wherein the accumulation circuit accumulates the video information received via the radio interface, and
[4b] the first radio communication circuit is further capable of transmitting the accumulated video information
[5pre] A display apparatus, comprising:
[5a] a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band, the first radio communication circuit capable of receiving video information by radio or transmitting information by radio using the first transmission frequency band;
[5b] a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band;
[5c] a third radio communication circuit capable of transmitting information and using a third transmission frequency band;
[5d] a compression circuit capable of implementing a plurality of compression schemes including a first compression scheme, the compression circuit compressing the video information received by the first radio communication circuit using the first compression scheme;
[5e] a display capable of displaying the information received by the first radio communication circuit or the second radio communication circuit; and
[5f] a controller controlling assignment of connection of each of the first, second, and third radio communication circuits,
[5g] wherein the controller controls assignment of connection for each of the first and second radio communication circuits in response to receiving an indication from a user such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio

communication circuit for receiving the video information or transmitting the information by radio,
[5h] wherein the controller controls each of the first and second radio communication circuits so that the first radio communication circuit receives video information and the second radio communication circuit connects to the internet or the home network simultaneously, and
[5i] wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the display apparatus is available, and the display apparatus executes an update process such that an updated operating system of the display apparatus is stored in the display apparatus after execution of the update process.
[8pre] The display apparatus according to claim 5, further comprising a radio interface capable of receiving video information by radio,
[8a] wherein the display device is further capable of displaying the video information received via the radio interface.
[9pre] A method for video processing, comprising:
[9a] receiving video information and still picture information via an optical system by an imaging circuit of a video processing apparatus;
[9b] compressing the still picture information using a first type of compression method and the video information using a second type of compression method;
[9c] accumulating video information received by the imaging circuit after the video information is compressed by the compression circuit;
[9d] implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band;
[9e] transmitting using the first transmission frequency band, the video information to an external device by radio, via a first radio communication circuit;
[9f] implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band;
[9g] connecting, by radio, to an internet or a home network to transmit and receive information using the second transmission frequency band, via a second radio communication circuit;
[9h] transmitting, via a third radio communication circuit, information using a third transmission frequency band;
[9i] controlling, via a controller, assignment of connection of each of the first, second, and third radio communication circuits,
[9j] wherein assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a

user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, a connection is assigned to the first radio communication circuit for transmitting the video information,
[9k] wherein the transmitting and connecting is controlled so that the first radio communication circuit is configured to transmit video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously;
[9l] receiving, via the second or third radio communication circuits a signal from the internet indicating that an update for an operating system is available; executing the update process; and storing an updated operating system after execution of the update process.
[10pre] A method, comprising:
[10a] implementing a first transmission scheme having a first modulation scheme and a first transmission frequency band;
[10b] implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band;
[10c] receiving video information by radio using the first transmission frequency band, via a first radio communication circuit and connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band, via a second radio communication circuit;
[10d] compressing the video information received by the first radio communication circuit using a first compression scheme;
[10e] transmitting, via a third radio communication circuit, information using a third transmission frequency band;
[10f] displaying, via a display circuit, information received by the first radio communication circuit or the second radio communication circuit;
[10g] controlling, via a controller, assignment of connection of each of the first, second, and third radio communication circuits,
[10h] wherein assignment of connection for each of the first and second radio communication circuit is controlled in response to receiving an indication from a user such that when an indication from the user indicates to use the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for receiving the video information,
[10i] wherein the receiving and connecting is controlled so that the first radio communication circuit is configured to receive video information and the second radio communication circuit is configured to connect to the internet or the home network simultaneously;

[10j] receiving, via the second or third radio communication circuits, a signal from the internet indicating that an update for an operating system is available; executing the update process; and storing an updated operating system after execution of the update process.
[11] The video processing apparatus of claim 1, further comprising a fourth radio communication circuit capable of transmitting information and using a fourth transmission frequency band that is different from the first, second, and third transmission frequency bands, wherein the controller controls assignment of connection of each of the first, second, third, and fourth radio communication circuits.
[12] The video processing apparatus of claim 1, wherein the third transmission frequency band is different from the first and second transmission frequency bands.
[14] The video processing apparatus of claim 1, wherein transmitting of the information by the third radio communication circuit comprises connecting to the internet.
[15] The video processing apparatus of claim 1, wherein the input device is capable of receiving a user's selection of content to be displayed on the video processing apparatus.
[16] The video processing apparatus of claim 1, wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an application of the video processing apparatus is available, and the video processing apparatus executes an application update process such that an updated application of the video processing apparatus is stored in the video processing apparatus after execution of the application update process.
[17] The video processing apparatus of claim 1, further comprising: a display for displaying a screen requesting user input, wherein the displayed screen prompts the user for a user input that indicates whether the user allows a connection between the first radio communication circuit and the external device to be established, wherein in response to receiving the user input indicating allowance of the connection, the first radio communication circuit transmits the accumulated video information to the external device.
[18] The video processing apparatus of claim 1, wherein the second modulation scheme comprises quadrature amplitude modulation (QAM).
[19] The video processing apparatus of claim 1, wherein the second radio communication circuit is controllable to change from the second modulation scheme to a different modulation scheme.
[20] The video processing apparatus of claim 1, wherein the video processing apparatus comprises a cellular phone.

[21] The video processing apparatus of claim 1, wherein the second and third radio communication circuits conduct demodulation through Orthogonal Frequency Division Multiplexing (OFDM).
[22] The video processing apparatus of claim 1, wherein at least the first radio communication circuit and the third radio communication circuit are implemented as a combined circuit.
[23pre] A cellular phone, comprising:
[23a] a first radio communication circuit implementing a first transmission scheme having a first modulation scheme and first transmission frequency band, the first radio communication circuit capable of transmitting video information by radio or receiving information by radio using the first transmission frequency band;
[23b] a second radio communication circuit implementing a second transmission scheme having a second modulation scheme different from the first modulation scheme and a second transmission frequency band different from the first transmission frequency band, the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band;
[23c] a third radio communication circuit capable of transmitting information using a third transmission frequency band;
[23d] a fourth radio communication circuit capable of transmitting information using a fourth transmission frequency band;
[23e] an imaging circuit capable of receiving video information and still picture information via an optical system;
[23f] a compression circuit compressing the still picture information using a first type of compression method and the video information using a second type of compression method;
[23g] a microphone receiving audio information corresponding to the video information received via the imaging circuit;
[23h] an accumulation circuit capable of accumulating video information received by the imaging circuit and audio information received by the microphone, wherein the first radio communication circuit can transmit video information accumulated in the accumulation circuit to an external device by radio;
[23i] a display displaying the video information received by the first radio communication circuit and displaying information received by the second radio communication circuit via the internet or home network;
[23j] a controller controlling assignment of connection of each of the first, second, third, and fourth radio communication circuits,

[23k] wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit, the controller assigns a connection to the first radio communication circuit for transmitting the video information,

[23l] wherein the controller controls each of the first and second radio communication circuit so that the first radio communication circuit transmits video information and the second radio communication circuit connects to the internet or the home network simultaneously, and

[23m] wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an operating system of the cellular phone is available, and the cellular phone executes an update process such that an updated operating system of the cellular phone is stored in the cellular phone after execution of the update process.

[24] The cellular phone of claim 23, wherein the second or third radio communication circuits receive a signal from the internet indicating that an update for an application of the cellular phone is available, and the cellular phone executes an application update process such that an updated application of the cellular phone is stored in the cellular phone after execution of the application update process.

[25] The cellular phone of claim 23, wherein the first modulation scheme comprises shift keying modulation and the second modulation scheme comprises quadrature amplitude modulation (QAM).

I. INTRODUCTION

Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. (“Petitioners”) request *inter partes* review of claims 1, 4-5, 8-12, and 14-25 (“Challenged Claims”) of U.S. Patent No. 10,129,590 (“’590 patent,” EX1004), owned by Maxell, Ltd. (“PO”).

II. STATEMENT OF PRECISE RELIEF REQUESTED

Petitioners request cancelation of the Challenged Claims in view of the following grounds:

Ground	Claims	Stat. Basis	Prior Art
1	1, 4-5, 8-12, 14-25	35 U.S.C. § 103	N93, Dua, Herle
2	1, 4-5, 8-12, 14-25	35 U.S.C. § 103	N93, Dua, Herle, Rooyen, Desai, BT-Spec, 3GPP-Spec, Kao
3	1, 4-5, 8-12, 14-25	35 U.S.C. § 103	Dua, Herle
4	1, 4-5, 8-12, 14-25	35 U.S.C. § 103	Dua, Herle, N93
5	1, 4-5, 8-12, 14-25	35 U.S.C. § 103	Dua, Herle, N93, Rooyen, Desai, BT-Spec, 3GPP-Spec, Kao

This Petition is based on, and copies significant portions from, the declaration of Dr Charles Creusere. EX1002.

III. THE ’590 PATENT

A. Overview

The ’590 patent discloses a conventional multi radio, multimedia cellular phone that was well known in the art by 2007. EX1004, Fig. 1. The ’590 patent

discloses conventional hardware (processor, memory, radios, camera, microphone) for performing conventional functions, including capturing, compressing, storing, transmitting, and receiving video and pictures by radio. *Id.*

PO is expected to assert that the '590 patent discloses novel ways of 1) transmitting video with one radio based on a user “indication” while connecting to a network with a second radio and 2) updating software. As shown below, these functionalities were well known in the prior art.

B. Overview of the File History

1. Prosecution of the '590 Patent

U.S. Appl. No. 15/208,886 was filed on 7/13/2016. EX1004, certificate.

The claims were rejected on 12/11/2017 (EX1005, 97-103), amended on 3/9/2018 (*id.*, 81-96), and allowed on 7/13/2018. *Id.*, 59-67.

2. Reexamination of the '590 patent (90/014,651)

On 1/12/2021, a third-party requestor filed a request for reexamination of the '590 patent based on US2006/0203758 (“Tee”) and US2006/0135076 (“Honkanen”). EX1006, 1005-1057.

Reexamination was ordered and all claims were initially rejected over Tee and/or Tee and Honkanen. *Id.*, 296-317, 161-228.

PO amended the claims, added several new claims, and argued the claims were patentable. *Id.*, 115-147.

On 10/29/2021, all claims were allowed. *Id.*, 33-39.

C. Person of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) at the time of the alleged invention of the ’590 patent (Nov. 28, 2007, based on the claim of priority to JP2007-306750) would have had a bachelor’s degree in electrical engineering or equivalent with at least one year of experience in the field of wireless communications. Additional education or experience might substitute for the above requirements. EX1002, ¶28.

D. Claim Construction Under 37 C.F.R. § 42.104(b)(3)

Because the prior art asserted herein discloses subject matter within the indisputable scope of the claims, the Board need not construe the outer bounds of the claims as part of these proceedings. The district court may have to address other bounds of the claims, for example, because Petitioners argue the outer bounds of some claims are indefinite under *IPXL*.

1. “circuit”

“Circuit” should be interpreted broadly as any circuitry. *See* EX1005, 82-85 (adding “circuit” to replace “device” and “unit”); EX1004, 3:50-52 (disclosing only imaging “device”). A circuit need not be separate from another circuit. *See* EX1004, claim 22 (claiming “combined circuit”).

2. “video”

“Video” is not limited to video of any quality, resolution, size, or transfer rate (e.g., real time). The claims are not limited to the examples disclosed in the

specification. *See e.g.*, EX1004, 8:25-32 (disclosing exemplary bit rates and an example where the “user continuously views videos with high picture quality”).

3. **“when an indication from the user indicates to transmit video information using the first radio communication circuit [or “indicates to use the first radio communication circuit”], the controller assigns a connection to the first radio communication circuit for transmitting [or “for receiving”] the video information”**

The prior art discloses each of PO’s interpretations, making construction unnecessary.

