

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ONEPLUS TECHNOLOGY (SHENZHEN) CO., LTD.,

Petitioners

v.

PANTECH CORPORATION,

Patent Owner.

IPR2025-00762

Patent No. 10,863,573

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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PETITIONERS' EXHIBIT LIST

Exhibit	Reference
1001	U.S. Patent No. 10,863,573 (“’573 Patent” or “’573Pat.”)
1002	File History of the ’573 Patent (“’573FH”)
1003	Declaration of Dr. Titus Lo in Support of Petition
1004	Dr. Titus Lo Curriculum Vitae
1005	U.S. Patent Application Publication No. 2014/0301362 (“Koskinen”)
1006	U.S. Patent Application Publication No. 2009/0149189 (“Sam-mour”)
1007	U.S. Patent Application Publication No. 2016/0021581 (“Deenoo”)
1008	U.S. Patent Application Publication No. 2014/0301281 (Koskinen281)
1009	<i>Pantech Corp.et al. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:24-cv-00038-RWS-JBB (E.D. Tex.), Dkt. No. 1, Complaint (“ <i>Pantech IP</i> ”)
1010	<i>Pantech Corp.et al. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:24-cv-00038-RWS-JBB (E.D. Tex.), Dkt. No. 9, Waiver of Service
1011	3GPP TS 36.323 v.11.2.0 (2013-03) (Packet Data Convergence Protocol (PDCP) specification)
1012	3GPP TS 36.300 v.11.5.0 (2013-03) (E-UTRAN overall description)
1013	3GPP TS 36.322 v.11.0.0 (2012-09) (Radio Link Control (RLC) protocol specification)
1014	3GPP TS 36.331 v.11.3.0 (2013-03) (Radio Resource Control (RRC); Protocol specification)
1015	<i>Pantech Corp.et al. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:24-cv-00038-RWS-JBB (E.D. Tex.), Dkt. No. 47, First Amended Docket Control Order
1016	Docket Navigator stay statistics for Judge Schroeder in EDTX
1041	<i>Sotera-plus</i> Stipulation

1042	<i>Pantech Corp. et al. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:22-cv-00069-RWS (E.D. Tex.), Dkt. No. 6, First Amended Complaint for Patent Infringement (“ <i>Pantech I</i> ”)
1043	<i>Pantech Corp. et al. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:22-cv-00069-RWS (E.D. Tex.), Dkt. No. 223, Redacted Amended Joint Final Pretrial Order
1044	<i>Pantech Corp. et al. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:22-cv-00069-RWS (E.D. Tex.), Dkt. No. 259, Verdict Form
1045	Cara Salvatore. <i>Albright Worried Multipatent Trials Ask Too Much of Jurors</i> . Law360 (Dec. 18, 2020)
1046	<i>Sonos Inc. v. D&M Holdings, Inc.</i> , 1:14-cv-01330-WCB (D. Del.), Dkt. No. 418, Discovery Dispute Letter Brief
1047	USPTO Recordation of Patent Assignment Document, Reel: 052662 Frames: 0609-0638
1048	<i>Pantech Corp. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:25-cv-00089 (E.D. Tex.), Dkt. No. 1, Complaint for Patent Infringement (“ <i>Pantech III</i> ”)
1049	Joshua Pond, et al. <i>Reexamining Three Preconceived Notions of SEPs as the 5G Patent Wars Ignite</i> . IPWatchDog (Oct. 25, 2021)
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1053	<i>Pantech Corp. et al. v. Oneplus Tech. (Shenzhen) Co., Ltd.</i> , 5:22-cv-00069-RWS (E.D. Tex.), Dkt. No. 502-1, Redacted Version of Court’s Order (Dkt. No. 498)
1054	Provisional 61/753,867 File History
1055	Provisional 61/811,233 File History
1056	Reply Declaration of Dr. Titus Lo
1057	Transcript of March 12, 2026, Deposition of Dr. Paul Min

I. INTRODUCTION

The Petition (“Pet.”) shows the Challenged Claims are unpatentable. PO’s Response (“POR”) does not undermine that showing and largely rehashes arguments from PO’s Preliminary Response, including assertions that Koskinen’s and Deenoo’s reordering timers do not teach the claimed “in-sequence timer”—arguments this Board has already considered and rejected. Additionally, the POR advances a fundamentally incorrect claim construction, mischaracterizes Petitioner’s obviousness arguments, and relies upon incorrect interpretations of prior art. PO’s largely conclusory and unsupported arguments should be rejected.

II. CLAIM CONSTRUCTION

PO’s construction of “in-sequence timer” fundamentally misapplies decades of jurisprudence, is conclusory, and simply wrong. Petitioner agrees with PO that the plain and ordinary meaning should apply to all other terms in the claims.

A. The Board’s interpretation of “in-sequence timer” is correct

Petitioner substantially agrees with the Board’s understanding that “in-sequence timer” is a timer “used to place the SDUs that were received out of order back into sequence.” Paper 10 (“DI”), 13. Petitioner notes, however, claims 1 and 8 already recite “for the PDCP SDUs,” so the construction does not require re-stating “the SDUs” and should be “a timer used to place data that were received out of order back into sequence.” Moreover, the “in-sequence timer” is associated with missing

packets (which include PDUs, SDUs, and associated SNs) in the user equipment. EX1056, ¶¶10-11. The specification supports this plain and ordinary meaning. *Id.*, ¶¶9-15. As the Board explained, “to ensure that PDCP SDUs are sent in order, an in-sequence timer is used” and “[a]s a result of that in-sequence timer, PDCP SDUs are delivered in sequential order.” DI, 5 (citing ’573Pat., 14:35-44, FIG. 13); *see also* ’573Pat., 13:43-48 (explaining if the received PDCP SN, which is part of the PDU, is not sequential then the timer is started), 14:23-55, 15:37-16:38.

