

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

TOGAIL TECHNOLOGIES LTD.,
Patent Owner.

IPR2023-00720
U.S. Patent No. 10,791,502

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104**

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Ex.1004	<i>Curriculum Vitae</i> of Dr. Zhi Ding
Ex.1005	Declaration of Mr. Craig Bishop under 37 C.F.R. § 1.68
Ex.1006	<i>Curriculum Vitae</i> of Mr. Craig Bishop
Ex.1007	3GPP TSG RAN WG2 Meeting #101 R2-1801795, “Discussion on SI Request Prohibit Timer,” Source: Oppo
Ex.1008	3GPP TSG RAN WG2 Meeting #101 R2-1802094, “Remaining issues of on demand SI,” Source: Vivo
Ex.1009	U.S. Patent No. 11,357,059 to Deenoo <i>et al.</i>
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Ex.1012	3GPP TSG RAN WG2 Meeting #Ad-hoc1801 R2-1800041, “Discussion on On-demand system information request in NR,” Source: ASUSTek
Ex.1013	3GPP TSG RAN WG2 Meeting #99 R2-1708072, “On demand SI acquisition and failure handling,” Source: Huawei, HiSilicon
Ex.1014	U.S. Patent Pub. No. 2020/0113011 to Peisa <i>et al.</i>
Ex.1015	U.S. Provisional Pat. App. No. 62/502,037 to Peisa <i>et al.</i>
Ex.1016	3GPP TSG RAN WG2 Meeting #101 R2-1802093, “Failure Handling for On Demand SI Acquisition Procedure,” Source: Vivo
Ex.1017	3GPP TSG RAN WG2 Meeting #100 R2-1713697, “Remaining issues on on-demand SI request procedure,” Source: LG

Ex.1018	3GPP TSG RAN WG2 Meeting #101 R2-1803366, “Failure handling for on-demand SI acquisition,” Source: Huawei
Ex.1019	3GPP TSG RAN WG2 Meeting #101 R2-1802960, “Remaining issues on on-demand System Information,” Source: Intel
Ex.1020	U.S. Patent Pub. No. 2016/0029376 to Fukuta <i>et al.</i>
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Ex.1022	3GPP TSG RAN WG2 Meeting #Ad-hoc1801 R2-1800453, “Upper layer actions for the Random Access problem,” Source: ZTE
Ex.1023	3GPP TSG RAN WG2 Meeting #101 R2-1801831, “Remaining issues of on-demand SI,” Source: CATT
Ex.1024	U.S. Patent Pub. No. 2017/0078911 to Jeong <i>et al.</i>
Ex.1025	3GPP TSG RAN WG2 Meeting #Ad-hoc1801 R2-1800874, “Failure Handling for On Demand SI Acquisition Procedure,” Source: Vivo
Ex.1026	3GPP TSG RAN WG2 Meeting NR AH#3 R2-1800288, “Open issues on On-demand SI,” Source: Ericsson
Ex.1027	WDTX case 622-cv-00326, Plaintiff’s Preliminary Disclosure of Infringement Contentions, served Oct. 3, 2022
Ex.1028	WDTX case 622-cv-00326, Dkt. 33, Scheduling Order, filed Oct. 24, 2022
Ex.1029	WDTX case 622-cv-00326, Dkt. 53, Defendant’s Reply re Motion to Transfer Venue, filed Feb. 9, 2023
Ex.1030	U.S. District Courts Combined Civil and Criminal Federal Court Management Statistics (Sept. 30, 2022), available at https://www.uscourts.gov/statistics/table/na/federal-court-management-statistics/2022/09/30-1
Ex.1031	WDTX case 622-cv-00326, Dkt. 49, Apple’s Opening Markman

	Brief, filed Jan. 26, 2023
Ex.1032	WDTX case 622-cv-00326, Dkt. 54, Togail's Responsive Markman Brief, filed Feb. 16, 2023
Ex.1033	WDTX case 622-cv-00326, Dkt. 55, Apple's Reply Markman Brief, filed Mar. 2, 2023
Ex.1101	Excerpts from F. Hillebrand, GSM and UMTS: The Creation of Global Mobile Communication, Wiley 2002
Ex.1102	Excerpts from H. Myung et al., Single Carrier FDMA: A New Air Interface for Long Term Evolution, Wiley 2008
Ex.1103	Excerpts from H. Holma et al., WCDMA for UMTS: Radio Access for Third Generation Mobile Communications, Revised Edition, Wiley 2001
Ex.1104	Email dated Dec. 1998 from 3GPP TSG RAN WG2 Archives, available at https://list.etsi.org/scripts/wa.exe?A2=ind9812&L=3GPP_TSG_RAN_WG2&O=D&P=65
Ex.1105	Wayback Machine capture of 3GPP-IETF Standardization Collaboration, RFC 3113 (as of Nov. 24, 2001), available at https://web.archive.org/web/20011124104400/http://www.ietf.org/rfc/rfc3113.txt (combined PDF of seven individual screenshots due to formatting)
Ex.1106	Third Generation Partnership Project, 3GPP Working Procedures (July 2000)
Ex.1107	F. Harrison & K.A. Holley, The development of mobile is critically dependent on standards, 19 BT Tech. J. 32 (Jan. 2001)
Ex.1108	3GPP FAQs - July 2017 webpage archive
Ex.1109	Specifications Groups Home - June 2017 webpage archive
Ex.1110	GSMA Mobile Technology - About Us webpage archive

Ex.1111	GSMA Number of Mobile Subscribers Worldwide Hits 5 Billion – Newsroom webpage archive
Ex.1112	3GPP PCG#39 Vienna, Austria – MCC Activity Report, Sept. 28, 2017
Ex.1113	3GPP Working Procedures - October 2016
Ex.1114	3GPP Calendar Home June 2017
Ex.1115	Participant List from 3GPP RAN2#101
Ex.1116	RAN2 - Radio layer 2 and Radio layer 3 RR - June 2017
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Ex.1126	R2-1800041 word document properties
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Ex.1129	3GPP Specification Groups page June 2017
Ex.1130	Draft RAN2-101-Athens-Meeting Report-v1

Ex.1131	Directory Listing, FTP TSG RAN WG2 RL2 TSGR2 AHs 2018 01 NR Docs
Ex.1132	R2 #101 TdocList (excerpt left columns)
Ex.1133	TSG RAN WG2 RL2 TSGR2 101, FTP Tdoclists
Ex.1134	Directory Listing, FTP TSG RAN WG2 RL2 TSGR2 101 Docs
Ex.1135	Directory Listing, FTP TSG RAN WG2 RL2 TSGR2 101
Ex.1136	R2-18xxxxx-RAN2-101-Athens-Proposed-Agenda-v1.0
Ex.1137	www.3gpp.org, FTP TSG RAN January 2018
Ex.1138	3GPP FTP - January 2018
Ex.1139	3GPP FTP TSG RAN WG2 RL2 - January 2018
Ex.1140	RAN WG2 #101 draft report email
Ex.1141	Draft agenda RAN WG2 #101 email
Ex.1142	Invitation email to RAN WG2 #101
Ex.1143	LISTSERV Archives at LIST.ETSI.ORG - Jan 2021
Ex.1144	List archives at LIST.ETSI.ORG - Dec 2012
Ex.1145	3GPP email lists link - June 2017
Ex.1146	E-mail lists - July 2017

I. INTRODUCTION

U.S. Patent No. 10,791,502 (the “’502 patent,” Ex.1001) is directed to on-demand system information (SI) requests in the context of 5G. The alleged invention of the ’502 patent merely uses a timer to prohibit a UE from retransmitting an SI request too quickly. Ex.1001, 17:24-34.

Prohibit timers, however, were already ubiquitous in the prior art:

- “**SI prohibit timer** ... At expiry: Trigger another SI request if the SI is still needed ... for RRC_Connected UEs.” Ex.1007, 2.
- “**Upon expiry of timer B**, a [UE] may retransmit the other-SI request message.” Ex.1009, 41:9-10.
- “[W]ith a terminal being in [] RRC_Connected mode ... UE can request the ‘Other SI’ **again after the expiry of this backoff timer.**” Ex.1010, 9:56-63.
- “[The UE] transmits the second request for the second portion of system information **upon expiry of the second timer.**” Ex.1014, [0060]; Ex.1015, 11-12.

Thus, pursuant to 35 U.S.C. §§ 311, 314(a), and 37 C.F.R. § 42.100, Apple Inc. (“Petitioner”) respectfully requests that the Board cancel as unpatentable under 35 U.S.C. §103 claims 1-20 (“Challenged Claims”) of the ’502 patent.

II. GROUNDS FOR STANDING

Petitioner certifies that the '502 patent is eligible for IPR and that Petitioner is not barred or estopped from requesting IPR challenging the patent claims. 37 C.F.R. § 42.104(a).

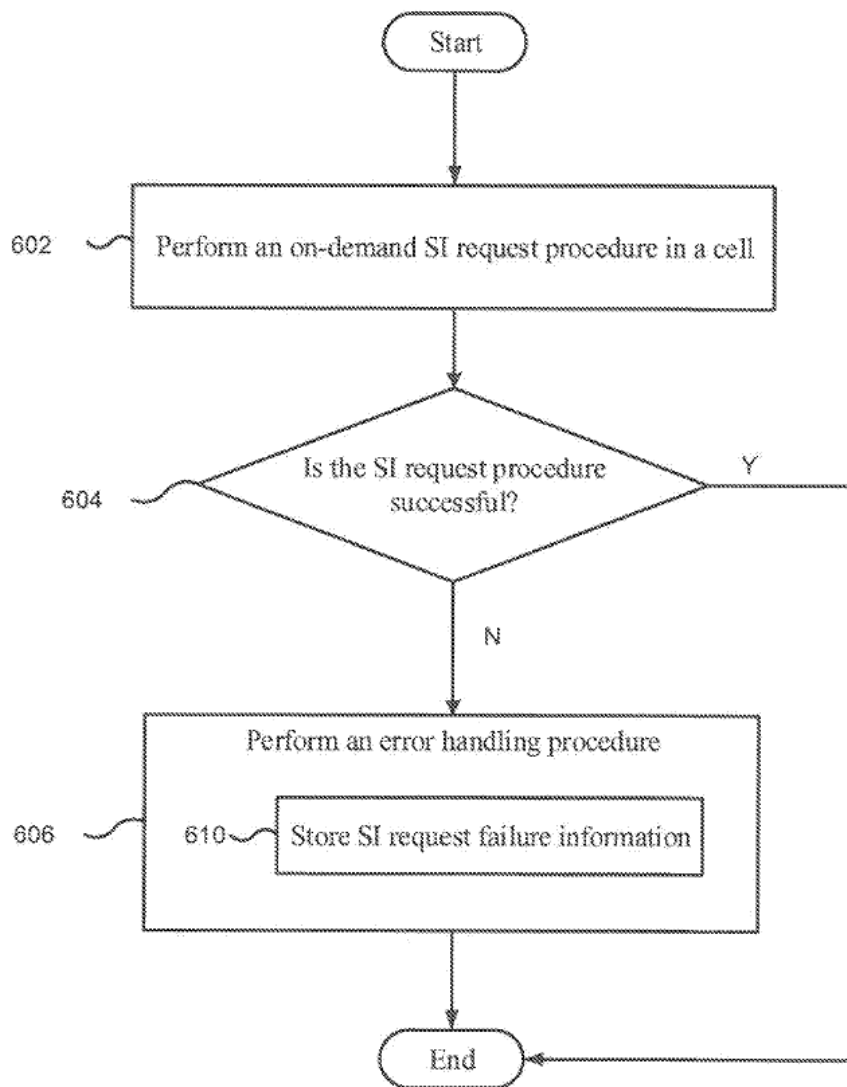
III. NOTE

Petitioner cites to exhibits' original page numbers. **Emphasis** in quoted material has been added. Claim terms are presented in *italics*.

IV. SUMMARY OF THE '502 PATENT

The '502 patent generally relates to “an on-demand system information (SI) request procedure.” Ex.1001, Abstract. The '502 patent explains that “[w]hen a UE finds that a required SI message(s) is not broadcasted ... the UE may perform an on-demand SI request procedure to ask the network [] to broadcast the required SIB(s)” (*i.e.*, system information blocks). Ex.1001, 1:27-33.

Fig. 6 illustrates an “on-demand SI request procedure” performed by a UE. Ex.1001, 15:33-38. The method includes step 602 a UE’s “on-demand SI request,” step 604 determining if the “SI request procedure is successful,” and step 606 “perform an error handling procedure” with optional step 610 “store the SI request failure information.” Ex.1001, Fig. 6.



Ex.1001, Fig. 6

The '502 patent alleges that “the next generation wireless network lacks an efficient mechanism for error handling associated with the on-demand SI request procedure.” Ex.1001, 1:33-36. The '502 patent proposes that “when the UE considers that the required SIB(s) and/or SI message(s) are not available ... the UE may activate a prohibit timer.” Ex.1001, 7:4-8. Then, “the UE may avoid initiating

another on-demand SI request procedure until the prohibit timer expires.” Ex.1001, 7:9-11.

However, as discussed in detail below, it was well known in the prior art for a UE in a 5G network to avoid initiating another on-demand SI request until a prohibit timer expires (Ex.1007, 1-2; Ex.1009, 41:5-10) and store SI request failure information (Ex.1013, 3, 7). Ex.1003, ¶¶30-33.

V. PROSECUTION HISTORY

The ’502 patent was filed in the U.S. on April 1, 2019 as application no. 16/372,389 and claims priority to provisional application no. 62/651,312 filed on April 2, 2018. It is unnecessary to determine whether the ’502 patent is entitled to its earliest alleged priority date of April 2, 2018 because the prior art relied upon herein pre-dates this date.