During reexamination, PO amended the claim and argued this limitation excludes a controller “automatically” selecting a radio. EX1006, 117-130, 137-140 (distinguishing Tee as “automatically” assigning a connection); 142 (arguing not obvious to replace automatic assignment with assignment in response to a user indication).

In the Litigation, however, PO argues this phrase encompasses the controller “automatically” selecting a radio. EX1024, 309-311 (accusing the “Intelligent Wi-Fi” feature where Petitioners’ phones automatically select either a Wi-Fi or cellular radio).

IV. PRIOR ART REFERENCES

A. EX1008 (“Dua”)

U.S. 2006/0258289 (“Dua”), filed 5/12/2005, published 11/16/2006, is prior art under pre-AIA 35 U.S.C. §§102(a), 102(b), 102(e).

B. EX1009 (“Herle”)

U.S. 7,149,508 (“Herle”), filed 2/5/2003, issued 12/12/2006, is prior art under pre-AIA 35 U.S.C. §§102(a), 102(b), 102(e).

C. EX1010 (“N93”)

Nokia N93 User Guide (“N93”) was publicly available on Nokia’s website at least as of 4/23/2007 when it was archived. EX1007, 1-2. N93 is prior art under pre-AIA 35 U.S.C. §102(a), 102(b).

D. EX1011 (“Rooyen”)

U.S. 2006/0128332 (“Rooyen”), filed 12/13/2004, published 6/15/2006, is prior art under pre-AIA 35 U.S.C. §§102(a), 102(b), 102(e).

E. EX1012 (“Desai”)

U.S. 2006/0274704 (“Desai”), filed 3/23/2006, published 12/7/2006, is prior art under pre-AIA 35 U.S.C. §§102(a), 102(b), 102(e).

F. EX1014 (“BT-Spec”)

The Specification of the Bluetooth System (“BT-Spec”) was publicly available on the Bluetooth website at least as of 2/24/2006 when it was archived. EX1007, 1-2. BT-Spec is prior art under pre-AIA 35 U.S.C. §§102(a), 102(b).

G. EX1015 (“3GPP-Spec”)

3GPP TS 36.211 Technical Specification Group Radio Access Network; Physical Channels and Modulation (“3GPP-Spec”) was publicly available on the

3GPP website at least as of 1/7/2007 when it was archived. EX1007, 1-2. 3GPP-Spec is prior art under pre-AIA 35 U.S.C. §§102(a), 102(b).

H. EX1013 (“Kao”)

U.S. 2004/0264600 (“Kao”), filed 6/29/2004, published 12/30/2004, is prior art under pre-AIA 35 U.S.C. §§102(a), 102(b), 102(e).

I. Analogous Art

Dua, Herle, N93, Rooyen, Desai, BT-Spec, 3GPP-Spec and Kao are analogous art at least because each “relates to a technique to establish connections between a plurality of apparatuses and networks by radio.” EX1004, 1:15-17; EX1002, ¶58.

V. LEGAL STANDARD FOR OBVIOUSNESS

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007)(“KSR”); *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966) (factors). Factor (3) is discussed *passim*. Under Factor (4), PO has not provided any evidence of any nexus for any alleged secondary considerations. Regardless, any alleged secondary considerations are insufficient to overcome the strong showing in this Petition. Factors (1) and (2) are addressed below.

VI. OVERVIEW OF THE GROUNDS AND FOUR RADIOS

A. Grounds

Ground 1 starts with N93's multi-radio cellular phone and "normal" user indications to assign radios for video transfer. Dua teaches obvious hardware implementation details of a multi-radio cellular phone like N93, more explicitly teaches "simultaneous" video transfers/connections, and an NFC radio. Herle teaches obvious over-the-air software update functionality for the cellular phones of N93 and Dua.

Ground 2 adds Rooyen (UMTS/GSM) and Desai (Bluetooth/Wi-Fi) as secondary references teaching that the standards-based radios disclosed in Dua and N93 may be implemented as separate or combined radio circuits.

Ground 2 also adds 3GPP-Spec, BT-Spec, and Kao (802.11a/b/g) as secondary references teaching the modulation schemes and frequencies used by the standards-based radios disclosed in Dua, N93, Rooyen and Desai.

Ground 3 starts with Dua's multi-radio cellular phone and "improved" user indications to assign user radios for video transfer (and "normal" user indications). Herle is relied on for the same reasons as Ground 1.

Ground 4 adds N93 as a secondary reference teaching the implementation details of the "normal" user indications referenced in Dua.

Ground 5 adds Rooyen, Desai, 3GPP-Spec, BT-Spec, and Kao as secondary references for the same reasons they are added in Ground 2.

B. Four Radios

N93 and Dua each disclose a number of standard short-range (Bluetooth/Wi-Fi) and cellular (UMTS/GSM) radios. Each of these radios could satisfy each of the four claimed radios. Dua also discloses an NFC radio, which satisfies the third or fourth radio. Each permutation of the radios is explicitly taught (or at least rendered obvious) by the Grounds. For convenience, Petitioners refer to the following mappings in this Petition:

Mappings	1 st circuit	2 nd circuit	3 rd circuit	4 th circuit*
A: Claims 1, 4-5, 8-12, 14-20, 23-25	Bluetooth	UMTS	GSM	NFC
B: Claims 1, 4-5, 8-11, 14-25	Bluetooth	UMTS	Wi-Fi	NFC or GSM

*Only required by claims 11, 23-25.

The characteristics of these radios would have been known to a POSITA because they were defined by the applicable standards:

Radio	Modulation Scheme	Frequency Band
Bluetooth	GFSK/ $\frac{\pi}{4}$ -DQPSK/8DPSK	2402-2480 MHz

UMTS	QAM/QPSK	2100 MHz
GSM	GMSK	800/1900 MHz
Wi-Fi	(a) OFDM (QAM) (b) CCK/DSSS (g) OFDM (QAM), CCK/DSSS (QPSK)	(a) 5000 MHz (b) 2400 MHz (g) 2400 MHz
NFC	ASK/PSK/QAM	13.56 MHz

EX1014, 198-200 (Bluetooth); EX1015, 21-23 (UMTS); EX1020, [0004], [0052] (GSM); EX1013, Fig. 1, [0028], [0035] (Wi-Fi); EX1021, [0061], [0067] (NFC); EX1002, ¶66.

VII. GROUND 1: N93, DUA, AND HERLE

A. Combination Rationale

N93 discloses a multi-radio, multimedia cellular phone. N93 teaches Bluetooth, Wi-Fi, UMTS and GSM radios, user interfaces (display, buttons, camera, speaker, microphone), and multimedia capabilities (video/audio recording via microphone and camera, playback on display, transmission and receipt of video over each of the four radios). *See* claim 1. N93 teaches its cellular phone contains memories and integrated circuits and runs an operating system and applications for performing the disclosed functionalities. *Id.* In short, N93 teaches a prior art smartphone. EX1002, ¶67.

The video transfer functionality disclosed by N93 includes real time video streaming and video transfer for storage and later playback. EX1010, 59-60 (video call streaming over UMTS), 23-26 (Bluetooth video transfer), 88-91 (UPnP over Wi-Fi, which a POSITA would have known included both streaming and transfer for storage and later playback). Additionally, N93 discloses the phone provides a modem connecting a PC to the Internet using simultaneous connections over Bluetooth to the PC and UMTS to the Internet. *Id.*, 83. This discloses (or at least renders obvious) to a POSITA that video could be streamed or transferred for storage and later playback over both radios, e.g., PC streaming video from the Internet or downloading a video file for later playback. EX1002, ¶68.

Dua also teaches a multi-radio, multimedia cellular phone. Dua teaches the same radios, user interfaces, and multimedia capabilities as N93. Dua expounds on N93's teaching that one radio can transmit/receive video simultaneously with another radio being connected to an internet or home network. Dua additionally teaches a) internal hardware implementation details for a cellular phone like N93 and b) an NFC radio for improved user indications and other functionality. *See infra*. claim 1. It would have been obvious to a POSITA to combine the teachings of N93 with these teachings in Dua. EX1002, ¶69.

The video transfer functionality disclosed by Dua also includes real time video streaming and video transfer for storage and playback. EX1008, [0190]-[0197], [0205]-[0206]; EX1002, ¶70.

Dua's Implementation Details

It would have been obvious for a POSITA to combine N93's teachings related to a cellular phone with Dua's teachings of the internal hardware implementation details of such a phone. N93 states the phone includes integrated circuits, but does not describe them in detail. A POSITA would have been motivated to find such implementation details in the art and been led to Dua. EX1002, ¶71.

For example, N93 teaches its phone includes integrated circuits and includes four radios, Bluetooth, Wi-Fi, UMTS and GSM radios, each of which can transmit and receive video. Dua teaches those radios can be implemented in short-range and long-range transceivers, i.e., the claimed radio communication circuits. N93 teaches the user, via the user interface and operating system, controls each radio to be assigned to perform its function. Dua teaches the operating system runs on a CPU connected to the transceivers to control their assignment. N93 teaches the phone includes a camera, microphone, memory, and application programs for recording still images and video, compressing them using MPEG or JPEG and storing them in memory for immediate (e.g., video call) or later (e.g., file transfer)

transmission. Dua teaches the phone includes a camera with imaging sensors to capture the images, compression circuitry such as a CODEC supporting MPEG and JPEG compression, microphone with audio codec, and memory. A POSITA would have had a reasonable expectation of success in implementing the features described in both references in the combination using Dua's implementation details. Dua's details were known techniques that would yield predictable results as taught by Dua and involve only routine skill. EX1002, ¶72.

Simultaneous

Some Challenged Claims require video transmissions/receipt over one radio and a "simultaneous" connection of a second radio to an internet or home network. N93 teaches simultaneous data packet connections over its UMTS and GSM radios on the one hand, and its WiFi and Bluetooth radios on the other. For example, N93 teaches the phone can be used as a modem for a PC to connect it to the Internet by simultaneously using a Bluetooth connection to the PC and a UMTS or GSM connection to the Internet. EX1010, 83. N93 explicitly teaches there can be a UMTS or GSM data packet connection and a simultaneous Wi-Fi connection. *Id.*, 18. N93 does state that the UI does not support certain options during a "voice call." *Id.*, 24. N93, however, does not disclose any similar limitation related to simultaneous video transfers over Bluetooth and data connections over UMTS.

Thus, a POSITA would have understood N93 to disclose simultaneous Bluetooth video transfers and data packet connections over UMTS. EX1002, ¶73.

Should PO argue that N93 does not sufficiently disclose or render obvious the “simultaneous” limitation, Dua explicitly teaches video transfers over a short-range (Bluetooth) radio and “simultaneous” connection to the Internet over a long-range radio (UMTS) to transfer video. For example, Dua teaches simultaneously transmitting video over the short-range transceiver while connected via 3G (UMTS) radio to the Internet to receive that same video via a SIP connection. EX1008, Fig. 10, [0190]-[0197]. Dua teaches receiving video over the short-range transceiver while simultaneously transmitting it over the network transceiver to a remote device. *Id.*, Fig. 1 (network transceiver 105, short-range transceiver 108, antenna 117), Fig. 10, [0190]-[0197]. A POSITA would have been motivated to support simultaneous video transfers to support the use cases disclosed by Dua. EX1002, ¶74.

A POSITA would have had a reasonable expectation of success in supporting “simultaneous” communications over Bluetooth and UMTS radios in the combination. A POSITA would have known Bluetooth could stream video. EX1014, 103, 1005; EX1022, 8, 11-12; EX1023, [0008] [0014], [0108]. While the claims do not require any minimum transfer rate, Bluetooth’s transfer rate was

similar to 3G (UMTS) transfer rates at the time, which Dua teaches were sufficient.

EX1014, 200 (1, 2, or 3 Mbps); EX1019, p. 6, ll. 6-8 (2 Mbps). EX1002, ¶75.

Supporting simultaneous transfers would simply involve applying a known technique (simultaneous video transfers) to a known device ready for improvement (multi-radio cellular phone) to yield predictable results as taught by Dua. During reexamination 90/014,651, the examiner found—and PO did not dispute—that “simultaneously” performing these claimed functions was “well known” in the prior art. EX1006, 194-195. A POSITA would have known radios like those in the N93 were capable of simultaneously transmitting in the unlicensed and cellular bands. EX1010, 2; EX1017, 16. A POSITA would have found obvious to support simultaneous operation of the radios so that the UMTS and GSM radios could connect to the Internet to receive messages (SMS, MMS, email) while using the Bluetooth radio to transfer/receive video. Supporting simultaneous video transfers would have involved only routine skill. EX1002, ¶76.

Given there is no teaching in either of Dua or N93 that simultaneous data connections over the Bluetooth and UMTS radios should be prohibited, and because of the explicit teachings above that it should be supported, a POSITA would have had no motivation to create a prohibition against simultaneous data connections in the combination. EX1002, ¶77.

NFC

It would have been obvious for a POSITA to combine N93's teachings related to a cellular phone with Dua's teaching that the cellular phone should include an NFC radio circuit. A POSITA would have been motivated to do so based on Dua's explicit teachings that it would enable Dua's "improved" user indication with similarly equipped devices. A POSITA also would have been motivated to add an NFC radio to support the functions of electronic wallets and keys. EX1008, [0054], [0089]; EX1002, ¶78.

A POSITA would have had a reasonable expectation of success in including an NFC radio in the combination. NFC was a known industry standard radio and Dua explicitly teaches what is required to include it in the combination. Supporting NFC in the combination would simply involve applying a known technique (NFC for Dua's "improved" techniques and electronic wallets and keys) to a known device ready for improvement (multi-radio cellular phone) to yield predictable results as taught by Dua. Supporting NFC in the combination would have involved only routine skill. EX1002, ¶79.

Over-The-Air Updates

It would have been obvious to combine each of N93's and Dua's teachings with Herle's teaching of an over-the-air ("OTA") update for software (operating system and applications) in a cellular phone. N93 discloses running a Symbian operating system and installed applications. EX1010, 2, 72, 98, 111, 114-116. Dua

discloses its cellular phone runs an operating system and applications. EX1008, [0060], [0078]. N93 discloses updating or repairing an existing application. EX 1010, 115. Dua also teaches that software on its devices may be “updated” with new capabilities. EX1008, [0151], [0154]. N93 and Dua do not explicitly describe the update process, but a POSITA would have been motivated by N93 and Dua to find known software update processes for similar devices and been led to Herle. EX1002, ¶80.

Herle provides the express motivation to incorporate its OTA update process into cellular phones like N93’s and Dua’s to provide upgraded software, bug fixes, and newer versions. EX1009, 1:39-45. Herle explains OTA is an “important aspect” to remove the need for a customer to visit a service center. *Id.*, 1:24-38. Herle correctly notes that such updates were known in the computer industry, but that mobile devices have more limited resources and different hardware (like limited flash memory) that makes updating more difficult. *Id.*, 1:46-2:11. Herle teaches an improved OTA update process including notifying a mobile device of the availability of an upgrade and a “delta file” that minimizes transmission and storage requirements. *Id.*, 2:32-3:67. A POSITA would have been motivated to implement Herle’s update process in the combination for these reasons. EX1002, ¶81.

Adding Herle's update process would simply involve applying a known technique (OTA updates for cellular phones as taught by Herle) to a known device ready for improvement (cellular phone) to yield predictable results (cellular phone with OTA update capability). *KSR*, 550 U.S. at 416; EX1002, ¶82.

A POSITA would have had a reasonable expectation of success in making the combination. The smartphone described by N93 and Dua is precisely the type of cellular phone Herle teaches should be improved by its upgrade process. EX1009, Fig. 2; EX1008, Fig. 1. Dua discloses the hardware components Herle discloses as being required for its update process (e.g., radios, processor, memory). EX1008, Fig. 1. N93 and Dua disclose the phones already have the capability of responding to OTA inquiries to provide their current software version information. EX1010, 115; EX1008, Fig. 7, [0141]. A POSITA would have just needed to implement the upgrade in the manner taught by Herle. EX1009, Fig. 2 (262, 263, 264), Fig. 4. The modifications taught by Herle would have involved only routine skill. EX1002, ¶83.

B. Claim 1

1. [1pre]

The combination discloses or renders obvious a “video processing apparatus (multi-radio, multimedia cellular phone).”¹ EX1010, 10, 23-25 (record videos), 57-66 (cellular calls); EX1008, Fig. 1, [0057]-[0058] (cellular phone media player); *see also* [1a]-[11]; EX1002, ¶84.

2. [1a]

The combination discloses or renders obvious “a first radio communication circuit implementing a first transmission scheme (Bluetooth) having a first modulation scheme ($\text{GFSK}/\frac{\pi}{4}$ -DQPSK/8DPSK) and a first transmission frequency band (2402-2480 MHz), the first radio communication circuit capable of transmitting video information (stored in Gallery) by radio or receiving information by radio (receiving video) using the first transmission frequency band (send/receive video over Bluetooth).” EX1010, 23-26 (send/receive via Bluetooth), 31-33, 83-87, 125 (circuits); EX1008, Figs. 1 (short-range transceiver 108 for Bluetooth), 7 (Bluetooth capability), 8B, 10, 18, [0059]-[0064] (circuits and

¹ The first sentence includes the language of the limitation at issue with exemplary arguments and evidence. Petitioners rely on all arguments and evidence provided with respect to a limitation (including any cross-referenced sections).

hardware for Bluetooth), [0137], [0156]-[0158] (wireless video transmission via Bluetooth), [0172], [0190]-[0192] (receiving video via Bluetooth), [0194], [0196], [0203]; EX1002, ¶85.

N93 discloses the cellular phone comprises electronic circuits and includes a Bluetooth radio communication circuit. EX1010, 10,14-16, 23-24, 33, 83-87, 125. N93 discloses using the Bluetooth radio to send and receive video and still images. *Id.*, 23-26, 31-33, 83-87. N93 teaches the user can record still pictures and video (with audio) using the imaging circuit in the camera and microphone, which is compressed and stored as a video file in the Gallery. *Id.*, 23-26; *see also* [1d]-[1e], [1g]. N93 discloses that the users can select a video clip or image in the Gallery and send it via Bluetooth and receive the same from another user. *Id.*, 23-26, 31-33, 83-87, 88; *see* [1h]-[1j], 17; EX1002, ¶86.

Dua also discloses the cellular phone comprises “integrated circuit chips and circuitry” including a short-range transceiver that comprises a Bluetooth radio communication circuit and provides additional implementation details. EX1008, Fig. 1 (transceiver 108), [0059]-[0062] (circuits and hardware components), [0062]-[0064] (combined circuit, short-range transceiver 108 supporting Bluetooth, Wi-Fi, etc.). Thus, transceiver 108 is a “combined circuit” that includes a Bluetooth radio circuit. *See* EX1004, Claim 22; EX1002, ¶87.

Dua also discloses the short-range transceiver sends and receives video using Bluetooth. EX1008, Fig. 7, [0062], [0137], [0156], [0196], [0203], [0206]-[0207]. Dua discloses video could be sent or received between media players using Bluetooth, *id.*, [0172], or received from a local video camera using Bluetooth. *Id.*, Fig. 10, [0190]-[0192]. Dua discloses the video could be converted and stored first or buffered while being converted and relayed. EX1008, Fig. 7, Fig. 8B (stored content 542), Fig. 18 (stored video 662), [0172] (converting), [0194] (buffering); 1[d]-[1e], 1[g]. Dua discloses the user can select previously recorded video to send via Bluetooth. EX1008, Fig. 8B (stored content 542), Fig. 18 (stored video 662); [1h]-[1j], 17; EX1002, ¶88.

N93 and Dua's disclosure of Bluetooth inherently discloses to a POSITA the modulation scheme ($\text{GFSK}/\frac{\pi}{4}$ -DQPSK/8DPSK) and frequencies (2402-2480 MHz) required by the Bluetooth standard. EX1014, 198-200, 195; EX1017, 4. In the alternative, the Bluetooth modulation schemes and frequencies would have been obvious based on the knowledge of a POSITA as evidenced by those same references. EX1002, ¶89.

3. [1b]

The combination discloses or renders obvious "a second radio communication circuit implementing a second transmission scheme (UMTS) having a second modulation scheme (QPSK/QAM) different from the first

modulation scheme (GFSK/ $\frac{\pi}{4}$ -DQPSK/8DPSK) and a second transmission frequency band (2100MHz) different from the first transmission frequency band (2402-2480 MHz), the second radio communication circuit capable of connecting by radio to an internet or a home network to transmit and receive information using the second transmission frequency band (Internet access through cellular network).” EX1010, 8 (“UMTS 2100 networks”), 15, 61-64; EX1008, Fig. 1 (transceiver 105), [0059]-[0061], [0067], [0068], [0069]; *see* [1a] (different bands/modulations); EX1002, ¶90.

N93 discloses the cellular phone includes circuits and a UMTS radio communication circuit operating in the 2100 MHz band. EX1010, 8, 15, 59-62, 64, 92, 106, 110, 113, 125. The UMTS radio is a 3G radio that connects to the Internet to transmit and receive information such as video calls, web browsing, e-mail, MMS, video clips, etc. EX1010, 15, 59, 60-61, 64, 91-92 (connection manager), 106 (“connect to the Internet”), 113; EX1002, ¶91.

Dua also discloses the cellular phone includes a UMTS transceiver by disclosing a 3G radio that is fully compliant with all worldwide 3GPP standards and provides additional implementation details. EX1008, [0069]. Dua discloses the transceiver interacts with the CPU 109 to implement radio communication protocols and higher-level networking and application layer protocols (like TCP/IP, SIP, RTP, HTTP) to communicate over the radios and Internet. EX1008,

[0066]-[0069]. Dua also discloses the UMTS radio connects by radio to the Internet to transmit and receive video using SIP connections. EX1008, [0068], [0140], [0183]-[0189]; EX1002, ¶92.

Dua's disclosure of a radio to support "all worldwide 3GPP and 3GPP2 standards" (EX1008, [0069]) inherently discloses to a POSITA a UMTS radio using UMTS modulation schemes (QPSK, 16QAM, and 64QAM) and frequency (2100 MHz), as required by those standards. EX1015, 2, 21-23, 15; EX1010, 8; EX1011, [0010], [0019]. Dua's disclosure of "fully compliant" radio also inherently discloses UMTS with TDD, such that information is transmitted and received on the same frequencies. EX1015, 7. In the alternative, the UMTS modulation schemes and frequencies would have been obvious based on the knowledge of a POSITA, as evidenced by those same references. EX1002, ¶93.

4. [1c]

The combination discloses or renders obvious "a third radio communication circuit (GSM/Wi-Fi) capable of transmitting information and using a third transmission frequency band (GSM: 900, 1800, 1900 MHz; Wi-Fi: 2.4GHz or 5GHz)." EX1010, 8, 15-19, 30, 42-43, 53, 60, 78, 88-89, 91-92, 106-109, 112-113, 121, 125; EX1008, [0059]-[0061], [0066]-[0069], [0174]; EX1002, ¶94.

Mapping A: GSM

N93 discloses the cellular phone includes a GSM radio (third radio circuit) to connect to an internet and is capable of transmitting information (SMS or data over GPRS and EDGE) using the 900, 1800 and 1900 MHz transmission frequency bands. EX1010, 7, 15, 53 (texts), 91-92 (data connections), 106-107(connect to the Internet), 113, 125 (electronic circuits). EX1002, ¶95.

Dua also discloses the cellular phone includes a GSM radio communication circuit in network transceiver 105 for interfacing with the cellular network and connecting to the Internet and provides additional implementation details. EX1008, Fig. 1 (transceiver 105), [0059] (integrated circuit chips and circuitry) [0066] (GSM cellular network to access the Internet), [0067]-[0069]. A GSM radio is also disclosed based on Dua's teaching of full compliance with the worldwide standards. *Id.*, [0069]; EX1002, ¶96.