During a brief prosecution, the Patent Office issued a single office action rejecting as obvious the independent claims, which originally recited “*performing an error handling procedure if the on demand SI request [] is unsuccessful [which] comprises: storing SI request failure information.*” Ex.1002, 187, 320.

To overcome the office action, Applicant amended the independent claims to delete all existing limitations and add all new limitations that now included “*activating a prohibit timer,*” “*transmitting a second SI request message to the BS only when ... the prohibit timer expires,*” and “*determining that the UE is in a*

connected state.” Ex.1002, 175. These new claims were never rejected. The Patent Office issued a notice of allowance and the ’502 patent issued on September 29, 2020. Ex.1002, 167-168, 145, 137; Ex.1003, ¶¶34-36.

VI. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) in the field of the ’502 patent, as of April 2, 2018, would have been someone knowledgeable and familiar with the cellular telecommunications arts that are pertinent to the ’502 patent. That person would have at least a master’s degree in electrical engineering, computer engineering, computer science, or a related field from an accredited program and one year of relevant experience in mobile communications or wireless networks. A Ph.D. degree in a relevant field may substitute for some work experience. Ex.1003, ¶¶20-22.

VII. CLAIM CONSTRUCTION

In an *inter partes* review, claims “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b).

However, only those claim terms that are in controversy need to be

construed, and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *see also Samsung Electronics Co., Ltd. v. Smart Mobile Technologies, Inc.*, IPR2022-01248, Paper 13, at 58-60 (PTAB Jan. 24, 2023) (explaining that it is “not uncommon” for a petitioner to advance different constructions in district court and before the Board; for example, a petition may “present[] an unpatentability argument based on a broader construction, such as one advanced by a patent owner that is seeking to broadly construe the claims to prove infringement”).¹ For example, although there is a dispute in the district court that the preamble of claim 1 is limiting (*see* Exs. 1031-1033), the dispute is irrelevant for this proceeding because that dispute is not in controversy in light of the prior art relied upon in this instant Petition, which discloses or renders the preamble obvious. Petitioner submits that for the purposes of this proceeding, the terms of the challenged claims should be given their plain and ordinary meaning, and no terms require specific construction in this proceeding. Ex.1003, ¶37.

¹ The parties have filed claim construction briefs in district court (*see* Exs. 1031-1033) but there has been no claim construction decision to date nor is there likely to be one as of the time of institution due to the parties’ agreement that the district court case should be transferred (*see* Ex.1029, 3).

Petitioner does not concede that any term in the challenged claims meets the requirements of 35 U.S.C. § 112 or that the challenged claims recite patentable subject matter under 35 U.S.C. § 101. The prior art renders obvious the claims under their plain and ordinary meaning, which is Patent Owner's construction of all disputed claim terms of the '502 patent in the district court. *See e.g.*, Ex.1031, 14-20.

VIII. RELIEF REQUESTED AND THE REASONS FOR THE REQUESTED RELIEF

Petitioner asks that the Board institute a trial for *inter partes* review and cancel the Challenged Claims.

IX. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

A. Challenged Claims

Petitioner challenges all claims 1-20 of the '502 patent.

B. Statutory Grounds for Challenges

Grounds	Claim(s)	Basis
#1	1	35 U.S.C. 103 obvious over Oppo
#2	5-6	35 U.S.C. 103 obvious over Oppo in view of Vivo
#3	11, 15-16	35 U.S.C. 103 obvious over Oppo in view of Vivo and Deenoo
#4	1-2, 5-6, 11-12, 15-16	35 U.S.C. 103 obvious over Deenoo
#5	3, 13	35 U.S.C. 103 obvious over Deenoo in view of Futaki
#6	4, 7, 14, 17	35 U.S.C. 103 obvious over Deenoo in view of Asustek
#7	8-10, 18-20	35 U.S.C. 103 obvious over Deenoo in view of Huawei

Oppo: 3GPP TSG RAN WG2 Meeting #101 R2-1801795, “Discussion on SI Request Prohibit Timer,” Source: OPPO (“Oppo,” Ex.1007). Oppo was uploaded to the 3GPP FTP site and available to the public by Feb. 13, 2018. Ex.1005, ¶¶46-53. Oppo is prior art under 35 U.S.C. § 102(a)(1).²

Vivo: 3GPP TSG RAN WG2 Meeting #101 R2-1802094, “Remaining issues of on demand SI,” Source: Vivo (“Vivo,” Ex.1008). Vivo was uploaded to the

² Apple does not concede that any aspect of a 3GPP document was actually implemented in any version of the 5G NR Standard.

3GPP FTP site and available to the public by Feb. 14, 2018. Ex.1005, ¶¶54-61.

Vivo is prior art under 35 U.S.C. § 102(a)(1).

Deenoo: U.S. Patent No. 11,357,059 to Deenoo *et al.* (“Deenoo,” Ex.1009).

Deenoo issued from a PCT filed May 11, 2017; Deenoo issued Jun. 7, 2022.

Deenoo is prior art under 35 U.S.C. § 102(a)(2).

Futaki: U.S. Patent No. 11,252,643 to Futaki *et al.* (“Futaki,” Ex.1011).

Futaki issued from a foreign application filed Jan. 5, 2017 and a PCT filed Nov.

21, 2017; Futaki issued Feb. 15, 2022. Futaki is prior art under 35 U.S.C. §

102(a)(2).

Asustek: 3GPP TSG RAN WG2 Meeting #Ad-hoc1891 R2-1800041,

“Discussion on On-demand system information request in NR,” Source: ASUSTek

(“Asustek,” Ex.1012). Asustek was uploaded to the 3GPP FTP site and available to

the public by Jan. 12, 2018. Ex.1005, ¶¶62-69. Asustek is prior art under 35 U.S.C.

§ 102(a)(1).

Huawei: 3GPP TSG RAN WG2 Meeting #99 R2-1708072, “On demand SI acquisition and failure handling,” Source: Huawei, HiSilicon (“Huawei,” Ex.1013).

Huawei was uploaded to the 3GPP FTP site and available to the public by Aug. 12,

2017. Ex.1005, ¶¶70-77. Huawei is prior art under 35 U.S.C. § 102(a)(1).

Petitioner’s analysis also cites additional prior art to demonstrate the background knowledge of a POSITA and to provide contemporaneous context to

support Petitioner’s assertions regarding what a POSITA would have understood from the prior art. *See Yeda Research v. Mylan Pharm. Inc.*, 906 F.3d 1031, 1041-1042 (Fed. Cir. 2018); 37 C.F.R. § 42.104(b).

C. Ground 1: Claim 1 is obvious under 35 U.S.C. § 103 over Oppo

1. Summary of Oppo

Oppo describes methods for an “on-demand SI request” by a UE in the context of the 3GPP 5G standard. Ex.1007, 1. Oppo’s methods are for “RRC_Idle and RRC_Connected UEs”—*i.e.*, UEs in either idle or connected mode. Ex.1007, 1.

Oppo describes a UE using a “prohibit timer” so that after an on-demand SI request, the “UE refrains from retrying until a certain time.” Ex.1007, 1. Oppo illustrates this prohibit timer in the table below. Ex.1007, 2.

UE starts SI prohibit timer upon transmitting initial SI request		UE resends request only after timer expires and SI is not yet received	
Timer	Start	Stop	At expiry
Txxx	Transmission of SI request by RRC signalling or trigger MAC to perform Random Access for SI request	Reception of SI request acknowledgement; The requested SI has been available in latest SIB1	Trigger another SI request if the SI is still needed in the concern cell

Ex.1007, 2 (annotated); Ex.1003, ¶¶41-42.

2. Claim 1

[1.0] A method of an on-demand system information (SI) request procedure performed by a user equipment (UE), the method comprising:

Oppo teaches the preamble, as it describes methods for “on-demand SI request” (“*on-demand [] SI request procedure*”). Ex.1007, 1. Oppo describes its on-demand SI request procedure in the context of the 3GPP 5G standard. Ex.1007, 1.

Oppo describes a method where a UE uses a “prohibit timer” so that after an on-demand SI request, the “UE refrains from retrying until a certain time” (“*[a] method ... performed by a [] UE*”). Ex.1007, 1; Ex.1003, ¶¶43-45.

[1.1] transmitting a first SI request message to a base station (BS) after determining that the UE is in a connected state,

Oppo teaches sending an “**SI request for RRC Connected UEs.**” Ex.1007, 1. Oppo explains that “RRC_Connected UEs” have an “RRC connection.” Ex.1007, 1. A POSITA would have understood that such UEs having completed RRC establishment and having an “RRC connection” are determined at the UE to be in connected mode and capable of increased network functionality, *e.g.*, compared to “idle mode” (“*determining that the UE is in a connected state*”). Ex.1003, ¶46.

Oppo further describes using each of an “**RRC-based SI request,**” a “**MSG1-based SI request,**” and a “**MSG3-based SI request ... for** **RRC Connected UEs**” (“*transmitting a first SI request message ... after determining that the UE is in a connected state*”). Ex.1007, 1; Ex.1003, ¶47.

Oppo describes the SI request as being sent to a “cell” or “gNB” (*i.e.*, g-Node B), which a POSITA knew were each also known as “*a base station (BS)*.” Ex.1007, 1; Ex.1009, 4:53-56 (“the base station ... may be referred to as a cell”), 6:40-41 (“base station[] may represent ... a Node-B”); Ex.1003, ¶48.

Oppo illustrates the “*first SI request*” in the table below. Ex.1007, 2.

UE transmits a first SI request message to a cell (base station)



Timer	Start	Stop	At expiry
Txxx	Transmission of SI request by RRC signalling or trigger MAC to perform Random Access for SI request	Reception of SI request acknowledgement; The requested SI has been available in latest SIB1	Trigger another SI request if the SI is still needed in the concern cell

Ex.1007, 2 (annotated); Ex.1003, ¶49.

Thus, Oppo teaches a UE sending an initial SI request message to a cell after determining it is in RRC_Connected mode, which renders obvious “*transmitting a first SI request message to a base station (BS) after determining that the UE is in a connected state.*” Ex.1003, ¶50.

[1.2] the first SI request message including at least one requested system information block (SIB);

As discussed at [1.1], Oppo teaches that the UE sends a message to the network for an “SI request” (“*first SI request*”). Ex.1007, 1. Oppo further describes the UE using a “SI prohibit timer,” which “[d]epends on the SI/SIBs being

requested.” Ex.1007, 1. For instance, “after **UE send one SI request to gNB,** it should not send another one before check[ing] the latest SIB1 to know if **the request[ed] SIB** has been available.” Ex.1007, 1.

Therefore, Oppo describes the initial SI request message as specifying “**SIBs being requested**” (“*the first SI request message including at least one requested [] SIB*”). Indeed, a POSITA would have understood, as evidenced by Vivo, that it was well known that for “on demand SI” in 5G, “**[f]or SI request sent from the RRC CONNECTED UE, the minimum granularity of requested SI is one SIB.**” Ex.1008, 2-3; Ex.1003, ¶¶51-53.

Thus, Oppo’s teaching of a UE requesting SI/SIBs via an SI request message, in view of a POSITA’s understanding that the minimum granularity of requested SI is one SIB, renders obvious “*the first SI request message including at least one requested system information block.*”

[1.3] activating a prohibit timer; and

Oppo teaches that an “**SI prohibit timer is started when SI request is initiated**” (“*activating a prohibit timer*”). Ex.1007, 2.

In more detail, Oppo teaches that for an “on-demand SI request,” the “UE refrains from trying until a certain time. **The prohibit timer** [] might be specified or be configurable etc.” Ex.1007, 1; Ex.1003, ¶¶54-55. For instance, the “**SI prohibit timer**” is introduced for MSG1, MSG3 and dedicated RRC signalling to

suppress UE to generate frequent SI request signalling.” Ex.1007, 1-2.

Oppo therefore teaches that the UE starts the SI prohibit timer (“*activating*”) upon transmitting the initial SI request to the network as the table below illustrates. Ex.1007, 2.

UE starts SI prohibit timer upon transmitting initial SI request (<i>activating a prohibit timer</i>)			
Timer	Start	Stop	At expiry
Txxx	Transmission of SI request by RRC signalling or trigger MAC to perform Random Access for SI request	Reception of SI request acknowledgement; The requested SI has been available in latest SIB1	Trigger another SI request if the SI is still needed in the concern cell

Ex.1007, 2 (annotated); Ex.1003, ¶56.

Thus, Oppo teaches a UE starts a prohibit timer upon sending an initial SI request message, to refrain from resending an SI request message until a certain time, which renders obvious “*activating a prohibit timer.*” Ex.1003, ¶57.

[1.4] *transmitting a second SI request message to the BS only when the at least one requested SIB is not received and the prohibit timer expires.*

First, Oppo discloses “*transmitting a second SI request message to the BS only when the at least one requested SIB is not received.*” Ex.1007, 2. Oppo teaches that “after UE send one SI request to gNB, it should not send another one before check the latest SIB1 to know if the request[ed] SIB has been available, otherwise, there can be frequent SI request which is unnecessary.” Ex.1007, 2.

Indeed, Oppo explains that a second SI request is transmitted to the gNB (*i.e.*, the cell's base station or "BS") only if "**the SI is still needed** in the [] cell." Ex.1007, 2.

Second, Oppo renders obvious "*transmitting a second SI request message to the BS only when ... the prohibit timer expires.*" Ex.1007, 2. Oppo teaches that for "the introduced SI prohibit timer ... the timer is started when SI request is initiated ... **When Timer expires, SI request can be triggered** UE still need the SI on the concern cell." Ex.1007, 2.

Oppo illustrates in the table below that a second SI request is transmitted to the cell's base station upon the conditions that (i) the "Timer" is "[a]t expiry" and (ii) "the SI is still needed," and it would have been obvious in view of Oppo that the transmission occurs "*only*" upon those conditions ("*transmitting a second SI request message to the BS only when the at least one requested SIB is not received and the prohibit timer expires*"). Ex.1007, 2; Ex.1003, ¶¶58-61.

Second SI request transmitted to BS only if the SI is still needed and the SI prohibit timer is at expiry

Timer	Start	Stop	At expiry
Txxx	Transmission of SI request by RRC signalling or trigger MAC to perform Random Access for SI request	Reception of SI request acknowledgement; The requested SI has been available in latest SIB1	Trigger another SI request if the SI is still needed in the concern cell

Ex.1007, 2 (annotated); Ex.1003, ¶60.

Thus, Oppo teaches that another SI request is sent if both the SI is still needed and the SI prohibit timer has expired, which renders obvious “*transmitting a second SI request message to the BS only when the at least one requested SIB is not received and the prohibit timer expires.*”

D. Ground 2: Claims 5-6 are obvious under 35 U.S.C. § 103 over Oppo in view of Vivo

1. Summary of Vivo

Vivo teaches methods for “on demand SI” requests by an “RRC_CONNECTED UE” in 5G. Ex.1008, 2-3. Vivo explains that “[f]or SI request sent from the RRC_CONNECTED UE, the minimum granularity of requested SI is one SIB” or system information block. Ex.1008, 2. Vivo further explains that, by contrast, for “MSG1 [or MSG3] based SI request, the minimum granularity of requested SI is one SI message” where one SI message includes multiple SIBs. Ex.1008, 1-2; Ex.1003, ¶62.

2. Reasons to Combine Oppo and Vivo

For the reasons set forth below, a POSITA would have been motivated to combine the teachings of Oppo and Vivo. Ex.1003, ¶63. In particular, before the priority date of the '502 patent, it would have been obvious, beneficial, and predictable to utilize Vivo's teachings regarding the granularity of a SI request message in combination with Oppo's system—for example, for a UE in idle or connected mode to specify the particular SIB(s) or SI message being requested; further, it would have been obvious to apply Vivo's teachings about actually receiving the requested SIBs via dedicated signaling. Ex.1003, ¶63.

As an initial matter, one of ordinary skill in the art when considering the teachings of Oppo would have naturally considered the teachings of Vivo as they are analogous prior art to the '502 patent and pertain to the same field of endeavor, namely, cellular telecommunications. *See* Ex.1007, 1; Ex.1008, 1. Specifically, both references describe on-demand SI requests in the context of the 5G standard. Ex.1007, 1; Ex.1008, 1. Further, both references were submitted to the same 3GPP RAN working group 3 meeting #101 in Athens, Greece on February 26 to March 2, 2018. Ex.1007, 1; Ex.1008, 1; Ex.1005, ¶¶46-61. Oppo and Vivo are also reasonably pertinent to the particular problem of the '502 patent. For example, Oppo and Vivo describe UE and BS procedure for initiating and handling on-demand SI requests in 5G. Ex.1007, 1; Ex.1008, 1; Ex.1003, ¶64.

One of ordinary skill in the art would have also been specifically motivated to incorporate Vivo's technique regarding the granularity of the SI requested in an SI request message into Oppo because doing so would clarify an implementation detail of Oppo's system—*i.e.*, providing UEs with only the system information needed (SIB versus SI message of multiple SIBs) depending on the UE's operating mode (idle or connected), in order to reduce communication overhead. Ex.1007, 1-2; Ex.1003, ¶65. Indeed, Oppo already contemplates that the SI request message would specify “the SI/ SIBs being requested.” Ex.1007, 1. Accordingly, a POSITA would have been motivated to integrate Vivo's technique into Oppo's system, to clarify whether a set of SIB(s) or an SI message can be requested in connected versus idle mode.

This combination beneficially allows UEs to request system information with finer granularity in connected mode, where only one or a small number of SIBs may be required. *See* Ex.1007, 1-3; Ex.1003, ¶66.

In one example implementation of this combination, a POSITA would have found it obvious to augment Oppo's SI request methods such that the SI request message sent by UEs in connected mode would request particular SIB(s) whereas UEs in idle mode would request particular SI messages (*i.e.*, at least multiple or a group of SIBs). Ex.1003, ¶67 (citing Ex.1007, 1; Ex.1008, 1-3). This combination would have been obvious because several other POSITAs also suggested the same

solution; in other words, POSITAs understood that there were only a limited number of options for an SI request and specifying the SIB(s) and/or SI message was one option proposed by several POSITAs. Ex.1003, ¶67 (quoting Ex.1009, 46:23-25 (“The specific [requested] other-SI (e.g., **SIB and/or SI message**) may be determined by the [UE.]”)).

Not only would utilizing Vivo’s technique in Oppo’s system have been advantageous, but a POSITA would have also found the combination predictable and would have had a reasonable expectation of success, for several reasons. Ex.1003, ¶68. For example, the combination does not change the intended functionality of either Oppo’s timer-based SI request methods or Vivo’s technique. *Id.* In fact, Vivo’s technique was *specifically intended* to be implemented in 5G on-demand SI request methods (such as Oppo’s). *See* Ex.1008, 1; Ex.1007, 1. Further, the combination is predictable because other POSITAs at the time already considered Vivo’s technique of UEs specifying the requested system information with the granularity of SIB(s) or SI message. Ex.1003, ¶68 (citing Ex.1009, 46:23-25; Ex.1014, [0010]; Ex.1016, 1).

Additionally, it would have been obvious to a POSITA that—following the SI request acknowledgment received from the BS, as taught by Oppo—the UE would actually receive the requested SIB. Ex.1003, ¶69. Indeed, this limitation was obvious to POSITAs, because the purpose of requesting SIBs is to receive them;

and for a connected mode UE, it was obvious to send the SIBs reliably and efficiently via dedicated signaling, i.e., utilizing the connected mode channels, as was explicitly taught by Vivo, for example. Ex.1008, 2. Indeed, Vivo explains, “the requested SI is delivered to RRC_CONNECTED UE via dedicated signaling.” Ex.1008, 2. The advantage to this implementation was also apparent to POSITAs, as Vivo explains that delivering requested SIBs via dedicated signaling “means it is possible for the network to deliver only the SIBs exactly needed by the UE.” Ex.1008, 2.

Accordingly, a POSITA would have found it obvious to apply Vivo’s teachings to Oppo’s SI request method that is ready for further implementation details. Ex.1003, ¶70.

3. Claim 5

[5.0] *The method of claim 1, further comprising: receiving, from the BS, the at least one requested SIB via dedicated signaling that is transmitted in response to the first SI request message.*

First, Oppo teaches “*receiving, from the BS*” an acknowledgment of the SI request “*that is transmitted in response to the first SI request message.*” Ex.1007, 2. For instance, Oppo explains that, after the “SI prohibit timer” is activated by the initial SI request, “[r]egarding the stop condition ... [one] condition is that UE get the acknowledgement of the SI request.” Ex.1007, 2.

Oppo further describes the scenario where “not all essential SIBs are

‘regularly’ broadcasted,” which a POSITA would have understood to mean that some SIBs are not broadcasted but instead delivered via dedicated signaling.

Ex.1007, 1. Indeed, Oppo considers the UE requesting SIBs using “dedicated RRC signalling,” and a POSITA would have understood that the SIBs would likewise be delivered via dedicated signaling for these connected-mode UEs. Ex.1007, 2; Ex.1003, ¶¶71-72.

To the extent Oppo does not explicitly teach “*receiving [] the at least one requested SIB via dedicated signaling*,” it would have been obvious to a POSITA that—following the SI request acknowledgment received from the BS, as taught by Oppo—the UE would receive the requested SIB. Ex.1003, ¶73. Indeed, this limitation was well known to POSITAs as taught by Vivo, for example. Ex.1008, 2.

Second, Vivo teaches that, at a prior meeting of the 3GPP RAN2 working group (the same working group that considered the Oppo document), “[i]t was agreed that the requested SI is delivered to RRC CONNECTED UE via dedicated signaling. This means it is possible for the network to deliver only the SIBs exactly needed by the UE.” Ex.1008, 2. Accordingly, a POSITA would have found it obvious for the UE described in Vivo, which receives from the gNB (BS) an acknowledgment of its SI request, to actually “*receiv[e] the at least one requested SIB via dedicated signaling*,” as was agreed to by the 3GPP RAN2

working group. *See* Ex.1008, 2; Ex.1003, ¶74.

Thus, Oppo teaches the UE receiving an acknowledgment of its SI request from the BS, and Vivo teaches the UE receiving the requested SIB via dedicated signaling, which renders obvious “*receiving, from the BS, the at least one requested SIB via dedicated signaling that is transmitted in response to the first SI request message.*” Ex.1003, ¶75.

4. Claim 6

[6.0] *The method of claim 1, further comprising: transmitting a fourth SI request message to the BS after determining that the UE is not in the connected state, the fourth SI request message including at least one requested SI message.*

First, Oppo teaches “*transmitting a fourth SI request message to the BS after determining that the UE is not in the connected state.*” Oppo teaches that the “**UE send SI request**” (“*fourth SI request message*”) for each of “MSG1-” and “MSG3-based SI request for **RRC Idle**” (“*UE is not in the connected state*”). Ex.1007, 1. Oppo further explains “we discuss the SI prohibit timer for MSG1 and MSG3 based **SI request** especially for **RRC Idle/inactive UEs**.” Ex.1007, 1.

To the extent Oppo does not disclose the details of a UE going from a connected state to not being in a connected state, this functionality was known as described in Deenoo. *See* Ex.1009, 54:36-39. Moreover, a POSITA would understand that issuing another SI request message after the UE goes from a connected to a not connected state renders obvious a “*fourth SI request message.*”

See Ex.1007, 1.

To the extent Oppo does not explicitly disclose that, for a UE not in connected mode, the SI request “*including at least one requested SI message*,” this limitation was well known to POSITAs as taught by Vivo, for example. Ex.1008, 1.

Second, Vivo teaches that in “RAN2#98 meeting, it was agreed that for MSG1 based SI request, the minimum granularity of requested SI is one SI message.” Ex.1008, 1. Vivo also teaches that “[f]or MSG3 based SI request, the minimum granularity of requested SI is one SI message.” Ex.1008, 1.

A POSITA would have found it obvious to apply Vivo’s teachings to Oppo at least for the reasons described above at Section IX.D.2. In the resulting combination, an idle or inactive mode UE transmits an SI request that includes at least one requested SI message. See Ex.1007, 1; Ex.1008, 1; Ex.1003, ¶¶76-80.

Thus, Oppo teaches that an idle/inactive mode UE transmits MSG1 or MSG3 based SI request, and Vivo teaches that an MSG1 or MSG3 based SI request includes a minimum of one requested SI message, which renders obvious “*transmitting a fourth SI request message to the BS after determining that the UE is not in the connected state, the fourth SI request message including at least one requested SI message*.”

E. Ground 3: Claims 11, 15-16 are obvious under 35 U.S.C. § 103

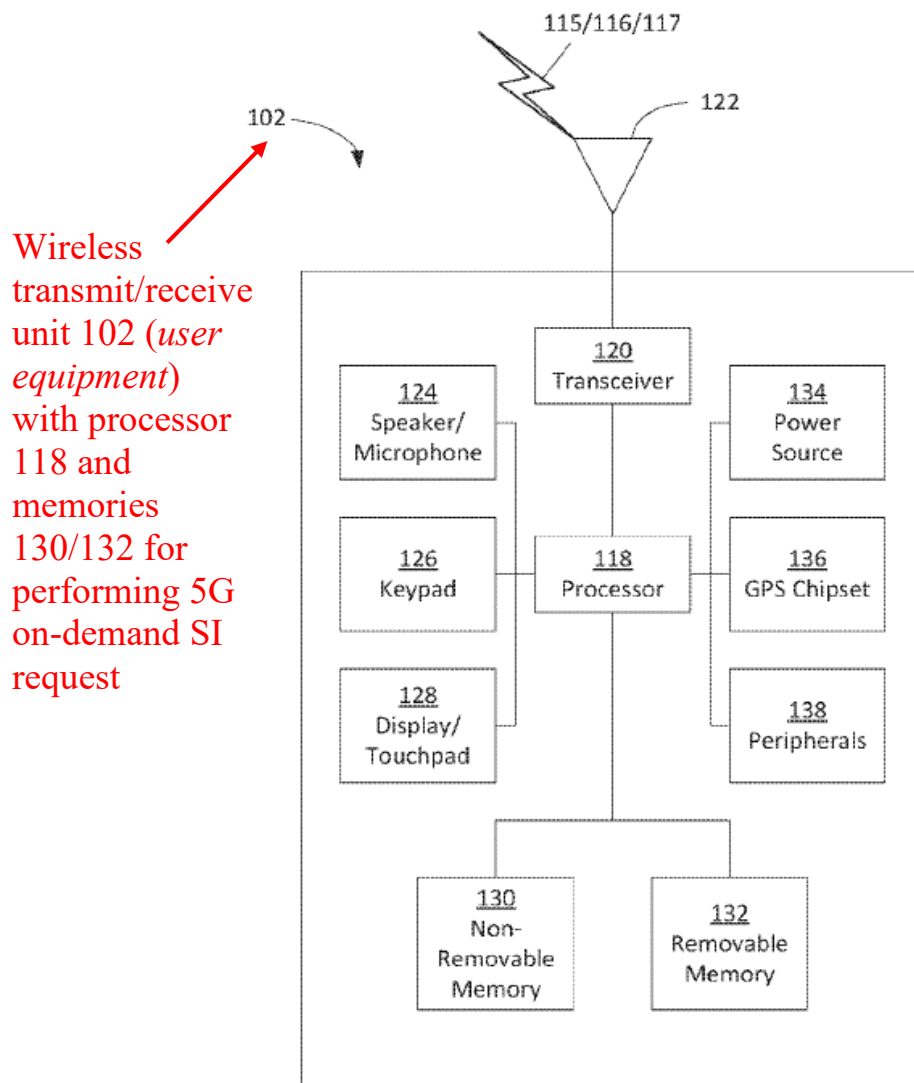
over Oppo in view of Vivo and Deenoo

1. Summary of Deenoo

Deenoo describes a “wireless transmit/receive unit (WTRU)” or UE that is “configured to determine one or more uplink (UL) resources with which to communicate information for the WTRU reception of the one or more on-demand SI messages.” Ex.1009, 2:17, 2:29-32.