N93 and Dua's disclosure of GSM radios inherently discloses to a POSITA the GSM frequency bands required by the relevant standards. EX1010, 8 (900, 1800, 1900); EX1011, Fig. 4a (412b), [0039]-[0040], [0080]-[0087] (GSM RFIC transceiver 900 and 1800 MHz). In the alternative, the GSM frequencies would have been obvious based on the knowledge of a POSITA, as evidenced by those same references. EX1002, ¶97.

Mapping B: Wi-Fi

N93 and Dua each disclose an additional “third radio communication circuit,” including a Wi-Fi radio circuit in short range radio transceiver 108 (802.11b or g at 2.4GHz or 802.11a at 5GHz), which can transmit media and connect to an internet on their respective third transmission frequency band. EX1010, 18, 125; EX1008, [0062], [0066]; EX1002, ¶98.

N93 and Dua’s disclosure of the Wi-Fi radio communication circuits inherently discloses to a POSITA the frequency bands and modulation schemes as defined by the relevant standards. EX1013, Fig. 1 (2.4 GHz, 5 GHz, both 802.11a and 802.11g use OFDM). In the alternative, the Wi-Fi frequencies and modulation schemes would have been obvious based on the knowledge of a POSITA, as evidenced by those same references. EX1002, ¶99.

5. [1d]

The combination discloses or renders obvious “an imaging circuit (camera with imaging sensors) capable of receiving video information and still picture information via an optical system (camera optics).” EX1010, 12, 23-29 125; EX1008, Fig. 1 (Camera 104), Fig. 3B, Fig. 7, [0061], [0085], [0165]-[0166], [0176], [0201]; EX1002, ¶100.

N93 discloses the phone includes cameras for taking still images and video. EX1010, 23-29, 125; EX1002, ¶101.

Dua also discloses the cellular phone includes a camera (Camera 104) to record videos and take still pictures and provides implementation details including lenses, filters and image sensors. EX1008, Fig. 1, Fig. 3B, [0061], [0085]. Dua discloses that Camera 104 includes imaging circuits such as CCD or CMOS sensors, which are imaging circuits. EX1008, Fig. 1, [0061]. Dua discloses Camera 104 can also include “optics (e.g., lenses, splitters, filters).” EX1008, [0061]. A POSITA would have understood from Dua’s teachings that the light passes through the optics and is sensed by the sensor, such that the sensor (imaging circuit) receives the information via the optics (optical system). Dua discloses the information includes videos and still pictures. *Id.*, [0057], [0058], [0142], [0166]; EX1002, ¶102.

6. [1e]

The combination discloses or renders obvious “a compression circuit (Video CODEC 107) compressing the still picture information using a first type of compression method (JPEG) and the video information using a second type of compression method (.3gp format (MPEG) with QCIF resolution or any MPEG).” EX1010, 23, 35, 42 (JPEG), 2, 23 (MPEG-4), 25 (.3gp-QCIF), 125; EX1008, Fig. 1 (CODEC 107), Fig. 7, [0058], [0142]-[0143], [0172], [0198], [0205]; EX1002, ¶103.

N93 renders obvious that the phone compresses the still pictures using one type (JPEG) and video using a different type (.3gp-QCIF/MPEG) of compression. EX1010, 23, 35, 42 (JPEG), 2, 23-25 (.3gp-QCIF/MPEG and video settings), 125 (electronic circuits). A POSITA would have understood that a .3gp file format was developed by 3GPP for MMS video sharing and 3G networks and required MPEG-4 compression. Conversion to QCIF, which is a lower resolution, also results in a smaller (i.e., compressed) file size. EX1002, ¶104.

Dua also discloses a camera (Camera 104) is connected to Video CODEC 107 supporting MPEG and JPEG compression and provides additional implementation details. EX1008, Figs. 1, [0061]. Dua discloses the media player may convert the files into formats supported by the receiving device or storage in the media player. *Id.*, [0058], [0143], [0172], [0198], [0205]. Dua discloses MPEG and JPEG digital formats, which a POSITA would have known were the most common digital formats for video and still picture information. *Id.*, Fig. 7 (showing support for JPEG, MPEG), [0142]. It would have been obvious to a POSITA from the portions of Dua cited above that Video CODEC 107 would have been a compression circuit because that is its purpose among the other circuits illustrated in Figure 1, and it is more efficient than software-based compression. Dua also discloses the CPU 109 is a compression circuit because it runs the media manager

application which performs conversion and compression. *Id.*, [0058] (media manager application on CPU); EX1002, ¶105.

7. [1f]

The combination discloses or renders obvious “an input device (keypad) capable of receiving a user indication (key presses).” EX1010, 10, 12, 48, 52-54, 84, 91-92, 106, 121 (press and select as user indication); EX1008, Figs. 2A-2C (keypad 200, keypad interface 195, RFID activation button 118), [0072]-[0073], [0076], [0082], [0196], [0227]; 1[j]; EX1002, ¶106.

N93 discloses the phone includes a keypad to receive user key presses as user indication. EX1010, 10, 12 (keypad); *see* 1[j] (user indications). These user indications are received through key presses. EX1010, 19, 48, 52-54, 84, 91-92, 106, 121 (“Press...and select...”). EX1002, ¶107.

Dua also discloses the cellular phone comprises a keypad, keypad interface, and RFID activation button. EX1008, FIGS. 2A-2C (), [0072]-[0073], [0076], [0082]. The keypad interface 195 comprises a button 186 to initiate a transmission to a target device, and joy stick 190 for the user to make selections. *Id.*, [0078], [0227]. The RFID activation button 118 is pressed by the user to establish wireless connectivity with a target device and transmit media content. *Id.*, [0196]; EX1002, ¶108.

8. [1g]

The combination discloses or renders obvious “an accumulation circuit (memory, hard drive) capable of accumulating video information received by the imaging circuit after the video information is compressed by the compression circuit (MPEG compression).” EX1010, 2, 14, 20-26, 30-33, 78-79; EX1008, Fig. 1 (memory 106, hard drive 112, video CODEC 107), [0059], [0142], [0194], [0198], [0205]; [1e] (compression circuit) EX1002, ¶109.

N93 discloses the phone includes accumulation circuits (e.g., memory card, device memory, memory card) capable of storing video captured locally, or received over a radio, for later playback or transmission. EX1010, 14, 20-22, 25 , 24, 30, 31 ,32, 33, 78-79. N93 renders obvious that the stored video files have been compressed using MPEG. *Id.*, 2, 23 ; EX1002, ¶110.

Dua also discloses the cellular phone comprises accumulation circuits (memory, hard drive) for storing video captured locally, or received over a radio, for later playback or transmission and provides additional implementation details. EX1008, Fig. 1 (memory 106, hard drive 112), [0059], [0166], [0198], [0205]-[0207]. Dua discloses buffering, another example of accumulation, of video (live/previously stored) for purposes of flow control when transmitting and receiving. *Id.*, [0194]. And Dua shows Video CODEC 107 between the camera 104

and memory 108/hard drive 102 such that the video is stored after being compressed by the Video CODEC 107. *Id.* Fig. 1, [0142]; EX1002, ¶111.

9. [1h]

The combination discloses or renders obvious “a controller (CPU 109) controlling assignment of connection of each of the first, second, and third radio communication circuits.” EX1010, 2, 98, 111, 114; EX1008, Fig. 1 (CPU 109), [0059], [0066]; EX1002, ¶112.

N93 discloses the phone is a computing device running the Symbian operating system with a UI for presenting the user with options on the display and responding to the user’s input and selection of radios to transmit or receive video or connect to the Internet or home network. EX1010, 2, 98, 111, 114; EX1002, ¶113.

N93 discloses the controller running the Symbian OS controls the UI and assignment of each of the Bluetooth UMTS, GSM, and Wi-Fi radios. EX1002, ¶114.

For Bluetooth, see [1j]. EX1002, ¶115

For UMTS and GSM, N93 discloses the operating system running on the controller has a user interface whereby the controller receives user indications to assign the UMTS or GSM radio to transmit or receive video as follows: (1) user exits the “Offline profile” (“Tools>Profiles”) to indicate to the controller to

activate or turn on the UMTS or GSM radio (EX1010, 101), (2) user indicates the controller should assign only UMTS or only GSM using the “Network Mode” setting (*id.*, 113), (3) user indicates whether the controller should automatically search for and select an available network, or whether it should be manual (*id.*), (4) user indicates the controller should define a packet data access point (*id.*, 107), and (5) user indicates whether the controller should connect “When available” or “When needed,” which will only connect when the user manually starts an application that requires it. *Id.*, 108-109. EX1002, ¶116

A user can then indicate to the controller to assign a connection via the specified UMTS or GSM radio to transmit video by defining the specified network as an access point for multimedia messages (EX1010, 48, 53-54, 106), or e-mail (*id.*, 48, 54-55, 106) and then going into Gallery and selecting Send>Via Multimedia or Send>Via e-mail. *Id.*, 32-33; EX1002, ¶117.

Additionally, for the UMTS radio, N93 discloses the user can indicate to the controller to assign a connection via UMTS to transmit video by selecting “Options>Share video>Live” during a voice call, which will cause the controller to assign a SIP connection over the UMTS radio. *Id.*, 61-62. The user can send an MMS message during a voice call, which will also cause the controller to assign the UMTS radio. *Id.*, 64. The user can indicate the controller should assign a connection via UMTS to receive a video call. *Id.*, 62; EX1002, ¶118.

For Wi-Fi, N93 discloses the controller displaying a prompt to the user to turn Wi-Fi scanning on to scan for a network, join the network, and create an IP or other connection to send/receive data over the Wi-Fi network, for example, using home share to send/receive videos. *Id.*, 15, 17-19, 30-31, 53, 88-92, 106-109, 121; EX1002, ¶119.

Dua also discloses the phone is a computing device running an operating system and applications and provides additional implementation details including explicitly identifying microprocessor/CPU 109, which controls assignment of connection of each of Dua's radios. EX1008, Fig. 1 (showing CPU 109 with lines connecting each component). [0059], [0066]. Dua discloses CPU 109 runs the operating system and media player and receives the indications from the user via the user interface. *Id.*, [0059]-[0060]; EX1002, ¶120.

Dua discloses CPU 109 controls each assignment of each connection of its radios. Dua discloses CPU 109 controls assignment of the radios because the CPU 109 implements the radio communication protocols with the transceivers and higher-level networking and application layer protocols (SIP, TCP/IP, SIP, RTP, HTTP) to communicate media over the radios and Internet. EX1008, [0066]-[0069]. Dua discloses CPU 109 controls assignment of the short-range radios (Bluetooth, Wi-Fi) to connect to a source/target based on profile information received via one of 1) the NFC radio, 2) from a user's selection of a stored profile,

or 3) a user's manual configuration. *See* [1j]. Dua discloses CPU 109 controls assignment of the cellular radios (UMTS, GSM) based on the SIP protocol and target information stored in a buddy list for the buddy indicated by the user.

EX1008, [0066]-[0069], [0178]-[0185], [0192]-[0194]. Dua discloses the CPU 109 controls assignment of connection of the NFC radio based on the user pressing an activation button. *Id.*, Fig. 1 (118), [0070]-[0074], [0090], [0095]-[0098]; EX1002, ¶121.

10. [1i]

The combination discloses or renders obvious “wherein the first radio communication circuit (Bluetooth) can transmit video information accumulated in the accumulation circuit to an external device by radio.” EX1010, 24, 31, 33, 83-86; EX1008, Fig. 8B, Fig. 18, [0166]-[0167], [0177], [0194], [0225]; *see* 1[a]; EX1002, ¶122.