Deenoo further teaches an SI request method where a UE “may start a timer” when an “other-SI request message is transmitted” (*i.e.*, the UE may start a prohibit timer). Ex.1009, 41:5-7. The UE may use “timer A and/or a timer B (e.g., where timer A time > timer B time).” Ex.1009, 41:5-7. Then, “[u]pon expiry of timer B, a WTRU may retransmit the other-SI request message and/or restart timer B.” Ex.1009, 41:9-10. Further, a UE “may be configured with a predefined number of retransmissions to acquire the other-SI until expiry of timer A. Upon expiry of timer A, a [UE] may consider the cell [BS] to be barred.” Ex.1009, 41:10-14.

Deenoo illustrates example UE hardware and software, including processor 118 and memories 130/132, in Fig. 1B shown below. Ex.1009, 6:29. Deenoo explains that the UE “may be configured with one or more rules for transmission of on-demand system information request that may be saved in memory as instructions executable by a processor.” Ex.1009, 39:44-47; Ex.1003, ¶¶81-83.



Ex.1009, Fig. 1B (annotated); Ex.1003, ¶83.

2. Reasons to Combine Oppo and Vivo with Deenoo

For the reasons set forth below, a POSITA would have been motivated to combine the teachings of Oppo and Vivo with Deenoo. Ex.1003, ¶84. In particular, before the priority date of the '502 patent, it would have been obvious and predictable to utilize Deenoo's teachings regarding UE hardware/software

implementation in combination with the system of Oppo and Vivo—for example, to perform the SI request method of Oppo and Vivo using Deenoo’s UE. It would have been plainly obvious to a POSITA to implement a 5G method in a UE designed to implement 5G methods. Ex.1003, ¶84.

As an initial matter, one of ordinary skill in the art when considering the teachings of Oppo and Vivo would have naturally considered the teachings of Deenoo as they are analogous prior art to the ’502 patent and pertain to the same field of endeavor, namely, cellular telecommunications. *See* Ex.1007, 1; Ex.1008, 1; Ex.1009, Abstract. Specifically, these references all describe on-demand SI requests in the context of the 5G standard. Ex.1007, 1; Ex.1008, 1; Ex.1009, Abstract, 37:23. Deenoo is also reasonably pertinent to the particular problem of the ’502 patent. For example, Deenoo describes UE and BS procedure for initiating and handling on-demand SI requests in 5G. Ex.1009, 37:43-46; Ex.1003, ¶85.

One of ordinary skill in the art would have also specifically looked to incorporate Deenoo’s technique of programming memory and a processor to execute stored instructions for performing an SI request into the system of Oppo and Vivo—because doing so would address implementation details left out of these 3GPP working group meeting proposals. Ex.1003, ¶¶86. In other words, Deenoo’s teachings describe well-known UE hardware/software design implementation details. Indeed, cellular standard-directed proposals such as Oppo and Vivo

routinely leave such details up to device manufacturers—such as Sony Corporation, the assignee of the Deenoo U.S. patent. A POSITA would have considered Deenoo’s UE as a suitable example implementation because Deenoo’s UE architecture provides flexibility for the memory and processor to be programmed to execute various functionality of the 5G standard. Ex.1009, Abstract. This combination also would have been obvious because Deenoo’s general UE architecture was common in the art. Ex.1003, ¶86 (citing Ex.1014, Fig.2, Fig.7).

A POSITA would have also found the combination predictable and would have had a reasonable expectation of success, as the combination does not change the intended functionality of any of Oppo’s and Vivo’s methods or Deenoo’s UE. Ex.1003, ¶87. For instance, a POSITA would have expected success as Oppo’s technique was *specifically intended* to be implemented in a UE with 5G capabilities (such as Deenoo’s). Ex.1007, 1. Indeed, like Oppo and Vivo, Deenoo itself describes an SI request technique for requesting on-demand SIBs using a prohibit timer. Ex.1009, 41:5-14.

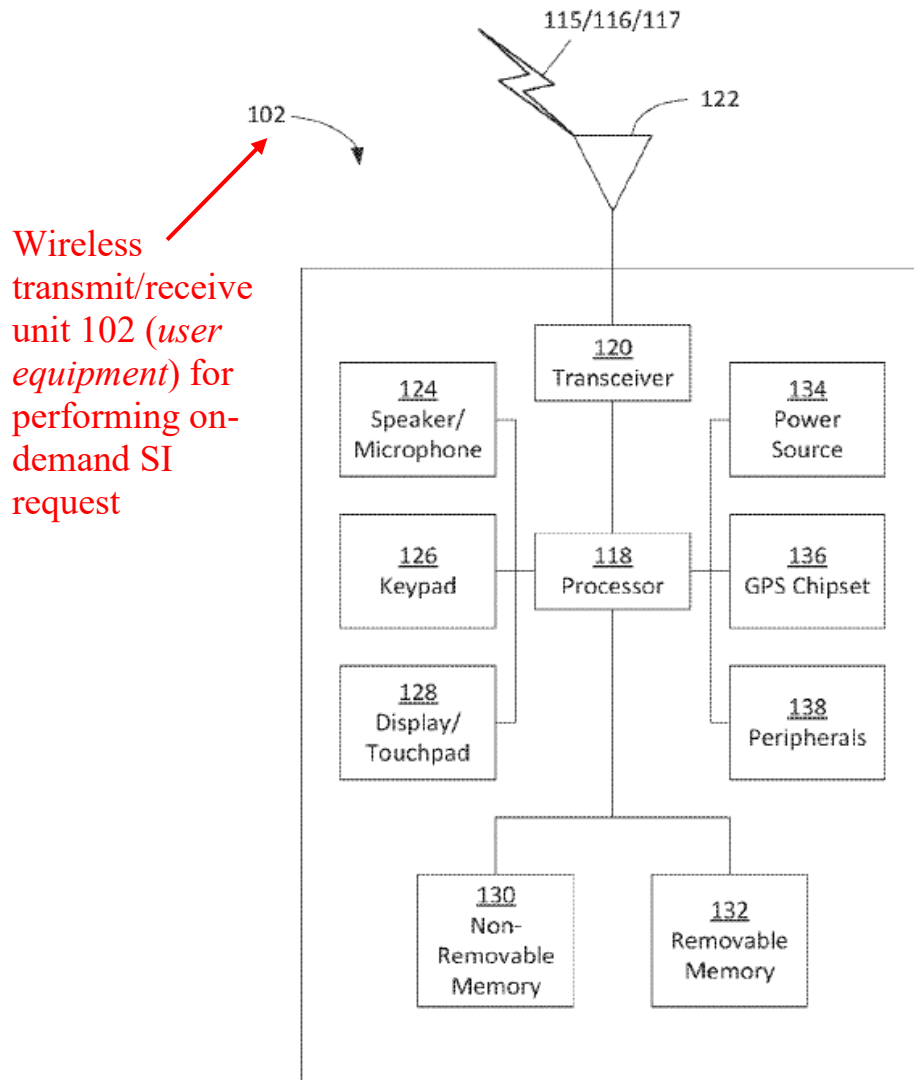
Accordingly, a POSITA would have found it obvious to apply Deenoo’s teachings to Oppo and Vivo because the combination merely amounts to implementing a known SI request technique in Deenoo’s 5G-capable UE ready for improvement. Ex.1003, ¶88.

3. Claim 11

[11.0] *A user equipment (UE), comprising:*

Oppo describes a UE that uses a “prohibit timer” so that, after an on-demand SI request, the “UE refrains from retrying until a certain time” (“[a] *user equipment (UE)*”). Ex.1007, 1.

Deenoo further describes details regarding an example UE configured for on-demand SI requests. For instance, Deenoo describes a “wireless transmit/receive unit (WTRU)” that is “configured to determine one or more uplink (UL) resources with which to communicate information for the WTRU reception of the one or more on-demand SI messages.” Ex.1009, 2:17, 2:29-32. Deenoo explains that “the WTRUs 102 ... may include user equipment (UE).” Ex.1009, 4:26-29. Deenoo illustrates an example WTRU or UE in Fig. 1B shown below. Ex.1009, 6:29.



Ex.1009, Fig. 1B (annotated); Ex.1003, ¶¶90.

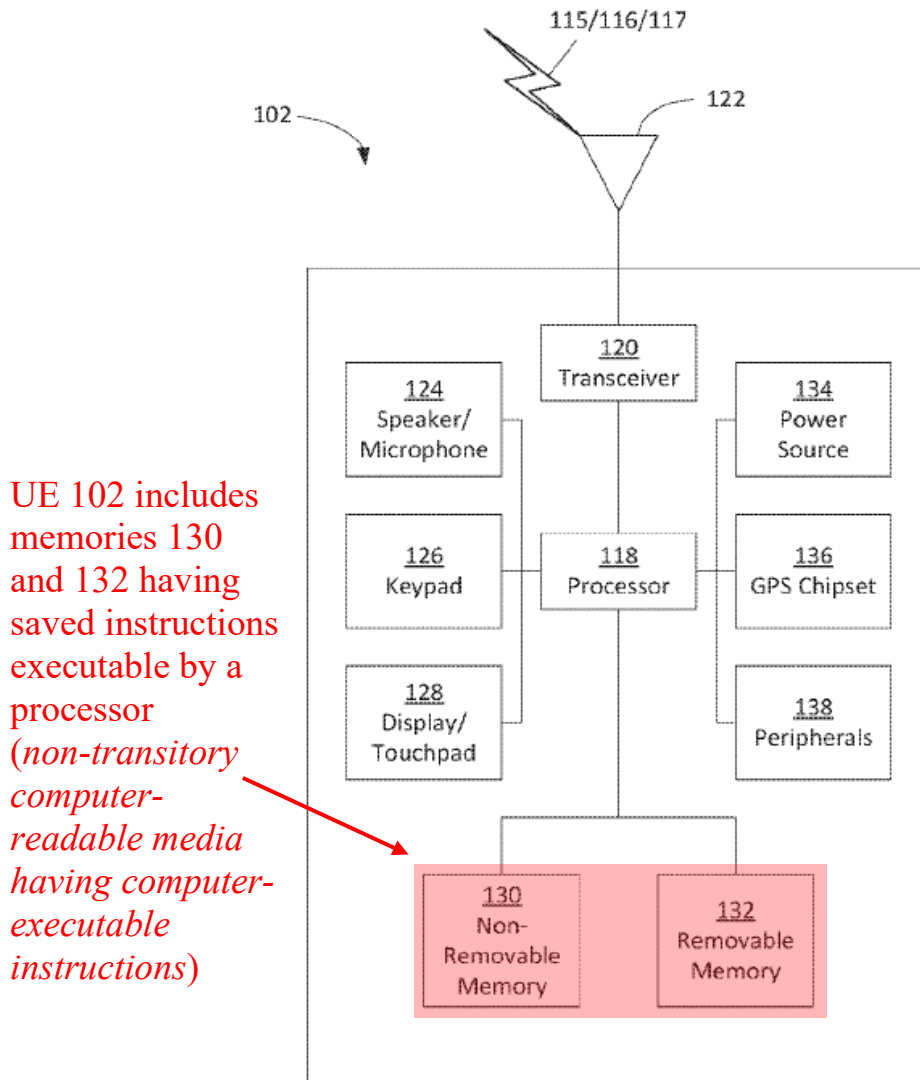
Thus, Oppo's UE that requests on-demand SI, in view of Deenoo's example UE configured for requesting and receiving messages regarding on-demand SI, renders obvious "*a user equipment.*" Ex.1003, ¶¶89-91.

[11.1] *one or more non-transitory computer-readable media having computer-executable instructions embodied thereon; and*

As discussed at [11.0], Oppo in view of Deenoo teaches a UE configured for

requesting and receiving messages regarding on-demand SI.

Deenoo describes the UE including “non-removable memory 130, removable memory 132” (“*one or more non-transitory computer-readable media*”). Ex.1009, 6:33-34; Ex.1003, ¶¶92-93. Deenoo further explains that the UE “may have **saved instructions in memory executable by a processor** and/or received from a wireless network via a message (e.g., rules) for triggering a system information (‘SI’) request procedure” (“*non-transitory computer-readable media having computer-executable instructions embodied thereon*”). Ex.1009, 1:62-65.



Ex.1009, Fig. 1B (annotated); Ex.1003, ¶93.

Thus, Oppo's UE that requests on-demand SI, in view of Deenoo's teaching that a UE stores SI request procedure instructions in memory that are executable by a processor, renders obvious "*one or more non-transitory computer-readable media having computer-executable instructions embodied thereon.*" Ex.1003, ¶94.