N93 discloses the Bluetooth circuit can transmit video information accumulated in memory (Gallery) to an external device by Bluetooth and receive video via Bluetooth and store same in the Gallery. EX1010, 24, 33, 83-87. N93 also discloses receiving video clips through Bluetooth connectivity and saving the video clips in the device memory. EX1010, 31; EX1002, ¶123.

Dua also discloses that Bluetooth can be used to transmit/receive video to/from an external device and provides additional implementation details. *See*

[1a]. Dua discloses transmitting video previously saved in memory. EX1008, Fig. 8B (stored content 542), Fig. 18 (stored video 662), [0166]-[0167], [0177], [0225]. Dua also discloses transmitting video currently being captured or received by another radio, dynamically converting it and buffering it for flow control prior to transmission. EX1008, [0194]. Each satisfies this limitation. EX1002, ¶124.

11. [1j]

The combination discloses or renders obvious “wherein the controller controls assignment of connection for each of the first (Bluetooth) and second radio communication circuit (UMTS) in response to receiving an indication from a user such that when an indication from the user indicates to transmit video information using the first radio communication circuit (Bluetooth video transfer), the controller assigns a connection to the first radio communication circuit for transmitting the video information.” EX1010, 31, 33, 83-87; EX1008, Fig. 8A, Fig. 8B, [0009], [0160], [0147], [0196], [0215]; [1g]; EX1002, ¶125.

For UMTS, *see* [1h], discussing how the controller controls assignment of the UMTS radio in response to receiving an indication from a user during a voice call, e.g., “Options>Share video>Live” and send MMS. EX1010, 61-62, 64; EX1002, ¶126.

For Bluetooth, N93 discloses the operating system running on the controller has a user interface whereby the controller receives the claimed user indication and performs the claimed assignment for transmitting video as follows:

- (1) user indicates to the controller to turn the Bluetooth radio on “Connect>Bluetooth>On” (EX1010, 84-85, 87);
- (2) user indicates to the controller to make the Bluetooth radio visible to other devices using “My phone’s visibility > Shown to all” (*id.*, 84-85);
- (3) user indicates to the controller to assign a Bluetooth radio to detect a Bluetooth external device to send a video to by, e.g., opening the Gallery application and selecting an item (video clip) to send using “Options>Send > Via Bluetooth” (*id.*, 33 (send video from Gallery via Bluetooth), 83 (“video clip”), 85 (Gallery), 86 (send via Bluetooth)), the user can interrupt the search by selecting “Stop” (*id.*, 86);
- (4) in response to a displayed prompt showing the detected Bluetooth external devices, the user indicates the particular device with which the user wants the controller to establish a connection to transfer the video (*id.*);
- (5) in response, if previously paired (or once paired using the “Pair devices” process), the N93 establishes a connection with the indicated device, transmission of the video clip begins, and “Sending data” is displayed. *Id.* EX1002, ¶127.

For reception of video via Bluetooth, the controller assigns the Bluetooth radio to receive video when the user provides an indication as follows: (1) turn Bluetooth on, (2) make the phone visible, (3) search for and, (4) pair with a transmitting device as shown above and (5) “accept” the transmission. EX1010,49, 84-87. N93 also discloses receiving different user indications for the controller to assign a connection to the UMTS radio to receive video. *Id.*, 59, 63 (key press to receive UMTS video call), 48, 106 (key presses to define network access point, e.g., UMTS to receive MMS); EX1002, ¶128.

PO accuses this “normal” user indication technique for Bluetooth video transfer in the Litigation. EX1024, 64, 325-330 (transmit), 1273-1281 (receive); EX1002, ¶129.

Dua discloses that prior art “normal” techniques required the user to manually configure the radio for transmission. EX1008, [0009], [0123]-[0124]. A POSITA would have recognized the N93’s Bluetooth implementation as an example of such a “normal” technique. EX1002, ¶130.

It would have been obvious to a POSITA to include the “normal” technique disclosed in detail in N93 and mentioned in Dua in the combination to support data exchanges with devices that did not support Dua’s “improved” techniques. EX1002, ¶131.

12. [1k]

The combination discloses or renders obvious “wherein the controller (CPU) controls each of the first and second radio communication circuit so that the first radio communication circuit (e.g., Bluetooth) transmits video information and the second radio communication circuit (e.g., UMTS) connects to the internet or the home network simultaneously.” *See* [1a], [1b], 1[h], 1[i], 1[j]; EX1010, 18, 83; EX1008, Fig. 10, Fig. 11, [0190], [0195]-[0196], [0203]; EX1002, ¶132.

N93 explicitly teaches the phone can be used as a modem for a PC by simultaneously using a Bluetooth connection to the PC and a UMTS connection to the Internet. *Id.*, 83. A PC can be a target Bluetooth external device for video transfer. *Id.*, 86. N93 also explicitly teaches there can be simultaneous Wi-Fi and UMTS data packet connections. *Id.*, 18. N93 states that the Camera application does not support a Send option during a “voice call.” *Id.*, 24. But N93 does not disclose any similar limitation related to data connections, which are explicitly supported as described above, or the Gallery application. N93 discloses Bluetooth can be used while running other applications. *Id.*, 84. Thus, a POSITA would have understood N93 discloses simultaneous Bluetooth video transfers and data packet connections over UMTS. EX1002, ¶133.

Dua also discloses the controller controls the Bluetooth and UMTS radios (*see* [1h]-[1j]) so that video can be transmitted and received over the Bluetooth

transceiver with local devices simultaneously with the UMTS radio connecting to the Internet to transmit and receive the video with remote devices. EX1008, Fig. 10 and [0191]-[0200] (player 100A receiving video via Bluetooth and transmitting the video via UMTS to internet 730, player 100B receiving video via UMTS from internet 730 and transmitting the video via Bluetooth to television 751), Fig. 11 and [0201]-[0208] (media player 100B receiving video through internet 730 using cellular and transmitting the received video through Bluetooth to television 851). Dua explicitly teaches the video transmission/reception over the first radio (Bluetooth) can be “simultaneous” with the internet connection via the second radio (UMTS) for video transmission/reception. *Id.*, Figs. 8a-8b and [0155]-[0172], Fig. 9 and [0173]-[0189], Fig. 16 and [0223], Fig. 17 and [0224], [0014], [0063], [0176], [0184], [0192] (each showing simultaneous transmission for live or internet sources). For example, Dua’s cellular phone receives incoming media such as real-time video from a local source using Bluetooth and/or a remote source over the Internet using UMTS and simultaneously transmits the real-time video to multiple target devices over the Internet. *Id.*, [0176], [0184]. Additionally, Dua’s cellular phone receives the incoming media and simultaneously transmits the incoming media to a local target device via Bluetooth. *Id.*, [0155]-[0156]. EX1002, ¶134.

It would have been obvious to a POSITA to support the simultaneous operation of these radios in the combination as claimed to support the Bluetooth video transfer functionality while the UMTS radio connects to the Internet to, e.g., simultaneously send/receive the video being transferred. *See* Section VII.A.

13. [11]

The combination disclose or renders obvious “wherein the second or third radio communication circuits (e.g., UMTS/GSM radios) receive a signal (notification message, list/notice of updates, delta file) from the internet indicating that an update for an operating system (cellphone’s OS) of the video processing apparatus is available, and the video processing apparatus executes an update process (uses the delta file to create an updated OS image) such that an updated operating system of the video processing apparatus is stored in the video processing apparatus after execution of the update process.” EX1010, 2, 72, 98, 111, 114-116; EX1008, Fig. 7, [0058], [0060], [0141], [0143], [0151], [0154]; EX1009, Figs. 1-4, 1:14-3:30, 6:9-7:18, 7:25-36, 7:66, 8:3-38 (software update); EX1002, ¶136.

N93 discloses its cellular phone running software, including an operating system and applications. EX1010, 2, 72, 98, 111, 114-116 (application download). N93 discloses its cellular radios being connected to the Internet. *See* [1b], [1c]; EX1002, ¶137.

Dua also discloses its cellular phone running software, including an operating system and applications. EX1008, [0058], [0060]. Dua discloses that the software on the cellular phone can be updated, but does not explicitly discuss how. *Id.*, [0141], [0143], [0151], [0154]. Dua discloses UMTS and GSM radios are connected to the Internet. *See* [1b], [1c]; EX1002, ¶138.

Herle discloses a cellular phone running software and further discloses updating that software (OS and applications) over the air (OTA updates). EX1009, Fig. 2, 1:14-3:30, 6:9-19, 6:20-7:18 (phone components); EX1002, ¶139.

Herle discloses the update process can begin with the mobile station 111 receiving via its cellular radio a notification message from the Internet from the upgrade server 300. *Id.*, Fig. 1 (internet and wireless network 100), Fig. 2 (RF transceiver 210), Fig. 3 (“To/From MS 111 Via Internet”), Fig. 4 (405), 7:25-29, 8:13-18 (“a notification message from upgrade server 300”). This notification message “informs MS 111 that an upgrade is available.” *Id.*, 7:66. MS 111 provides the upgrade server with its software version. *Id.*, Fig. 4 (405, 410, 415), 8:3-11; 8:18-33. MS 111 may request a list of available upgrades, which list will be provided by the upgrade server, or the upgrade server may simply tell MS 111 the upgrade is available. *Id.*, 7:30-36. Upgrade server 300 uses version information provided by MS 111 to produce and send the correct delta file. *Id.*, Fig. 4 (405, 410, 415), 8:3-11; 8:18-33. MS 111 receives the delta file as an OTA download.

Id., Fig. 4 (420, 425), 8:11-12, 8:33-38. Each of the signal containing the notification message, the signal containing the list or upgrade notice, and the signal containing the delta file satisfies the claimed “signal” because each is received by a cellular radio from the internet, and indicates an upgrade is available. The notification message indicates an upgrade is available in general, the list or notice specifically indicates which upgrade is available for that device, and the delta file indicates the specific delta file upgrade that is available for that device. EX1002, ¶140.

MS 111 executes an update process by storing the delta file, verifying the delta file, executing a program to convert the original image into the new image file using the delta file, and then rebooting and executing the new image file. *Id.*, Fig. 4 (425, 430), 8:34-48. Thus, the updated software (OS/application) is stored in MS 111 after execution of the update process. EX1002, ¶141.

It would have been obvious to a POSITA to implement Herle’s OTA upgrade process in the combination using the UMTS or GSM radios. *See* Section VII.A (combination).

C. Claim 4

The combination discloses the claim 1 video processing apparatus (cellular phone) further comprises a radio interface capable of receiving video by radio (e.g., Bluetooth, UMTS, GSM, or Wi-Fi radio interfaces) wherein the

accumulation circuit accumulates the video information received via the radio interface (stored in memory, hard drive, buffered for flow control and/or conversion) and the first radio communication circuit (Bluetooth) is further capable of transmitting the accumulated video information. *See* Claim 1. The radio interfaces are provided by antennas, radio circuits and associated programming. *See* Claim 1 [a, b, h, j]; EX1002, ¶143.

N93 discloses the cellular phone can receive video over the Bluetooth or UMTS radio interfaces as a “video clip,” store it in memory in the Gallery, and then transmit it over the first radio (Bluetooth). *See* Claim 1; EX1002, ¶144.

Dua discloses the cellular phone can receive video over the UMTS radio interface as “Internet Content” and transmit it over the Bluetooth radio circuit in real time with local buffering and conversion. EX1008,[0143], [0161], [0172], [0194]-[0197]. Dua discloses the cellular phone can receive a video feed over Bluetooth or Wi-Fi and transmit it over UMTS in real time with local buffering and conversion. *Id.*, [0143], [0191]-[0192], [0194]. Dua also discloses the phone can store video from any of those sources and later transmit it over the first radio (Bluetooth) as “Stored Content.” *See* Claim 1; EX1002, ¶145.

D. Claim 5

1. [5pre]

The combination discloses or renders obvious a “display apparatus (display photos, videos, multimedia)”. EX1010, 10, 23-26 (video/photo), 31 (Gallery), 59-60 (video calls), 62 (shared video), 78-79; EX1008; Figs. 1, 2A-2C (display screen 102), [0061], [0205] (video feed on display screen). EX1002, ¶146.

2. [5a]-[5c]

See [1a] (receive/transmit video over Bluetooth), [1b]-[1c].

3. [5d]

The combination discloses or renders obvious “a compression circuit capable of implementing a plurality of compression schemes (.3gp-QCIF/MPEG or JPEG) including a first compression scheme (.3gp-QCIF/MPEG), the compression circuit compressing the video information received by the first communication circuit (Bluetooth) using the first compression scheme (.3gp-QCIF/MPEG).” *See* [1e]; 1[a], 1[j]; EX1002, ¶148.

N93 does not impose a size or format requirement for videos received via Bluetooth, but discloses 300KB size and .3gp-QCIF file format requirements for sharing video clips via UMTS. EX1010, 25. N93 discloses video might need to be converted prior to sharing. *Id.*, 61-62. Thus, N93 renders obvious that a video might be received via Bluetooth in one format and would be converted into .3gp-QCIF file format (including MPEG compression) for video sharing. A POSITA

would have understood that conversion to be a compression scheme. EX1002, ¶150.

Dua teaches that the compression circuit in the media player converts files received via radio (e.g., Bluetooth) into the compression format supported by the target device or for storage in the media player itself. *Id.*, [0058] (media manager performing conversion), [0142]-[0143], [0172], [0198], [0205]. EX1002, ¶151.

Thus, in the combination, it would have been obvious to support compression of video received via Bluetooth to be able to share or store that video. EX1002, ¶152.

4. [5e]

The combination discloses or renders obvious “a display capable of displaying the information received by the first radio communication circuit or the second radio communication circuit.” *See* [1a], [1b], [15], *infra* (user selecting a video to be displayed); EX1010, 31 (display video clips received over Bluetooth or UMTS: e.g., MMS, e-mail), 62 (display live video received over UMTS); EX1008, Fig. 10 (displaying video from a local video camera 712), Fig. 17 (videos from the Internet), Fig. 20, [0191]-[0193], [0205], [228]; EX1002, ¶153.

N93 discloses a display for displaying video received over the first radio communication circuit (Bluetooth) and stored and selected for playback. *See* [1a]; [15]; EX1010, 31. N93 discloses displaying information (video) received by the

second radio communication circuit via the internet (MMS or SIP video call via UMTS). *See* [1b]; [15]; EX1010, 31, 62; EX1002, ¶154.

Dua also discloses that a media player can receive media content from local devices (short range radios like Wi-Fi or Bluetooth) or over the network (UMTS/GSM) and allows the user to view the content on the display. EX1008, [0205]. For example, Dua discloses that a media player can receive video information from a video camera via Bluetooth. *See* 1[a]. As another example, Dua discloses receiving Internet content via cellular radios. EX1008, Fig. 17; *see* 1[b]. Dua discloses that the display can play video received from any kind of source. EX1008, Fig. 20, [0228] (display playing a video being transmitted to a target device), Fig. 15, [0221] (video transmitted includes live content received from a video camera via Bluetooth or Internet content received via cellular radios). A POSITA would have understood that Dua displays video information received using Bluetooth and also displays information received using cellular radio. EX1002, ¶155.

5. [5f]

See 1[h].

6. [5g]

See 1[j] (receiving and transmitting video via Bluetooth).

7. [5h]

See 1[k] (receives video via Bluetooth and connects to internet via UMTS simultaneously).

8. [5i]

See [11].

E. Claim 8

1. [8pre]

See Claim 4 (radio interfaces e.g., Bluetooth/UMTS capable of receiving video).

2. [8a]

See 5[e] (displaying video, e.g., Bluetooth/Gallery, UMTS/video share or video call).

F. Claim 9

As shown above for claim 1, the combination discloses or renders obvious the steps as claimed in method claim 9. EX1002, ¶162.

1. [9pre]

See [1pre].

2. [9a]

See [1a].

3. [9b]

See [1e]

4. [9c]

See [1g].

5. [9d]

See [1a].

6. [9e]

See [1a], [1i], [1k].

7. [9f]-[9g]

See [1b].

8. [9h]

See [1c].

9. [9i]

See [1h].

10. [9j]-[9l]

See [1j]-[1l].

G. Claim 10

As shown above for claims 1 and 5, the combination discloses or renders obvious the steps as claimed in method claim 10. EX1002, ¶173.

1. [10pre]

See [1pre].

2. [10a]

See [1a].

3. [10b]

See [1b]

4. [10c]

See [1a], [5a] (receiving video via Bluetooth), [1b].

5. [10d]

See [5d] (compressing video received via Bluetooth); *see also* [1e].

6. [10e]

See [1c].

7. [10f]

See 5[e].

8. [10g]

See [1h].

9. [10h]

See [1j], [5g] (receives video via Bluetooth).

10. [10i]

See [1k], [5h] (receives and connects simultaneously).

11. [10j]

See [1l].

H. Claim 11

The combination discloses or renders obvious “a fourth radio communication circuit (NFC/GSM) capable of transmitting information

(interrogation signals, messages) and using a fourth transmission frequency band (13.56 MHz for NFC or 900/1800 MHz for GSM) that is different from the first, second, and third transmission frequency bands (1[a]-1[c]), wherein the controller controls assignment of connection of each of the first, second, third, and fourth radio communication circuits video processing apparatus (see [1h]).” EX1002, ¶185.

NFC: For mappings A and B/NFC, Dua discloses the cellular phone includes an NFC radio (transceiver 113). EX1008, Fig. 1, [0070]-[0074]. The NFC radio transmits on the 13.56 MHz frequency band, which is different from the other bands. *Id.*, [0052]-[0055]; *see* [1a]-[1c] (other radios/bands). The NFC radio transmits several types of information. EX1008, [0070]-[0071] (interrogation signals, electronic payments, secure key access), [0129] (message components 451 outlined in FIG. 7). The CPU 109 controls assignment of all the radios, including the NFC radio. *See* [1h]; EX1002, ¶186.

It would have been obvious to a POSITA to implement Dua’s NFC radio in the combination. *See* Section VII.A.

GSM: For Mapping B/GSM, N93 and Dua each discloses the cellular phone includes a GSM radio, which transmits information (e.g., video) on a band different from the other three bands. *See* [1a]-[1c]. The CPU 109 controls assignment of all the radios, including the GSM radio. *See* [1h]; EX1002, ¶188.

I. Claim 12

For Mapping A, the third transmission frequency band ([1c] (GSM)) is different from the first ([1a] (Bluetooth)) and second ([1b] (UMTS)) transmission frequency bands. *See* claim 1; EX1002, ¶189.

J. Claim 14

The transmitting of the information by the third radio (GSM/Wi-Fi) comprises connecting to the internet. *See* [1c]; EX1002, ¶190.

K. Claim 15

N93 discloses the video processing apparatus (cellular phone) has an input device (EX1010, 10 (Keypad)), capable of receiving a user's selection of content to be displayed on the phone. *Id.*, 78-79 (pressing a key to play a selected video file). EX1002, ¶191.

Dua discloses the video processing apparatus (cellular phone) has an input device (EX1008, Fig. 1 (Keypad 111), [0061]), capable of receiving a user's selection of content to be displayed on the phone. *Id.*, [0078]-[0080] (selecting content to display); EX1002, ¶192.

L. Claim 16

See 1[l] (Herle teaching software update for applications); EX1002, ¶193.

M. Claim 17

See [1j] (showing the N93 cell phone display displays a series of menu prompts requesting a user to turn on Bluetooth, discover a Bluetooth target device,

and then indicate a Bluetooth connection should be established with a particular Bluetooth device to transfer a video, and in response to that indication transferring the video via Bluetooth to that device). This is the same user interface and Bluetooth video transfer functionality PO accuses in the Litigation of practicing this claim. EX1024, 1445-1446. EX1002, ¶194.

N. Claim 18

See [1b] (UMTS uses QAM); EX1002, ¶195.

O. Claim 19

See [1b] (UMTS uses QAM and QPSK). A POSITA would have understood that a UMTS connection, per the standard, is controllable to change schemes e.g., based on the available network and network conditions. For example, in a noisy environment, a UMTS connection is controllable to use a more robust but lower bandwidth modulation scheme to mitigate the effects of the noise. EX1002, ¶196.

P. Claim 20

See [1pre] (N93 and Dua disclose cellular phones); EX1002, ¶197.

Q. Claim 21

See [1b], [1c] (Mapping B: UMTS and Wi-Fi (802.11a and 802.11g) use OFDM demodulation); EX1002, ¶198.

R. Claim 22

Dua discloses Bluetooth (first) and Wi-Fi (third) radio communication circuits are implemented as a combined circuit, short-range transceiver 108. *See* [1a], [1c] (Mapping B); EX1002, ¶199.

S. Claim 23

1. [23pre]

See [1pre].

2. [23a]

See [1a].

3. [23b]

See [1b].

4. [23c]

See [1c].

5. [23d]

See [11].

6. [23e]

See [1d].

7. [23f]

See [1e].

8. [23g]

The combination discloses or renders obvious “a microphone receiving audio information corresponding to the video information received via the imaging circuit.”

N93 discloses a microphone receives audio corresponding to the video being recorded on the camera. EX1010, 24, 34; EX1002, ¶208.

Dua also discloses a microphone receives audio corresponding to the video being recorded by the camera. EX1008, Fig. 1 (microphone 115), Fig. 3D (microphone 245), [0061], [0087], [0201] (video filming includes audio), [0203] (video feed includes both image and audio portions); EX1002, ¶209.

9. [23h]

See [1g] (accumulation circuit), [1a, 1i] (transmission to external device) EX1002, ¶210.

The combination also discloses or renders obvious an “accumulation circuit capable of accumulating...audio information received by the microphone.” *See* [23g]. N93 discloses the video includes audio and is sent via Bluetooth to the external device. EX1010, 24, 34. Dua’s disclosure of storing and buffering video information discloses to a POSITA that the stored or buffered video information that is transmitted to the external device via Bluetooth includes audio information. EX1008, [201] (video filming includes audio), [0203] (video feed includes both

image and audio portions). Dua explicitly discloses the video can be separated into audio and video during playback at the external device. *Id.*, [203]; EX1002, ¶211.

10. [23i]

See [5e].

11. [23j]

See [1h] and [11] (controller for all four); EX1002, ¶213.

12. [23k]

See [1j]; EX1002, ¶214.

13. [23l]

See [1k]; EX1002, ¶215.

14. [23m]

See [1l]; EX1002, ¶216.

T. Claim 24

See [16]; EX1002, ¶217.

U. Claim 25

See 1[a] (Bluetooth uses shift keying modulation (GFSK/ $\frac{\pi}{4}$ -

DQPSK/8DPSK)), 1[b] (UMTS uses QAM); EX1002, ¶218.

VIII. GROUND 2: N93, DUA, HERLE, ROOYEN, DESAI, BT-SPEC, 3GPP-SPEC, AND KAO

A. Combination Rationale

Further combination with Rooyen and Desai.

It would have been obvious to combine the Ground 1 combination with the further implementation details of Rooyen and Desai related to radio frequency integrated circuits. Dua and N93 disclose Bluetooth, Wi-Fi, GSM, and UMTS radios and Dua further discloses the radios are implemented as a short-range transceiver 108 and a network transceiver 105. But neither reference explicitly discloses the lower-level implementation details. Thus, a POSITA would have been motivated to look for known implementations in the art and been led to Rooyen and Desai. EX1002, ¶219.

A POSITA would have been motivated to use the implementation details provided by Rooyen related to UMTS and GSM radio circuits in the combination. Rooyen explains how UMTS and GSM radio frequency integrated circuits (RFICs) can be implemented as separate or combined RFICs as the radio frequency front end (RFFE) of a transceiver like network transceiver 105. Rooyen explains how to design the device to additionally support broadcast radios at the same time, like the broadcast radios disclosed in Dua. Thus, a POSITA would have been motivated to use Rooyen's implementations to support the functions Dua teaches are desirable. EX1002, ¶220.