[11.2] at least one processor coupled to the one or more non-transitory computer-readable media, and configured to execute the computer-executable

instructions to perform operations for an on-demand system information (SI) request procedure, the operations comprising:

As discussed at [11.1], Deenoo describes a UE “**may have saved instructions in memory executable by a processor** and/or received from a wireless network via a message (e.g., rules) for triggering a **system information (‘SI’) request procedure**.” Ex.1009, 1:62-65. Deenoo further explains that the UE “may be configured with one or more rules for transmission of **on-demand system information request that may be saved in memory as instructions executable by a processor**.” Ex.1009, 39:44-47; Ex.1003, ¶95.

Thus, Oppo’s UE that requests on-demand SI, in view of Deenoo’s UE including saved instructions in memory executable by a processor for performing operations of on-demand SI request procedures, renders obvious “*at least one processor coupled to the one or more non-transitory computer-readable media, and configured to execute the computer-executable instructions to perform operations for an on-demand system information (SI) request procedure.*”

Ex.1003, ¶96.

[11.3] transmitting a first SI request message to a base station (BS) after determining that the UE is in a connected state, the first SI request message including at least one requested system information block (SIB); activating a prohibit timer; and transmitting a second SI request message to the BS only when the at least one requested SIB is not received and the prohibit timer expires.

Oppo in view of Vivo and Deenoo render obvious this element; see Ground

#1 [1.1]-[1.4] and Ground #3 [11.2] above. Ex.1003, ¶97.

4. Claim 15

[15.0] *The UE of claim 11, wherein the operations further comprise: receiving, from the BS, the at least one requested SIB via dedicated signaling that is transmitted in response to the first SI request message.*

Oppo in view of Vivo and Deenoo render obvious this element; see Ground #2 [5.0] above. Ex.1003, ¶98.

5. Claim 16

[16.0] *The UE of claim 11, wherein the operations further comprise: transmitting a fourth SI request message to the BS after determining that the UE is not in the connected state, the fourth SI request message including at least one requested SI message.*

Oppo in view of Vivo and Deenoo render obvious this element; see Ground #2 [6.0] above. Ex.1003, ¶99.

F. Ground 4: Claims 1-2, 5-6, 11-12, and 15-16 are obvious under 35 U.S.C. § 103 over Deenoo

1. Summary of Deenoo

As discussed above at Section IX.E.1, Deenoo describes a UE configured for requesting and receiving messages regarding on-demand SI. Ex.1003, ¶100.

2. Claim 1

[1.0] *A method of an on-demand system information (SI) request procedure performed by a user equipment (UE), the method comprising:*

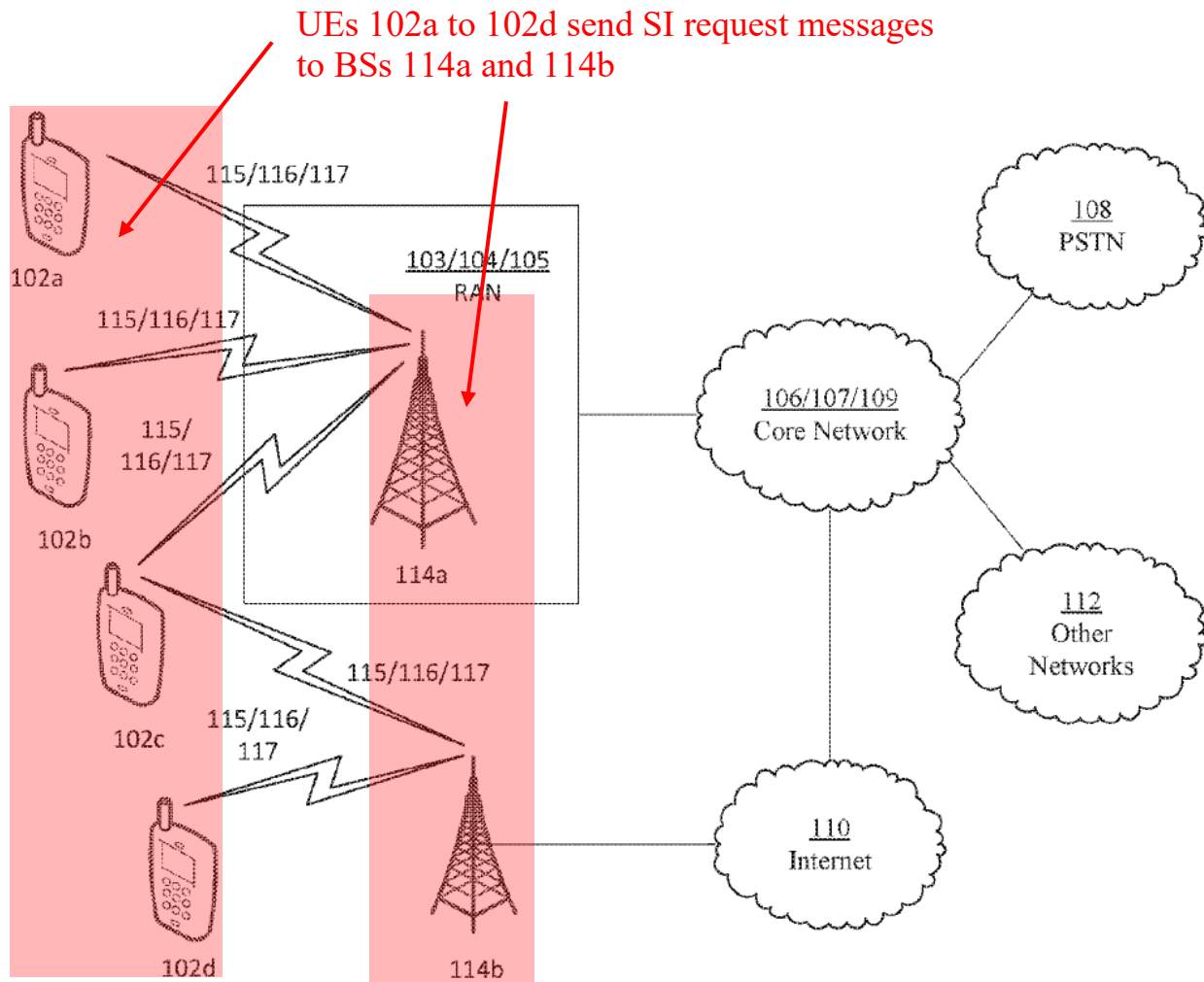
Deenoo teaches the preamble, describing “procedures in a wireless transmit/receive unit (WTRU),” which can “include user equipment (UE).”

Ex.1009, 76:15-16, 4:28-29. “**A WTRU may initiate a request for on-demand SI** in the new cell and/or acquire the on-demand SI” (“*an on-demand [SI] request procedure performed by a [UE]*”). Ex.1009, 61:43-45; Ex.1003, ¶101.

[1.1] transmitting a first SI request message to a base station (BS) after determining that the UE is in a connected state,

Deenoo teaches that the UE’s “transceiver may be configured to **send the request for the one or more on-demand SI messages to the communication network** using the one or more UL resources.” Ex.1009, 2:36-39. The communications network’s “**base stations**” receive the UE’s on-demand SI messages. Ex.1009, 4:34-37 (“Each of the base stations 114 a, 114 b may be any type of device configured to wirelessly interface with at least one of the [UEs].”).

Fig.1A below illustrates UEs 102a to 102d, which send SI request messages to BSs 114a and 114b. Ex.1009, Fig.1A; Ex.1003, ¶¶102-103.



Ex.1009, Fig. 1B (annotated); Ex.1003, ¶103.

Deenoo explains that a UE “may trigger a **system information request procedure in any state (e.g., idle, inactive, and/or connected)**.” Ex.1009, 39:38-39. For instance, the UE “may perform a system information request by for example **using a dedicated resource**,” which are only available to connected-mode UEs. Ex.1009, 39:39-43; Ex.1003, ¶104.

Thus, Deenoo’s UE that transmits on-demand SI messages to a base station

in a connected state renders obvious “*transmitting a first SI request message to a base station (BS) after determining that the UE is in a connected state.*” Ex.1003, ¶105.

[1.2] *the first SI request message including at least one requested system information block (SIB);*

Deenoo teaches that “[s]pecific combinations of preamble and resources may be reserved for the WTRU to **request one or more, or multiple other-SI and/or a set of SIBs** (e.g., a set of SIBs and/or SI related to a specific feature).” Ex.1009, 46:19-22; Ex.1003, ¶106.

Deenoo explains that the “terms system information request and Other-SI request may be used interchangeably.” Ex.1009, 38:28-29. Deenoo also uses the terms “on-demand SI” and “other-SI” interchangeably, explaining “[s]ystems may manage [] the impact of on-demand other-SI broadcast on an uninterested WTRU. Multi-stage RACH may be used for other-SI request” (“*first SI request message*”). Ex.1009, 13:27-30. In addition to using RACH, the “other-SI request may be an RRC message” (also teaching a “*first SI request message*”). Ex.1009, 44:3-4.

Thus, Deenoo’s teaching of the on-demand SI request message including one or more SIBs renders obvious “*the first SI request message including at least one requested system information block.*” Ex.1003, ¶¶107-108.

[1.3] *activating a prohibit timer; and*

Deenoo teaches that a “[UE] **may start** a timer A and/or **a timer B** (e.g., where timer A time > timer B time), **when the first other-SI request message is transmitted.**” Ex.1009, 41:5-7. Then, “[u]pon expiry of timer B, a WTRU **may retransmit the other-SI request message** and/or restart timer B.” Ex.1009, 41:9-10; Ex.1003, ¶109.

Thus, Deenoo teaches starting a timer B when the on-demand SI request is transmitted, and prohibiting retransmitting the on-demand SI request until the timer B expires, which renders obvious “*activating a prohibit timer.*” Ex.1003, ¶110.

[1.4] transmitting a second SI request message to the BS only when the at least one requested SIB is not received and the prohibit timer expires.

As discussed above at [1.3], Deenoo’s method includes a UE starting “**timer B,**” i.e., a prohibit timer, “when the first other-SI request message is transmitted.” Ex.1009, 41:5-7.

Deenoo explains that “**[w]hile timer B is running, a WTRU may monitor for the presence and/or scheduling of other-SI** via a broadcast signaling.”

Ex.1009, 41:15-17. Deenoo further teaches that the UE “**may stop ... timer B when the WTRU completes the acquisition of other-SI.**” Ex.1009, 41:7-10. In other words, if timer B expires, the SI message was never received because timer B stops when the SI message is received. Additionally, Deenoo teaches that “**[u]pon expiry of timer B, a WTRU may retransmit the other-SI request message.**”

Ex.1009, 41:7-10. Accordingly, if the SI request message is retransmitted: (i) the prohibit timer B has expired and (ii) the SI message was never received. Ex.1009, 41:5-10, 41:15-17; Ex.1003, ¶¶111-112.

Notably, the concept of retransmitting the SI request “*only when the at least one requested SIB is not received and the prohibit timer expires*” was obvious and well known to POSITAs. Ex.1003, ¶113 (citing Exs. 1010, 1014, 1015).

Thus, Deenoo teaches that timer B stops when the requested SIB(s) is received and a second request is only transmitted when timer B expires, which renders obvious “*transmitting a second SI request message to the BS only when the at least one requested SIB is not received and the prohibit timer expires.*” Ex.1003, ¶114.

3. Claim 2

[2.0] *The method of claim 1, wherein the on-demand SI request procedure is unsuccessful when one of the following conditions is met: a number of times the UE transmits a random access preamble reaches a threshold; and the UE receives SI request rejection information.*

First, Deenoo teaches that for the “*on-demand SI request procedure ... the UE transmits a random access preamble.*” As discussed above at [1.2], Deenoo teaches that “**[m]ulti-stage RACH** [*i.e.*, random access channel] may be used for other-SI request.” Ex.1009, 13:27-30. Deenoo further explains that a UE “may perform requests for other-SI using transmission of one or more, or multiple

preambles in different RACH resources.” Ex.1009, 47:12-14.

Second, Deenoo explains that the UE “may be configured with a **predefined number of retransmissions to acquire the other-SI until expiry of timer A**” (“*a number of times the UE transmits a random access preamble reaches a threshold*”). Ex.1009, 41:11-13. Then, “**[u]pon expiry of timer A, a WTRU may consider the cell to be barred** for a predefined duration (e.g., not use that cell)” (“*the on-demand SI request procedure is unsuccessful*”). Ex.1009, 41:13-14; Ex.1003, ¶¶115-116.

Indeed, it was well known in the prior art, and described in several references in addition to Deenoo, that a “*SI request procedure is unsuccessful when [] a number of times the UE transmits a random access preamble reaches a threshold.*” For instance, Sharma teaches “using Random Access ‘RA’ preamble for ... requesting the SI,” where “**a terminal may decide to try again only for a number of further attempts.**” Ex.1010, 6:29-31, 9:67-10:5; Ex.1003, ¶117.

Thus, Deenoo teaches that the UE considers a cell barred after a predefined number of RACH preamble retransmissions, which renders obvious “*wherein the on-demand SI request procedure is unsuccessful when one of the following conditions is met: a number of times the UE transmits a random access preamble reaches a threshold; and the UE receives SI request rejection information.*”

Ex.1003, ¶118.

4. Claim 5

[5.0] *The method of claim 1, further comprising: receiving, from the BS, the at least one requested SIB via dedicated signaling that is transmitted in response to the first SI request message.*

As discussed above at [1.4], Deenoo teaches that the UE (*i.e.*, WTRU) “may stop timer A and/or timer B when **the WTRU completes the acquisition of other-SI**” requested from the base station. Ex.1009, 41:7-9. Deenoo explains that **“system information may be acquired by** splitting information across broadcast and **dedicated transmissions.**” Ex.1009, 34:55-57. Deenoo further explains that an “SI request” for “[o]n-demand (dedicated) information may comprise **obtaining remaining system information through dedicated resources.**” Ex.1009, 1:62-2:2, 34:50-52.