A POSITA would have been motivated to implement the Bluetooth and Wi-Fi radios in the combination as radio communication circuits in a combined circuit as taught by Desai to incorporate Desai's improved co-existence techniques. Desai

explains that Wi-Fi and Bluetooth radios in handheld wireless devices can interfere with each other, and prior art co-existence techniques were not optimal. EX1012, Fig. 1c (cell phone), [0007]-[0013]. Desai discloses implementing the radios in a single integrated circuit with an improved co-existence technique that includes priority levels and a packet transfer scheduler (PTS). *Id.*, [0028]. Desai also expressly provides a motivation to combine so that some portions of the radio circuits can be implemented by “common logic, circuitry, and/or code.” *Id.*, [0048]. This provides the advantages of reduced power consumption and die size of the radio chip, which a POSITA would have recognized as important in the combination’s mobile phone. *Id.* A POSITA also would have been motivated to make the combination because, in a cellular phone like Dua and N93, it is advantageous to reduce the overall chip count to reduce the size of the circuit boards and simplify overall system design. EX1002, ¶221.

A POSITA would have had a reasonable expectation of success in making the combinations. Rooyen and Desai teach the implementation details to a POSITA, which are a matter of routine skill. These are standards-compliant radios, which were and remain well known to a POSITA, and widely implemented in the industry. EX1002, ¶222.

Further combination with BT-Spec, 3GPP-Spec and Kao.

As explained for Ground 1, the combination inherently discloses the claimed modulation and transmission frequency limitations because they are required by the disclosed standards. Alternatively, they are rendered obvious by the knowledge of a POSITA. Petitioners present these references as secondary references out of an abundance of caution to the extent the Board disagrees. EX1002, ¶223.

Dua and N93 disclose standard UMTS, GSM, Bluetooth and Wi-Fi radios as explained in Ground 1. The modulations and frequencies utilized by those radios are not all explicitly disclosed. Thus, a POSITA would have been interested in determining the appropriate modulations and frequencies to comply with the disclosed standards and enable communications with the intended standard-compliant devices. 3GPP-Spec, BT-Spec, and Kao (802.11a/b/g) are secondary references that disclose the correct modulations and frequencies. *See* Section VI.B. A POSITA would have had a reasonable expectation of success in making the combination because these are each known standards implemented with standard technologies and are a matter of routine skill. EX1002, ¶224.

B. Overview and Incorporation from Ground 1

Ground 2 relies on the disclosures in BT-Spec, 3GPP-Spec, and Kao as secondary references for the relevant modulations and frequencies. The relevant disclosures are already included in Ground 1 as evidence of inherency and the

knowledge of a POSITA and are incorporated herein by reference. Ground 2 also relies on Rooyen and Desai for “circuit” implementation details (including “combined circuit” for claim 22). The limitations impacted by those details are addressed below.

C. Claim 1

1. [1pre]

See Ground 1. EX1002, ¶226.

2. [1a]

See Ground 1.

It would have been obvious to a POSITA to implement the Bluetooth radio in the combination using a “first radio communication circuit” in view of Desai. Section VIII.A. Desai discloses the Bluetooth radio can be implemented as a radio communication circuit within a combined integrated circuit with the Wi-Fi radio communication circuit. Desai discloses there is a Bluetooth radio circuit portion comprising logic, circuitry, and/or code. *Id.*, Figs. 2 (208), 3 (306), 7 (706), [0042], [0084]. Desai discloses there is a Wi-Fi radio circuit portion comprising logic, circuitry, and/or code. *Id.*, Figs. 2 (206), 3 (304), 7 (704), [0040]-[0041], [0046], [0083]. Desai discloses there can be common portions that can result in reduced power consumption and die size. *Id.*, [0048]. Desai discloses there is additional prioritization and scheduling circuit to promote co-existence. *Id.*, [0044], [0049]-[0050]; EX1002, ¶228.

3. [1b]

See Ground 1.

It would have been obvious to a POSITA to implement the UMTS radio as a “second radio communication circuit” in view of Rooyen. Section VIII.A. Rooyen discloses a UMTS radio in a cellular phone like Dua and N93 can be implemented as a separate radio communication circuit (EX1011, Fig. 4a (412a), [0039]-[0040], [0080]-[0087] (UMTS RFIC transceiver 2100 MHz) or as a combined circuit with the GSM radio circuit (EX1011, Fig. 4b (413), [0040], [0088], each of which would have been obvious and satisfies this limitation. EX1002, ¶230.

4. [1c]

See Ground 1.

Mapping A: It would have been obvious to a POSITA to implement the GSM radio in the combination as a “third radio communication circuit” in view of Rooyen. Section VIII.A. Rooyen discloses an RF front end for the GSM radio can be implemented as a separate radio communication circuit (EX1011, Fig. 4a (412b), [0039]-[0040], [0080]-[0087] (GSM RFIC transceiver 900 and 1800 MHz) or as a combined circuit with the UMTS radio circuit (EX1011, Fig. 4b (413), [0040], [0088], each of which would have been obvious and satisfies this limitation. EX1002, ¶232.

Mapping B: It would have been obvious to a POSITA to implement the Wi-Fi radio as a “third radio communication circuit” in view of Desai. Section VIII.A (combination). Desai discloses the Wi-Fi radio (third radio) can be implemented as a radio communication circuit within a combined integrated circuit with the Bluetooth radio communication circuit (first radio). Desai discloses there is a Bluetooth radio circuit portion comprising logic, circuitry, and/or code. *Id.*, Figs. 2 (208), 3 (306), 7 (706), [0042], [0084]. Desai discloses there is a Wi-Fi radio circuit portion comprising logic, circuitry, and/or code. *Id.*, Figs. 2 (206), 3 (304), 7 (704), [0040]-[0041], [0046], [0083]. Desai discloses there can be common portions that can result in reduced power consumption and die size. *Id.*, [0048]; EX1002, ¶233.

5. [1d]-[1l], Claims 4-5, 8-12, 14-21, 23-25

See Ground 1; Ground 2 ([1a]-[1c] for circuits). EX1002, ¶234.

D. Claim 22

See Ground 1. Additionally, in the combination, it would have been obvious to implement the Bluetooth (first) and Wi-Fi (third) radio communication circuits of transceiver 108 as a “combined circuit” as taught by Desai. *See* [1a], [1c], Section VIII.A; EX1002, ¶235.

IX. GROUND 3: DUA AND HERLE

A. Combination Rationale

It would have been obvious to combine the cellular phone of Dua with the over-the-air software (OS and application) functionality taught by Herle as shown above for Ground 1. *See* VII.A.

B. Overview and Incorporation from Ground 1

Ground 3 differs from Ground 1 in two ways. First, Ground 3 relies on everything in Ground 1 (incorporated herein by reference) except for the subject matter from N93. Second, Ground 3 is based primarily on Dua’s “improved” user indications.

C. Claim 1

1. [1pre]-1[i]

See Ground 1; EX1002, ¶238.

2. 1[j]

The combination discloses or renders obvious “wherein the controller controls assignment of connection for each of the first and second radio communication circuit in response to receiving an indication (user selection of NFC, stored profile, or prior art normal configuration) from a user such that when an indication from a user indicates to transmit video information using the first radio communication circuit (Bluetooth) the controller assigns a connection to the

first radio communication circuit for transmitting the video.” EX1008, Fig. 8A, Fig. 8B, [0009], [0160], [0147], [0196], [0215]; EX1002, ¶239.

Dua discloses this limitation in at least three ways. First, Dua discloses receiving an indication from a user when a user presses the NFC activation button 118 while holding the device near a target device, which indicates the controller should assign a connection to the radio in the target device’s profile. EX1008, Fig. 8A (502), Fig. 8B, [0160], [0165], [0196]. The NFC radio communicates with the target device to obtain its profile. *Id.* That information is provided to the CPU 109. *Id.*, [0128], [0144]-[0155]. The CPU 109 assigns connection of the relevant short-range radio (Bluetooth) and transmits/receives the video. *Id.*, [0128], [0147], [0196]; EX1002, ¶240.

Second, Dua discloses receiving an indication from a user when the user manually selects a previously stored target device profile, indicating the controller should assign a connection to the short-range radio in that target device profile. EX1008, Figs. 13-14, [0020], [0147], [0163], [0173], [0215]-[0220]. In the example illustrated in Fig.13, the user desires to transmit video to a target TV. If the user selects device profile entry 611, the CPU 109 will assign a connection to the radio in target TV 611’s stored profile (e.g., Bluetooth) causing a connection to be made and the video to be transferred to TV 611. *Id.* If the user had instead

indicated TV 612, the controller would not have assigned the connection to the Bluetooth radio for TV 611. *Id.*, [0215]; EX1002, ¶241.

Dua's teachings regarding the first and second methods include the use-case where the target device supports only a single radio (e.g., Bluetooth), such that the user's indication (through the user's use of NFC or selection of a stored profile) is determinative of the radio to assign. EX1008, [0137]. In other words, Dua discloses support for the use case where the controller has no discretion to choose between radios, since the user's indication has dictated the radio that must be assigned by the controller. The intended radio would have been known and subjectively intended by the POSITA. EX1002, ¶242.

Dua does not disclose that the radio (e.g., Bluetooth) is explicitly displayed to the user, e.g., the word "Bluetooth" is not displayed on the screen in Figure 13. Thus, PO may attempt to argue Dua's improved indications are "implicit" indications by the user of the radio, and that the claims should be construed to require an "explicit" user indication. PO, however, accuses "implicit" user indications in the Litigation. EX1024, 288-291 (accusing the user selecting "Quick Share" for "nearby" sharing, when the user does not explicitly indicate which radio to use for that "nearby" share). EX1002, ¶243.

Dua includes the additional teaching, under PO's broad interpretation, that some target devices and stored profiles can support multiple radios in a preferred

order, in which case the user indication only indicates the device and CPU 109 automatically assigns a radio connection in the preferred order based on operating conditions. EX1008, [0137]; EX1024, 310-313 (accusing “Intelligent Wi-Fi” settings); EX1002, ¶244.

Third, Dua discloses the prior art “normal” technique that required the user to manually configure the radio for transmission. EX1008, [0009], [0123]-[0124]. This “normal” technique requires the user to manually input the configuration commands through the user interface, which commands will be received by the CPU, and the CPU will assign the radio connection as directed by the manually entered configuration settings to transmit/receive the video. *Id.* A POSITA would have understood that a target device may not support Dua’s new and improved methods, requiring the user to manually enter the configuration using the “normal” technique. A POSITA would have understood that such manual configuration would require the user to “explicitly” indicate the radio. EX1002, ¶245.

3. [1k]-[1l]

See Ground 1; EX1002, ¶246.

D. Claim 4

See Ground 1; EX1002, ¶247.

E. Claim 5

1. [5pre]-[5f]

See Ground 1; EX1002, ¶248.

2. [5g]

See Ground 1 and Ground 3, [1j] (Dua’s “improved” and “normal” indications); EX1002, ¶249.

Dua’s indications are applicable to the reception of video via Bluetooth. For example, instead of a TV for video transmission, a user can use NFC or select a stored profile of a video camera for video reception. EX1008, Fig. 12, [0211], [0191]. And for the UMTS radio, the user can accept the SIP invitation and the controller will assign a connection to the UMTS radio to receive the video. *Id.*, [0194]. EX1002, ¶250.

3. [5h]-[5i]

See Ground 1; EX1002, ¶251.

F. Claim 8

See Ground 1; EX1002, ¶252.

G. Claim 9

1. [9pre]-[9i]

See Ground 1; EX1002, ¶253.

2. [9j]

See Ground 1 and Ground 3, [1j] (Dua’s “improved” and “normal” indications); EX1002, ¶254.