Thus, Deenoo teaches that, in response to an on-demand SI request, the UE receives the requested on-demand SI from the base station through dedicated downlink transmission resources, which renders obvious “*receiving, from the BS, the at least one requested SIB via dedicated signaling that is transmitted in response to the first SI request message.*” Ex.1003, ¶¶119-120.

5. Claim 6

[6.0] *The method of claim 1, further comprising: transmitting a fourth SI request message to the BS after determining that the UE is not in the connected state, the fourth SI request message including at least one requested SI message.*

First, as discussed above at [1.1], Deenoo teaches that a UE “may trigger a

system information request procedure in any state (e.g., idle, inactive, and/or connected).” Ex.1009, 39:38-39. Indeed, a UE in connected mode may “go back to idle mode” and UEs “in Idle mode or Inactive mode can acquire the system information while remaining within the respective state” (“*transmitting a fourth SI request message to the BS after determining that the UE is not in the connected state*”). Ex.1009, 32:47-48, 43:2-4.

Second, Deenoo further teaches that the UE may “**request one or more system information (SI) messages** from the communication network.” Ex.1009, 2:7-8. Deenoo explains that a “WTRU may perform **requests for other-SI** using transmission of **one or more**, or multiple **preambles** in different RACH resources” and “may transmit a specific preamble for one or more, or each, of the other-SI (e.g., SIB and/or **SI message**) used (e.g., required) by the WTRU” (“*the fourth SI request message including at least one requested SI message*”). Ex.1009, 47:12-18, 60:61-65.

Thus, Deenoo teaches that a UE transitions from connected to idle mode and requests an SI message in idle mode. A POSITA would understand that Deenoo’s teaching of issuing another SI request message after the UE goes from a connected to a not connected state renders obvious “*transmitting a fourth SI request message to the BS after determining that the UE is not in the connected state, the fourth SI request message including at least one requested SI message.*” Ex.1003, ¶¶121-

123.

6. Claim 11

[11.0] *A user equipment (UE), comprising:*

Deenoo describes this element; see Ground #3 [11.0]. Ex.1003, ¶124.

[11.1] *one or more non-transitory computer-readable media having computer-executable instructions embodied thereon; and*

Deenoo describes this element; see Ground #3 [11.1]. Ex.1003, ¶125.

[11.2] *at least one processor coupled to the one or more non-transitory computer-readable media, and configured to execute the computer-executable instructions to perform operations for an on-demand system information (SI) request procedure, the operations comprising:*

Deenoo describes this element; see Ground #3 [11.2]. Ex.1003, ¶126.

[11.3] *transmitting a first SI request message to a base station (BS) after determining that the UE is in a connected state, the first SI request message including at least one requested system information block (SIB); activating a prohibit timer; and transmitting a second SI request message to the BS only when the at least one requested SIB is not received and the prohibit timer expires.*

Deenoo teaches this element; see Ground #4 [1.1]-[1.4] above. Ex.1003, ¶127.

7. Claim 12

[12.0] *The UE of claim 11, wherein the on-demand SI request procedure is unsuccessful when one of the following conditions is met: a number of times the UE transmits a random access preamble reaches a threshold; and the UE receives SI request rejection information.*

See Ground #4 [2.0] above. Ex.1003, ¶128.

8. Claim 15

[15.0] *The UE of claim 11, wherein the operations further comprise: receiving, from the BS, the at least one requested SIB via dedicated signaling that is transmitted in response to the first SI request message.*

See Ground #4 [5.0]. Ex.1003, ¶129.

9. Claim 16

[16.0] *The UE of claim 11, wherein the operations further comprise: transmitting a fourth SI request message to the BS after determining that the UE is not in the connected state, the fourth SI request message including at least one requested SI message.*

See Ground #4 [6.0]. Ex.1003, ¶130.

G. Ground 5: Claims 3 and 13 are obvious under 35 U.S.C. § 103 over Deenoo in view of Futaki

1. Summary of Futaki

Futaki describes on-demand SI request procedures in the context of 5G. Ex.1009, 5:8-14. Futaki further describes SI requests in dual connectivity mode. Ex.1011, 12:7-15.

In particular, Futaki teaches a UE requesting system information of a secondary node-b base station (NB), describing a “procedure for sending an indication of on-demand system information available in the cell 21 of the secondary gNB (SgNB) 2.” Ex.1011, 10:43-47. Futaki explains that the system information for the secondary node is sent to the UE from the master node base station (MeNB): “system information of ... SgNB 2 [is sent] to the UE 3 via the

master eNB (MeNB) 1 in Inter-RAT dual connectivity.” Ex.1011, 10:43-47;
Ex.1003, ¶¶131-132.

2. Reasons to Combine Deenoo with Futaki

For the reasons set forth below, a POSITA would have been motivated to combine the teachings of Futaki with the system of Deenoo described above. Ex.1003, ¶133. In particular, before the priority date of the ’502 patent, it would have been obvious, beneficial, and predictable to utilize Futaki’s teachings regarding SI requests in dual connectivity mode in combination with the SI request method and example 5G-capable UE of Deenoo—for example, to provide implementation details regarding the dual connectivity mode contemplated by Deenoo. Ex.1009, Abstract, 41:5-14, 65:49-51; Ex.1011, 10:43-46; Ex.1003, ¶133.

As an initial matter, one of ordinary skill in the art when considering the teachings of Deenoo would have naturally considered the teachings of Futaki as they are analogous prior art pertaining to the same field of endeavor as the ’502 patent, namely, cellular telecommunications. *See* Ex.1009, Abstract; Ex.1011, Abstract. Specifically, both references describe on-demand SI requests in the context of the 5G standard. Ex.1009, Abstract, 37:23; Ex.1011, 5:8-14. Futaki is also reasonably pertinent to the particular problem of the ’502 patent, such as UE and BS procedure for initiating and handling on-demand SI requests in 5G. Ex.1011, Abstract; Ex.1003, ¶134.

Deenoo refers to “dual connectivity” mode and the UE connecting to a master node or “MeNB (Master eNB)” but leaves some implementation details to a POSITA. Ex.1009, 65:49-51; Ex.1003, ¶135. One of ordinary skill in the art would have been specifically motivated to incorporate Futaki’s technique for requesting SI from a secondary node into the system of Deenoo because doing so addresses a well-known implementation issue of SI requests in dual connectivity systems—*i.e.*, whether to send SI requests to a primary or secondary node. In other words, Futaki’s technique advantageously solves this problem, such that a POSITA would have been motivated to incorporate Futaki’s teachings into the system of Deenoo. In the combined system, the UE sends to the master node a request for SIBs of the secondary node, as explained by Futaki. Ex.1011, 10:43-47; Ex.1003, ¶135.

A POSITA would have also found the combination predictable and would have had a reasonable expectation of success, as the combination does not change the intended functionality of Deenoo’s dual connectivity system or Futaki’s technique. Ex.1003, ¶136. For instance, a POSITA would have expected success as Futaki’s technique was *specifically intended* to be implemented in a UE capable of on-demand SI requests and 5G dual connectivity (such as Deenoo’s UE). Ex.1009, Fig. 2; 41:5-14, 65:49-51; Ex.1011, 10:43-46.

Accordingly, a POSITA would have found it obvious to apply Futaki’s teachings to Deenoo’s system because the combination merely amounts to

implementing a known dual connectivity technique in Deenoo's UE and SI request method to achieve predictable results. Ex.1003, ¶137.

3. Claim 3

[3.0] *The method of claim 1, wherein when the UE is in a dual connectivity mode, the method further comprises: transmitting a third SI request message to a master node when the UE requires on-demand system information of a cell belonging to a secondary node.*

First, Deenoo teaches that a UE's "RRC connection for dual connectivity may be associated with a WTRU specific RNTI in the MeNB (Master eNB)." Ex.1009, 65:49-51. To the extent Deenoo does not provide details regarding transmitting an SI request when connected to master and secondary nodes, such techniques were well known to a POSITA as taught by Futaki.

Second, Futaki describes a UE requesting system information of a secondary Node-B base station (NB or SgNB, "*secondary node*"), including a "procedure for sending an indication of on-demand system information available in the cell 21 of the secondary gNB (SgNB) 2." Ex.1011, 12:7-15. Futaki explains that the system information for the secondary node is sent to the UE from the master node base station (MeNB) ("*master node*"): "system information of ... SgNB 2 [is sent] to the UE 3 via the master eNB (MeNB) 1 in Inter-RAT dual connectivity" ("*the UE is in a dual connectivity mode*"). Ex.1011, 12:7-15.

In more detail, Futaki explains that "the UE 3 (i.e., the E-UTRA AS layer)

sends [] an SI request in the E-UTRA cell (i.e., Primary Cell (PCell)) of the MeNB 1 (Step 904) (“*transmitting a third SI request message to a master node*”). Ex.1011, 12:7-15. Futaki further explains that the “SI request is a request for transmission of the **on-demand system information from the SgNB 2**” (“*when the UE requires on-demand system information of a cell belonging to a secondary node*”). Ex.1011, 12:7-15.

Thus, Deenoo teaches a system for on-demand SI requests that includes dual connectivity with a master node, and Futaki teaches dual connectivity including sending an SI request to the master base station for on-demand SI of the secondary base station, which render obvious “*wherein when the UE is in a dual connectivity mode, the method further comprises: transmitting a third SI request message to a master node when the UE requires on-demand system information of a cell belonging to a secondary node.*” Ex.1003, ¶¶138-141.

4. Claim 13

[13.0] *The UE of claim 11, wherein when the UE is in a dual connectivity mode, the operations further comprise: transmitting a third SI request message to a master node when the UE requires on-demand system information of a cell belonging to a secondary node.*

See [3.0] above. Ex.1003, ¶142.

H. Ground 6: Claims 4, 7, 14, and 17 are obvious under 35 U.S.C. §

103 over Deenoo in view of Asustek

1. Summary of Asustek

Asustek describes on-demand SI requests in the context of 5G. Ex.1012, 1. Asustek explains which signal radio bearers (SRBs) are used to send on-demand SI requests. Ex.1012, 2. Asustek teaches that a “UE in RRC_CONNECTED transmits a system information request message through SRB1.” Ex.1012, 2. Asustek further teaches that “a UE in RRC_IDLE/RRC_INACTIVE transmits a system information request message containing a UE identity through SRB0.” Ex.1012, 2; Ex.1003, ¶143.

2. Reasons to Combine Deenoo with Asustek

For the reasons set forth below, a POSITA would have been motivated to combine the teachings of Asustek with Deenoo. Ex.1003, ¶144. In particular, before the priority date of the ’502 patent, it would have been obvious, beneficial, and predictable to utilize Asustek’s teachings regarding transmitting SI requests on various signal bearers in combination with the system of Deenoo—for example, to use SRB0 to perform Deenoo’s method in idle mode and SRB1 in connected mode. Ex.1003, ¶144.

As an initial matter, one of ordinary skill in the art when considering the teachings of Deenoo would have naturally considered the teachings of Asustek as they are analogous prior art pertaining to the same field of endeavor as the ’502

patent, namely, cellular telecommunications. *See* Ex.1009, Abstract; Ex.1012, 1. Specifically, both references describe on-demand SI requests in the context of the 5G standard. Ex.1009, Abstract, 37:23; Ex.1012, 1. Asustek is also reasonably pertinent to the particular problem of the '502 patent, such as UE and BS procedure for initiating and handling on-demand SI requests in 5G. Ex.1012, 1; Ex.1003, ¶145.

The combination would have been predictable with an expectation of success because Deenoo itself contemplates various SRB configurations for control information. *See, e.g.*, Ex.1009, 68:4-5. Indeed, Deenoo contemplates using “SRB0, 1, 2, 3, etc. and/or using different sets thereof” but does not explicitly say how they are used in the context of on-demand SI requests. *See* Ex.1009, 75:41-42. Therefore, one of ordinary skill in the art would have been specifically motivated to incorporate Asustek’s technique of using SBR0/SRB1 for SI requests into the system of Deenoo because doing so would address a well-known implementation issue of SI requests—*i.e.*, choosing which signaling bearer to use for the requests. Ex.1003, ¶146.

In one example implementation of this combination, a POSITA would have found it obvious that the idle-mode and connected-mode SI requests of Deenoo’s system could optionally be transmitted on various signaling bearers. Ex.1003, ¶147. This combination would have been obvious because applying SBR0/SRB1 to

deliver idle-mode and connected-mode control messaging was common in the art. Ex.1003, ¶147 (citing Ex.1021, ¶0470).

A POSITA would have also found the combination predictable and would have had a reasonable expectation of success, as the combination does not change the intended functionality of Deenoo’s SI request method or Asustek’s technique. Ex.1003, ¶148. For instance, a POSITA would have expected success as Asustek’s technique was *specifically intended* to be implemented in 5G on-demand SI requests in idle and connected mode (such as Deenoo’s). Ex.1009, 39:38-39; Ex.1012, 1.

Accordingly, a POSITA would have found it obvious to apply Asustek’s teachings to Deenoo’s system because the combination merely amounts to implementing a known technique in Deenoo’s UE ready for improvement. Ex.1003, ¶149.

3. Claim 4

[4.0] *The method of claim 1, wherein the first SI request message is transmitted on signaling radio bearer 1 (SRB1).*

First, Deenoo teaches that a UE configures “signaling radio bearers” or “SRBs” including “to enable transmission of control signaling (e.g. a signaling radio bearer and/or equivalent).” Ex.1009, 27:32-33. A UE configures one or more SRBs as a UE “may have one or more, or multiple termination points for control

signaling.” Ex.1009, 72:21-23. Further, a UE “may (de)multiplex control signaling (e.g. RRC PDUs and/or the like) **using different logical connections, bearers (e.g. SRB0, 1, 2, 3, etc. and/or using different sets thereof).**” Ex.1009, 75:39-41.

To the extent Deenoo does not provide details regarding which of SRB0, SRB1, SRB2, SRB3, *etc.* is used for SI requests in connected mode, such techniques were well known to a POSITA as taught by Asustek. Ex.1003, ¶¶150-151.

Second, Asustek teaches that a “**UE in RRC CONNECTED transmits the system information request message through SRB1.**” Ex.1012, 2. Ex.1003, ¶152. A POSITA would have found it obvious to apply Asustek’s teachings to Deenoo at least for the reasons provided above at Section IX.H.2.

Thus, Deenoo teaches a UE using bearers SRB0, 1, 2, etc. for control signaling, and Asustek teaches that a UE in connected mode sends an SI request on SRB1, which renders obvious “*wherein the first SI request message is transmitted on signaling radio bearer 1 (SRB1).*” Ex.1003, ¶153.

4. Claim 7

[7.0] The method of claim 6, wherein the fourth SI request message is transmitted on signaling radio bearer 0 (SRB0).

First, as discussed above at [6.0], Deenoo teaches that a UE “may trigger a **system information request procedure in any state (e.g., idle,** inactive, and/or

connected).” Ex.1009, 39:38-39. And as discussed above at [4.0], Deenoo further teaches that a UE “may (de)multiplex **control signaling ... using different [] bearers (e.g. SRB0, 1, 2, 3, etc.)**” Ex.1009, 75:39-41.

To the extent Deenoo does not provide details regarding which of SRB0, 1, 2, 3, *etc.* is used for SI requests in idle mode, such techniques were well known to a POSITA as taught by Asustek. Ex.1003, ¶¶154-155.

Second, Asustek teaches that “a UE in **RRC_IDLE**/RRC_INACTIVE transmits a **system information request** message containing a UE identity through **SRB0**.” Ex.1012, 2. A POSITA would have found it obvious to apply Asustek’s teachings to Deenoo at least for the reasons provided above at Section IX.H.2. Ex.1003, ¶¶156-157.

Thus, Deenoo teaches a UE using bearers SRB0, 1, 2, *etc.* for control signaling, and Asustek teaches that a UE in idle mode sends an SI request on SRB0, which renders obvious “*wherein the fourth SI request message is transmitted on signaling radio bearer 0 (SRB0).*”

5. Claim 14

[14.0] The UE of claim 11, wherein the first SI request message is transmitted on signaling radio bearer 1 (SRB1).

See Ground #3 [4.0]. Ex.1003, ¶158.

6. Claim 17

[17.0] *The UE of claim 16, wherein the fourth SI request message is transmitted on signaling radio bearer 0 (SRB0).*

See Ground #3 [7.0]. Ex.1003, ¶159.

I. Ground 7: Claims 8-10 and 18-20 are obvious under 35 U.S.C. § 103 over Deenoo in view of Huawei

1. Summary of Huawei

Huawei describes on demand SI requests in the context of 5G. Ex.1013, 1. Huawei teaches that if “SI request reaches the maximum number, the on-demand SI request shall be considered failed.” Ex.1013, 7.

For instance, **“[if] the RACH procedure using for SI request failed, UE will send indication to RRC.”** Ex.1013, 6. Huawei further teaches that if “the requested on-demand SI doesn’t prevent the UE from using regular services, **UE can just label the SI as not available in the cell and mark the function as unavailable. Otherwise, cell reselection can be triggered[.]**” Ex.1013, 7; Ex.1003, ¶¶160-161.

2. Reasons to Combine Deenoo with Huawei

For the reasons set forth below, a POSITA would have been motivated to combine the teachings of Huawei with Deenoo. Ex.1003, ¶162. In particular, before the priority date of the ’502 patent, it would have been obvious, beneficial, and predictable to utilize Huawei’s teachings in combination with Deenoo’s

system for handling SI request failure—for example, to provide procedures for storing failure information at the UE. Ex.1003, ¶162.

As an initial matter, one of ordinary skill in the art when considering the teachings of Deenoo would have naturally considered the teachings of Huawei as they are analogous prior art pertaining to the same field of endeavor as the '502 patent, namely, cellular telecommunications. *See* Ex.1009, Abstract; Ex.1013, 1. Specifically, both references describe on-demand SI requests in the context of the 5G standard. Ex.1009, Abstract, 37:23; Ex.1013, 1, 6-7. Additionally, both references describe techniques for handling SI request failure—including retransmitting an SI request a maximum number of times before barring the cell (Deenoo) as well as reporting the failure to the UE's RRC layer and storing failure information at the UE (Huawei). Ex.1003, ¶163. Huawei is also reasonably pertinent to the particular problem of the '502 patent, such as UE and BS procedure for initiating and handling on-demand SI requests in 5G. Ex.1013, 1; Ex.1003, ¶163.

One of ordinary skill in the art would have been specifically motivated to incorporate Huawei's techniques for storing SI request failure information into the system of Deenoo because doing so would address a well-known implementation issue with SI request failure methods—*i.e.*, how or even whether to maintain a record of the failure at the UE. Ex.1003, ¶164 (citing Ex.1013, 6-7). In other

words, Huawei's technique solves this problem—explaining to send failure information to the UE's RRC layer as well as store information about the cell and unavailable SIBs at the UE. Therefore, a POSITA would have been motivated to incorporate Huawei's teachings into the system of Deenoo. Ex.1013, 1, 6-7.

A POSITA would have found the combination particularly advantageous because Huawei's technique provides options in the different cases of “whether the requested SI impacts the service or not.” Ex.1013, 7. Huawei's technique also beneficially specifies that the UE communicates the instance of an SI request failure to the UE's RRC layer—which the UE could then transmit to the network's RRC layer so that the network may coordinate a response if necessary. Ex.1009, 6. In one example implementation of this combination, a POSITA would have found it obvious that Deenoo's UE in idle or connected mode would implement the techniques described in Huawei. Ex.1003, ¶165 (citing Ex.1009, Fig. 2; Ex.1013, 6-7).

This combination would have been predictable because the SI request failure options described in Deenoo (retransmitting an SI request a maximum number of times) and Huawei (storing SI request failure information at the UE) were common in the art. Ex.1003, ¶166 (citing Ex.1019, 3 (“In the case the UE request fails during RACH procedure (MAC indicates a RACH failure to RRC for the SI request); Ex.1020, ¶0348 (“the UE should inform the MeNB of RACH failures.”);

Ex.1016, 3 (“[W]e should have such a counter to determine[e] the maximum times the UE could try to acquire the other SI. If the counter reaches its crest value, the UE shou[l]d send an SI request failure to the upper layer.”)).

The combination of Deenoo with Huawei also would have been predictable because POSITAs were well aware of Huawei’s technique of performing cell reselection in the event of SI request failure. Ex.1013, 7; Ex.1003, ¶167 (citing Ex.1022, 1-2 (“Alternative 3: Increase cell selection or reduce re-selection threshold for a period as that scheme introduced in LTE R12. ... Scenario C: There is suitable neighbor cell which can provide similar RSRP/RSRQ. ... UE will re-select to the neighbor cell.”)); Ex.1023, 2 (“UE shall treat the cell as barred and perform cell re-selection, when MAC reports random access problem to upper layer for Msg1 based SI request procedure.”)).

In the resulting combination, a POSITA also would have found it obvious that Deenoo’s UE performing SI request failure handling in dual connectivity (DC) (Ex.1009, 65:49-51), in view of Huawei’s technique of performing reselection after SI request failure (Ex.1013, 7), would result in a UE reselecting its master node upon secondary node failure. Ex.1003, ¶168. This combination would have been predictable because it was known in the art to perform reselection from a secondary to master node in the context of SI requests with dual connectivity.

Ex.1003, ¶168 (citing Ex.1024, ¶0148 (“[T]he SI request message may contain at

least one of an identifier indicating an operation for the dual connectivity, an identifier indicating the type of operation (e.g., ... an operation of modifying the context of an EPS bearer set to the SeNB [i.e., secondary node], and an operation of removing the EPS bearer set to the SeNB and bringing again the EPS bearer to the MeNB)[i.e., master node.]”). This combination also would have been obvious because the UE has a limited number of options after secondary node failure—e.g., reselect the master node or reselect a new master node. Ex.1003, ¶168.

A POSITA would have also found the combination predictable and would have had a reasonable expectation of success, as the combination does not change the intended functionality of Deenoo’s or Huawei’s technique. Ex.1003, ¶169. For instance, a POSITA would have expected success as Huawei’s technique was *specifically intended* to be implemented in 5G UEs performing on-demand SI requests (such as Deenoo’s). Ex.1009, 41:5-14. Further, a POSITA would have expected success as it was well known in the art to flexibly implement SI request failures depending on, for example, the importance of the SIB(s) or UE implementation options, some of which were already developed for LTE. Ex.1003, ¶169 (citing Ex.1025, 2 (“In LTE, how to handle the missing of essential SI is specified, while how to handle the missing of non-essential SI (equivalent to other SI in NR) is left to UE implementation. ... As the principle works well in LTE, we prefer to follow the same principle in NR.”)).

Accordingly, a POSITA would have found it obvious to apply Huawei's teachings to Deenoo's system because the combination merely amounts to implementing a known technique in Huawei's UE and method ready for improvement. Ex.1003, ¶170.

3. Claim 8

[8.0] *The method of claim 1, further comprising: storing SI request failure information after determining that the on-demand SI request procedure is unsuccessful.*

First, as discussed at [1.3], Deenoo teaches that a UE “may start a timer A and/or a timer B (e.g., where timer A time > timer B time), when the first other-SI request message is transmitted.” Ex.1009, 41:5-7. Then, “[u]pon expiry of timer B, a WTRU may retransmit the other-SI request message and/or restart timer B.” Ex.1009, 41:9-10. Using timers A and B, the UE “may be configured with a predefined number of retransmissions to acquire the other-SI until expiry of timer A.” Ex.1009, 41:9-11-13.

Deenoo also teaches, as discussed at [2.0], that “[u]pon expiry of timer A, **a WTRU may consider the cell to be barred for a predefined duration (e.g., not use that cell)**” (“*determining that the on-demand SI request procedure is unsuccessful*”). Ex.1009, 41:13-14. To the extent Deenoo does not explicitly teach “*storing SI request failure information*,” this technique was well known to POSITAs as taught by Huawei. Ex.1003, ¶¶171-172.

Second, Huawei teaches that if “SI request reaches the maximum number, the on-demand SI request shall be considered failed.” Ex.1013, 7. Huawei further teaches that, if “the requested on-demand SI doesn’t prevent the UE from using regular services, **UE can just label the SI as not available in the cell and mark the function as unavailable.**” Ex.1013, 7. Here, a POSITA would have understood that for a UE to “label the SI as not available” and “mark the function as unavailable” includes storing in memory the information about the unavailable requested SI and functionality (“*storing SI request failure information*”). See Ex.1013, 7; Ex.1003, ¶¶173-174.

Thus, Deenoo teaches a UE determining that requested SI is unavailable after a maximum number of SI request retransmissions, and Huawei teaches that, after a threshold number of unsuccessful SI request attempts, a UE may label the SI as not available and mark the function as unavailable, which render obvious “*storing SI request failure information after determining that the on-demand SI request procedure is unsuccessful.*”

4. Claim 9

[9.0] The method of claim 8, wherein the SI request failure information comprises at least one of the following: the at least one requested SIB; the at least one requested SI message; a cell identifier (ID) associated with the BS; a synchronization signal block (SSB) index for performing the on-demand SI request procedure; a message type of the on-demand SI request procedure; and a timestamp for performing the on-demand SI request procedure.

As discussed at [8.0], Deenoo teaches a UE determining that requested SI is unavailable after a predefined maximum number of SI request retransmissions. Ex.1009, 41:11-14. And Huawei further teaches a technique for “requested SIB(s)”: if “the requested on-demand SI doesn’t prevent the UE from using regular services, **UE can just label the SI as not available in the cell** and mark the function as unavailable.” Ex.1013, 3, 7.

A POSITA would have understood that for a UE to “**label the SI** as not available in the cell,” as taught by Huawei, means that the UE stores information about the requested SIB(s) that is not available (“*wherein the SI request failure information comprises at least one of the following: the at least one requested SIB; the at least one requested SI message*”). See Ex.1013, 7; Ex.1003, ¶¶175-176. Thus, Deenoo in view of Huawei renders obvious this element.

5. Claim 10

[10.0] The method of claim 8, further comprising: transmitting the SI request failure information; wherein the SI request failure information is transmitted to a master node when the UE is in a dual connectivity mode.

First, as discussed at [8.0], Deenoo teaches a UE determining that requested SI is unavailable after a predefined maximum number of SI request retransmissions. Ex.1009, 41:11-14. Deenoo further teaches that a UE’s “**RRC connection for dual connectivity may be associated with a [UE] specific RNTI in the MeNB (Master eNB)**.” Ex.1009, 65:49-51. To the extent Deenoo does not

explicitly teach that “*the SI request failure information is transmitted to a master node when the UE is in a dual connectivity mode,*” this limitation would have been obvious in view of Huawei.