3. [9k]-[9l]

See Ground 1; EX1002, ¶255.

H. Claim 10

1. [10pre]-[10g]

See Ground 1; EX1002, ¶256.

2. [10h]

See Ground 1 and Ground 3, [1j] (Dua’s “improved” and “normal” indications), Ground 3, [5g] (reception); EX1002, ¶257.

3. [10i]-[10j]

See Ground 1, Ground 3, [5g] (reception); EX1002, ¶258.

I. Claims 11-12, 14-16

See Ground 1; EX1002, ¶259.

J. Claim 17

See [1j] (discussing Figs. 13-14 wherein a display screen prompts user to select a stored profile to indicate the user allows a connection to be established with TV 611 (not auto-detected or auto-connected), wherein in response, the Bluetooth connection is established and transmits the accumulated video to the TV 611); EX1002, ¶260.

K. Claims 18-22

See Ground 1.

L. Claim 23

1. [23pre]-[23j]

See Ground 1.

2. [23k]

See Ground 1 and Ground 3, [1j] (Dua’s “improved” and “normal” indications).

3. [23l]-[23m]

See Ground 1.

M. Claims 24-25

See Ground 1; EX1002, ¶265.

X. GROUND 4: DUA, HERLE, N93

A. Combination Rationale

It would have been obvious to a POSITA to further combine Dua-Herle with the additional implementation details and features taught by N93. EX1002, ¶266.

N93 is a user manual for a multi-radio, multimedia cellular phone, like the one disclosed in Dua. Like Dua, N93 had Bluetooth, Wi-Fi, UMTS and GSM radios, user interfaces (display, buttons, camera, speaker, microphone), and provided multimedia capabilities (video/audio recording via microphone and camera, playback, transmission, and receipt). In short, the N93 discloses a smartphone like Dua’s. EX1002, ¶267.

It would have been obvious to a POSITA to combine Dua with the “normal” user indications disclosed by N93 for assigning radios for video transfer and reception. Dua discloses a method of setting up connections using NFC, which it describes as an improvement over the prior art. EX1008, [0009]. Dua referred to

such prior art techniques as, for example, the “normal Bluetooth” session set-up and discovery process. *Id.*, [0123]-[0124]. While Dua teaches its “improved” NFC method is preferred, a POSITA would have understood that not every target device would have an NFC chip or support Dua’s improved method. Thus, a POSITA would have been motivated to retain support for the “normal” user indications as well. To the extent a POSITA did not already know of those “normal” indications, a POSITA would have been motivated to search in the art to find known implementations of such a normal process and been led to the N93. EX1002, ¶268.

N93 teaches the details of the “normal” user indications referred to by Dua, including the more detailed, explicit, indications by the user regarding the particular radio. For example, for Bluetooth video transfer, N93 teaches how the user manually turns the Bluetooth radio on, initiates a scan for devices, initiates a connection, conducts pairing, and eventually transfers video via Bluetooth. N93 teaches the corresponding manual, “normal” steps for UMTS, GSM, and Wi-Fi radios. EX1010, 61, 91-92, 106-107, (UMTS), 91-92, 106-107 (GSM), 17-19, 91-92, 106-109 (Wi-Fi). These steps, like Dua’s, include SIP connections over the cellular radios and UPnP connections over Wi-Fi. EX1010, 61-62 (SIP), 88-91, 119 (UPnP); EX1008, [0068], [0140], [0180]-[0186], [0192]-[0194], [0202] (SIP), [0150] (UPnP); EX1002, ¶269.

N93 expressly teaches several additional motivations to implement the “normal” user configuration process in the combination. N93 teaches that power can be conserved if you allow the user to turn radios on/off or at least stop scanning for new networks. *Id.*, 85, 121. N93 teaches these features are also desirable to prevent discovery by undesirable third party devices. EX1010, 85. N93 teaches that certain services often charge based on the amount of packet data. *Id.*, 65. A POSITA would have been motivated to include the N93’s functionality that permits the user to manually choose the radio connection to minimize data charges (e.g., power and/or select only UMTS or GSM to avoid roaming onto the wrong operator, or use “Offline profile” to limit to Wi-Fi). While Dua’s improved connection teachings can be more efficient, a POSITA would have understood and been motivated to also support the functionality to “ask first” before assigning a particular radio connection. EX1002, ¶270.

A POSITA would have had a reasonable expectation of success in modifying Dua to support the “normal” prior art configuration process discussed in Dua and shown in detail in N93. N93 teaches the “normal” indications. Dua itself discloses this as the “normal” process, so by definition, it is well within the skill and knowledge of a POSITA. EX1002, ¶271.

Additionally, it would have been obvious to a POSITA to combine Dua with implementation details for the radios disclosed by N93. Dua and N93 disclose the

same radios, but N93 provides additional implementation details that would have been obvious to include in the combination. For example, Dua states the cellular radios support GSM and all worldwide 3GPP and 3GPP2 standards. N93 discloses an example of including at least GSM at 1900 MHz with GPRS and EDGE, which would work, for example, on systems in the United States, and GSM at 800 and 900 MHz and UMTS at 2100 MHz, which would work, for example, on systems in Europe. It would have been obvious to include such implementation details as they are governed by the applicable standards. EX1002, ¶272.

A POSITA would have had a reasonable expectation of success in implementing the standard radios in the combination as taught by N93. These were defined and fully described by international standards bodies, and as such, implementing them was well within the skill and knowledge of a POSITA. EX1002, ¶273.

Additionally, it would have been obvious to a POSITA to combine Dua with the Bluetooth video transfer and reception functionalities of N93. Dua discloses streaming video between devices (e.g., SIP over cellular, UPnP over Wi-Fi) and transferring video to a device for storage and later playback. EX1008, [0205]-[0206] (describing automatic storage of received videos for later playback). N93 also discloses streaming (e.g., SIP over cellular, UPnP over Wi-Fi) and transferring video to a device for storage and later playback (e.g., Bluetooth video transfer,

MMS, e-mail). These are standard transfer protocols based, e.g., on Bluetooth Generic Object Exchange Profile, Object Push Profile, File Transfer Profile.

EX1010, 84. Given Dua explicitly supports Bluetooth and transfer for later playback, it would have been obvious to support standard types of video transfers disclosed in N93 as well. EX1002, ¶274.

A POSITA would have had a reasonable expectation of success in implementing the standard video transfer functions in the combination and as taught by N93. These were standard messaging functions (MMS, e-mail, Bluetooth video transfer), and implementing them was well within the skill and knowledge of a POSITA. EX1002, ¶275.

B. Overview and Incorporation from Ground 1

Ground 4 differs slightly from Ground 1 because it starts with Dua's "improved" user indications (incorporated from Ground 3) and additionally relies on N93's implementation details of "normal" user indications (incorporated from Ground 1) as a secondary reference.

C. Claim 1

1. [1pre]-1[i]

See Ground 1.

2. 1[j]

See Ground 1 [1j]; Ground 3 [1j]. In addition to Dua's "improved" user indications, it would have been obvious to a POSITA to implement N93's

teachings regarding the “normal” user indications to transfer video using Dua’s video transfers and N93’s video transfers. *See* Section X.A.

3. [1k]-[1l]

See Ground 1.

D. Claim 4

See Ground 1.

E. Claim 5

1. [5pre]-[5f]

See Ground 1.

2. [5g]

See Ground 1 [1j]; Ground 3 [1j].

3. [5h]-[5i]

See Ground 1.

F. Claim 8

See Ground 1.

G. Claim 9

1. [9pre]-[9i]

See Ground 1.

2. [9j]

See Ground 1, [1j] and Ground 3, [1j].

3. [9k]-[9l]

See Ground 1.

H. Claim 10

1. [10pre]-[10g]

See Ground 1.

2. [10h]

See Ground 1, [1j] and Ground 3, [1j].

3. [10i]-[10j]

See Ground 1.

I. Claims 11-12, 14-16

See Ground 1.

J. Claim 17

See Ground 1, 1[a], 1[j], 17 (N93's "normal" indications); *see* Ground 3, 1[a], 1[j], 17 (Dua's improved indications).

K. Claims 18-22

See Ground 1.

L. Claim 23

1. [23pre]-[23j]

See Ground 1.

2. [23k]

See Ground 1, 1[j] and Ground 3, [1j].

3. [23l]-[23m]

See Ground 1.

M. Claims 24-25

See Ground 1; EX1002, ¶297.

XI. GROUND 5: DUA, HERLE, N93, ROOYEN, DESAI, BT-SPEC, 3GPP-SPEC, AND KAO

A. Combination Rationale

Further combination with Rooyen, Desai, BT-Spec, 3GPP-Spec, and Kao.

It would have been obvious to combine the combination of Dua, Herle, and N93 with the further implementation details of Rooyen and Desai related to separate or combined radio frequency integrated circuits. *See* Section VIII.A.

It would have been obvious to combine the combination with the further implementation details of BT-Spec, 3GPP-Spec, and Kao for the relevant aspects of the standard. *See* Section VIII.A.

B. Overview and Incorporation from Grounds 1-4

Ground 5 relies on the order of combination of the references and evidence set forth in Grounds 3-4. The secondary references added in Ground 5 are relied on for the same reasons they are relied on in Ground 2, which is incorporated herein by reference. *See* Section VIII.A-C.

XII. DISCRETIONARY DENIAL IS NOT WARRANTED

A. 35 U.S.C. § 314(a) Analysis

Discretionary denial is not warranted here as the “compelling merits” standard set forth in the June 21, 2022 Interim Guidance weighs against

discretionary denial. The Challenged Claims are clearly invalidated, for example, by N93's "normal" user indications.

B. 35 U.S.C. § 325(b) Analysis

The Board should not exercise its §325(d) discretion to deny institution because the combinations of N93, Dua, and Herle was not previously considered. Additionally, the examiner erred in allowing the claims during reexamination without performing a proper prior art search for the added "software update" limitation. EX1006, 33-39 (relying, in part, on this new limitation). To the extent that the challenges herein are found to be based on prior art that is cumulative to prior art considered by the examiner during prosecution, the examiner has made a clear error in allowing the claims over such prior art. This is at least because the challenges in this Petition satisfy the compelling merits standard, and allowing the claims over such prior art is therefore clear error.

XIII. COMPLIANCE WITH FORMAL REQUIREMENTS

A. Mandatory Notices Under 37 C.F.R. §§ 42.8(b)(1)-(4)

1. Real Party-In-Interest

Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. are the Petitioners and real parties-in-interest.

2. Related Matters

The '590 patent is subject to the following action: *Maxell, LTD. v. Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc.*, 5:23-cv-00092-RWS (ED TX 2023) (the “Litigation”).

Petitioners filed IPR2024-00906 against related patent 11,445,241 on May 17, 2024. To ease the burden on the Board and parties, Petitioners have used the same exhibit numbering in both IPRs. This results in the unusual situation where the challenged patent in this IPR is EX1004 instead of EX1001.

3. Lead and Backup Counsel

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4. Service Information

Service information for lead and backup counsel is provided in the designation of lead and backup counsel above.

B. Standing

In accordance with 37 C.F.R. §42.104(a), Petitioners certify that the '590 patent is available for *inter partes* review and that Petitioners are not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified in this Petition.

XIV. CONCLUSION

All Challenged Claims should be found unpatentable as discussed above.

Date: May 31, 2024

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioners certify that this petition includes 13,830 words, as measured by Microsoft Word, exclusive of the table of contents, mandatory notices under § 42.8, certificates of service, word count, claim listing, and exhibits.

Date: May 31, 2024

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CERTIFICATE OF SERVICE

The undersigned certifies pursuant to 37 C.F.R. §§ 42.6(e) and 42.105 that on May 31, 2024, a true and correct copy of the Petition for *Inter Partes* Review of U.S. Patent No. 10,129,590 was served by emailing a copy of same (by agreement) to the following attorneys for the Patent Owner:

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