Second, Huawei teaches that “[i]f SI request reaches the maximum number, the on-demand SI request shall be considered failed.” Ex.1013, 7. “**If the RACH procedure using for SI request failed, UE will send indication to RRC**” (“*SI request failure information*”). Ex.1013, 6.

Huawei further teaches that “the UE behaviour of failure of on-demand SI request may be different depending on whether the requested SI impacts the service or not.” Ex.1013, 7. For instance, “[i]f the requested on-demand SI doesn’t prevent the UE from using regular services, UE can just label the SI as not available in the cell and mark the function as unavailable. Otherwise, **cell reselection can be triggered when the request of SI reaches the maximum number.**” Ex.1013, 7.

Therefore, Deenoo teaches a UE configured for on-demand SI requests and dual connectivity mode, and Huawei further teaches that, after an SI request failure, the UE sends an SI request failure indication to its RRC layer and performs cell resection. Ex.1009, 41:9-14; Ex.1013, 6-7. It would have been obvious to a POSITA that a dual-connectivity UE performing cell reselection after an SI request failure would reselect a cell that the UE is already connected to, i.e., the master

node, and provide the SI failure indication to the master node. See Ex.1009, 41:9-14; Ex.1013, 7; Ex.1003, ¶¶177-180.

Indeed, this combination—where a UE reselects and provides an SI request failure indication to the master node—would have been obvious because it was well known in the art to report such secondary node failures to the master node, which controls whether to remove and reselect secondary nodes. Ex.1003, ¶181 (citing Ex.1020, ¶¶0218-0219, 0338, 0340). Therefore, a POSITA would have found it obvious that the SI request failure indication sent to the UE’s RRC layer, as described in Huawei, would be sent to the master node in Deenoo’s dual-connectivity system—*e.g.*, to prevent the UE from reconnecting to the failed secondary cell and aid the UE in finding a new cell having the requested SIB(s). Ex.1013, 6-7.

Furthermore, because the prior art teaches *transmitting an SI request to a master node to request SIBs from a secondary node* as discussed above at [3.0]—it also would have been obvious to *transmit SI request failure information to a master node regarding SIBs requested from a secondary node*. Ex.1003, ¶¶182-183.

Thus, Deenoo in view of Huawei renders obvious “*transmitting the SI request failure information; wherein the SI request failure information is transmitted to a master node when the UE is in a dual connectivity mode.*”

6. Claim 18

[18.0] *The UE of claim 11, wherein the operations further comprise: storing SI request failure information after determining that the on-demand SI request procedure is unsuccessful.*

See Ground #7 [8.0] above. Ex.1003, ¶184.

7. Claim 19

[19.0] *The UE of claim 18, wherein the SI request failure information comprises at least one of the following: the at least one requested SIB; the at least one requested SI message; a cell identifier (ID) associated with the BS; a synchronization signal block (SSB) index for performing the on-demand SI request procedure; a message type of the on-demand SI request procedure; and a timestamp for performing the on-demand SI request procedure.*

See Ground #7 [9.0] above. Ex.1003, ¶185.

8. Claim 20

[20.0] *The UE of claim 18, wherein the operations further comprise: transmitting the SI request failure information; wherein the SI request failure information is transmitted to a master node when the UE is in a dual connectivity mode.*

See Ground #7 [10.0] above. Ex.1003, ¶186.

X. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. The *Fintiv* Factors Favor Institution Under § 314

The six *Fintiv* factors considered for § 314 denial strongly favor institution.

See Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020)

(precedential); *Memorandum: Interim Procedure for Discretionary Denials in AIA*

Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022)

(applying *Fintiv* factors). Not only is the parallel WDTX case at an early stage, but both Apple and Togail have asked to transfer the case to a California district. Ex.1029, 3. The likely transfer of the district court case will vacate the current scheduling order.

1. No evidence regarding a stay

No motion to stay has been filed, so the Board should not infer the outcome of such a motion. *Sand Revolution II LLC v. Continental Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative) (“*Sand*”). Thus, this factor is neutral on discretionary denial.

2. Parallel proceeding trial date

According to the current WDTX Scheduling Order, the *Markman* Hearing will not take place until March 30, 2023; fact discovery will not open in earnest until March 31, 2023³; and trial will not commence until April 1, 2024. Ex.1028, 2-3. This Markman hearing and trial schedule, however, is likely to be vacated because Apple and Togail agree that the case should be transferred to a California

³ Apple and Togail conducted venue discovery in connection with a motion to transfer and agreed to limited third-party discovery prior to the start of fact discovery on March 31, 2023. Full fact discovery between the parties has not commenced

district. Ex.1029, 1. Apple filed a motion seeking transfer to NDCA, and Togail opposes only to the extent that it believes the case should instead be transferred to SDCA. Ex.1028, 1-3. This uncertainty weighs in favor of institution. *See Sand* at 8-10, 14.

Moreover, even if the case was not transferred, the projected WDTX trial date based on median time-to-trial statistics is not until September of 2024, the same month the Board is expected to issue its Final Written Decision. *See* Ex.1030, 37 (showing median time-to-trial of 28.9 months). This factor heavily favors institution.

3. Investment in the parallel proceeding

The investment in the co-pending litigation has been minimal. As mentioned above, a claim construction hearing has not yet occurred; full fact discovery has not yet commenced and will not close until October 18, 2023; and expert discovery has not commenced and will not close until December 21, 2023. Ex.1028, 2-3; *see PEAG LLC v. Varta Microbattery GmbH*, IPR2020-01214, Paper 8 at 17 (Jan. 6, 2021). This lack of investment favors institution.

Since Petitioner learned which claims were being asserted in October 2022, Petitioner has worked expeditiously to file this petition. Ex.1028, 1. And, as of this filing, Patent Owner has not yet served its final infringement contentions. Under

Fintiv, Petitioner’s prompt filing “weigh[s] against exercising the authority to deny institution.” *Fintiv*, Paper 11 at 11.

4. Overlapping issues with the parallel proceeding

Because the co-pending litigation is in its early stages, Petitioner’s invalidity positions have not yet been fully developed—only the preliminary invalidity contentions have been served. Final invalidity contentions are not due until May 25, 2023. Ex.1028, 3. The extent of overlap is thus speculative at this point in time.

5. Petitioner is a defendant

Petitioner is a defendant in the co-pending litigation. That is true of most Petitioners in IPR proceedings, making this factor neutral. *See HP Inc. v. Slingshot Printing LLC*, IPR2020-01084, Paper 13 at 9 (PTAB Jan. 14, 2021).

6. Other circumstances

The prior art presented in this Petition renders the Challenged Claims unpatentable as obvious. The merits of Petitioner’s arguments are compelling. For instance, Petitioner presents two grounds that invalidate each of the Challenged Claims.

Additionally, Patent Owner has engaged in a campaign of asserting the ’502 patent against multiple defendants across the industry, including Samsung Electronics Co., Motorola Mobility LLC, Google LLC, TCL Technologies, and TCT Mobile. *See infra* Section XII.B. There is thus a strong public interest in the

Office adjudicating the validity of the claims here. This factor weighs against discretionary denial.

As such, because the *Fintiv* factors are either neutral or weigh against discretionary denial, institution should not be denied on discretionary factors.

B. The *Fintiv* Framework Should Be Overturned

The *Fintiv* framework should be overturned because it (1) exceeds the Director’s authority, (2) is arbitrary and capricious, and (3) was adopted without notice-and-comment rulemaking.

C. The *Advanced Bionics* Test Favors Institution Under § 325(d)

Denial under § 325(d) is not warranted because the challenges presented in this petition are neither cumulative nor redundant to the prosecution of the ’502 patent. The Examiner did not consider any of the references relied upon in this petition. Moreover, the challenges in this petition are non-cumulative because the art relied upon here teaches the claim elements that the Examiner deemed allowable. *See* Ex.1002, 167-168, 175; Ex.1007; Ex.1009.

D. The *General Plastic* Test Favors Institution Under § 314(a)

Unified Patents filed a petition challenging the ’502 patent on February 2, 2023 (IPR2023-00338). Apple had no involvement with or knowledge of Unified’s petition until it was filed. Apple’s petition challenges all claims, whereas Unified’s challenges only a subset; and Apple’s petition includes different prior art grounds,

including those based on the Deenoo and Sharma references. The Board consistently finds that this fact pattern does not warrant denial under *General Plastic*. See, e.g., *Apple Inc. v. Gesture Tech. Partners LLC*, IPR2021-00920, Paper 12 at 22-28 (Dec. 6, 2021); *Mercedes-Benz USA, LLC v. Carucel Investments, LP*, IPR2019-01404, Paper 12 at 7-14 (Jan. 22, 2020); *Netflix, Inc. and Hulu, LLC, v. DivX, LLC*, IPR2020-00052, Paper 42 at 6-17 (May 14, 2020)).

1. Whether the same petitioner previously filed a petition directed to the same claims of the same patent.

Apple has never before challenged the '502 patent. Further, it is well accepted that Apple and Unified's relationship is not the type of "significant relationship" necessary for denial under *Valve*. See, e.g., *Netflix*, Paper 42 at 11 (finding that petitioner's membership in Unified "does not create the type of 'significant relationship' that was found in *Valve* to favor denying institution"); *Mercedes-Benz*, Paper 12 at 12 (same).

Additionally, the present petition challenges all claims 1-20 of the '502 patent, whereas Unified's petition only challenges claims 1, 4-7, 11, and 14-17. Further, Unified's petition does not cover all claims asserted against Apple in district court. Ex.1027, 1. The "significantly greater number of claims challenged" in Apple's petition weighs toward institution. *Gesture Tech.* Paper 12 at 25.

2. Whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second

petition.

- 3. Patent owner’s preliminary response and the Board’s institution decision of the first petition.**
- 4. Time elapsed between the first and second petitions.**
- 5. Petitioner’s explanation for the time elapsed between the filings of multiple petitions.**

The second to fifth factors “bear little relevance” here because Petitioner has never before challenged the ’502 patent, nor worked with Unified in any capacity with respect to these filings. *Unified Patents, Inc. v. Certified Measurement, LLC*, IPR2018-00548, Paper No. 7 at 7-8 (Sep. 5, 2018).

Apple worked independently and diligently to prepare its petition since receiving Togail’s infringement contentions on October 2, 2022. When Apple first learned of Unified’s petition upon its filing, Apple had already substantially drafted its petition and two supporting expert declarations that cite a total of 66 exhibits. The grounds and prior art analysis in Apple’s near-final drafts were not modified in response to Unified’s petition. Moreover, Apple’s petition was filed only 1.5 months after Unified’s and thus well before any Patent Owner Preliminary Response.

These four factors therefore favor institution.

6. The finite resources of the Board.

Although there is some overlap between the Unified’s petition and the

instant petition, such overlap is minimal. The distinctions between the two petitions far outweigh the similarities. For example, Apple’s petition challenges 10 additional claims—including claims that have been asserted against Apple in the parallel district court case. Further, Apple’s petition includes four grounds primarily based on the Deenoo reference, a reference that is not cited or relied upon in the Unified petition. Importantly, the non-overlapping Deenoo grounds challenge several of the claims that are not challenged in the Unified petition—meaning there is no overlap for those claims.

Finally, the two petitions were filed close in time and there is no readily identifiable roadblock for the Board to issue a final determination within the statutory one-year limit. These factors therefore also favor institution.

Because all *General Plastic* factors favor institution, the Board should institute and evaluate the merits of this petition.

XI. CONCLUSION

Petitioner has established a reasonable likelihood that the Challenged Claims are unpatentable.

Respectfully submitted,

Dated: March 16, 2023
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XII. MANDATORY NOTICES

A. Real Party-in-Interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that the real party-in-interest is Apple Inc.

B. Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), to the best knowledge of the Petitioner, the '502 patent is or was involved in the following cases:

Case Heading	Number	Court	Filed
<i>Togail Technologies Ltd. v. Apple Inc.</i>	6-22-cv-00326	WDTX	Mar. 28, 2022
<i>Togail Technologies Ltd. v. Samsung Electronics Co., Ltd. et al.</i>	6-22-cv-00328	WDTX	Mar. 28, 2022
<i>Togail Technologies Ltd. v. Motorola Mobility LLC</i>	1-22-cv-02176	NDIL	Apr. 26, 2022
<i>Togail Technologies Ltd. v. Google LLC</i>	6-22-cv-00327	WDTX	Mar. 28, 2022
<i>Togail Technologies Ltd. v. TCL Tech. Group Corp. et al.</i>	2-23-cv-00039	EDTX	Feb. 1, 2023
<i>Unified Patents, LLC v. Togail Technologies Ltd.</i>	IPR2023-00338	PTAB	Feb. 2, 2023

C. Lead and Back-up Counsel and Service Information

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Please address all correspondence in this proceeding to lead and back-up counsel. Petitioner consents to service in this proceeding by email at the addresses above.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner hereby certifies, in accordance with and reliance on the word count provided by the word-processing system used to prepare this Petition, that the number of words in this paper is 13,999. Pursuant to 37 C.F.R. § 42.24(d), this word count excludes the table of contents, table of authorities, mandatory notices under § 42.8, certificate of service, certificate of word count, appendix of exhibits, and any claim listing.

Dated: March 16, 2023

/Scott T. Jarratt/
Scott T. Jarratt
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CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. § 42.6(e) and 37 C.F.R. § 42.105, service was made on Patent Owner as detailed below.

Date of service March 16, 2023

Manner of service FEDERAL EXPRESS

Documents served Petition for *Inter Partes* Review Under 35 U.S.C. § 312 and 37 C.F.R. § 42.104 of U.S. 10,791,502; Petitioner's Exhibit List; Exhibits 1001-1033, 1101-1146.

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