B. PO’s construction of “in-sequence timer” is incorrect

PO proposes the “in-sequence timer” is “a timer that begins upon the detection of an out-of-sequence SDU and lasts for a period of time.” POR 18 (citing EX2012, ¶¶94-100). While it is uncontroversial that a timer begins and ends after a certain period of time (EX1056, ¶8; EX1057, 88:4-19), PO’s arguments to narrowly construe “in-sequence timer” with specific beginning conditions are unavailing, and PO’s condition that the timer “lasts for a period of time” is both vague and unnecessary. The construction’s fundamental flaws are explained below.

PO’s disagreement with the Board: Although stating that the Board “misunderstood the meaning of an ‘in-sequence timer’” (POR 18), PO does not appear to disagree with the Board (EX1057, 59:19-60:4 (agreeing that the in-sequence timer “is used to wait for that missed SDU so that the SDU can be sent to the upper layer in order”)); instead PO argues “[r]eordering may, or may not, occur

during the period of the in-sequence timer, but is not a function of the in-sequence timer itself.” POR 18-19. However, the Board’s explanation does not require the reordering to occur during the timer’s activity, or the timer itself to perform any reordering. Notably, the use of a timer to place back into sequence data that is received out-of-order merely needs to be in furtherance of sequencing the received data. Furthermore, PO’s assertions regarding the in-sequence timer do not address the Board’s interpretation that it is “used to place the SDUs that were received out of order back into sequence.”

PO’s timer duration requirement: PO’s construction does not include a timer duration requirement, but PO relies on Dr. Min to contrast Koskinen’s t-Reordering timer¹ with the claimed “in-sequence timer” based on timer duration. POR 19 (citing EX2012, ¶¶94-97); EX1057 89:3-11. PO’s attempts to differentiate t-Reordering from the in-sequence timer duration fail because neither the claims nor specification require any specific duration value for the in-sequence timer. EX1056, ¶12. The ’573 patent instead explains: “the duration of the in-sequence timer may be

¹ PO admits t-Reordering “detect[s] any missing PDCP SDU[s]” and “is triggered when a PDCP packet is received non-consecutively in their sequence numbers.” *Id.* This characterization alone undermines PO’s arguments against Koskinen and admits that t-Reordering is an “in-sequence timer.”

determined by considering the receiving delay of the transmission path of the PDCP PDU in the case of the multi-flows. *Alternatively, the duration of the in-sequence timer may be determined by considering an overall situation of the system.*” ’573Pat, 13:48-53 (emphasis added). The in-sequence timer is not limited to any specific duration, rather the duration is set based on conditions of the transmission of PDUs. EX1056, ¶¶12-13. This is precisely how Koskinen describes the duration of its timer. EX1003, ¶167.

PO’s assertion that t-Reordering timer has a significantly different duration than in-sequence timer is also undermined by the ’573 patent itself. Notably, the ’573 patent’s Table 1 shows example in-sequence timer durations of 20-60ms, all of which are also listed as possible duration values for t-Reordering (0-200ms). Pet. 24 (citing EX1014, 219-20 showing the values of t-Reordering); EX1056, ¶13. This was also confirmed by PO’s expert. EX1057, 89:17-90:17 (agreeing that 3GPP specification allows for “shorter values”).

PO’s construction imports limitations recited elsewhere within the Challenged Claims: PO argues its construction “is confirmed by the actual usage of ‘in-sequence timer’ in the patent claims.” POR 18. PO notes “for the PDCP SDU” is recited in claims 1 and 8; and claims 3-5 and 10-12 provide “further limitations.” *Id.* But instead of showing how those claim limitations inform PO’s construction, PO simply incorporates them into the construction to improperly narrow the term.

For example, PO includes “begins upon the detection of an out-of-sequence SDU” in its construction—what claims 3 and 11 are directed to—rendering those claims redundant. EX1056, ¶¶18-20; *TMI Prods., Inc. v. Rosen Ent. Sys., L.P.*, 610 F. App'x 968, 972 (Fed. Cir. 2015) (affirming trial court rejection of proposed construction that would render other claim language “redundant.”).

Packet loss arguments contradict the '573 patent: PO argues the “in-sequence timer does not address the case of packet loss, which is the main purpose of the t-Reordering timer.” POR 19. But the '573 patent clearly explains the in-sequence timer expires when a packet is not received, i.e., the packet is lost. '573Pat., 13:54-61; claim 5. Therefore, contrary to PO's assertions, the in-sequence timer's expiry includes, and is associated, with packet loss. EX1056, ¶¶14, 17.

PO misapplies Petitioner's expert's testimony: PO attempts to erroneously support its construction by pointing to Dr. Lo's deposition testimony regarding '573 patent's description at 13:43-53. POR 18. PO's actions amount to a disingenuous attempt to obfuscate a claim construction question by asking Dr. Lo about operations in one specific embodiment. EX2013, 64:13-65:3; EX1056, ¶21. Notably, PO did not ask Dr. Lo's opinion about the in-sequence timer's construction *in the context of claim 1*. Dr. Lo's response that the in-sequence timer “begins upon detection of an out-of-sequence SDU” is not an incorrect statement, but Dr. Lo did not state that such a condition should be part of the construction for this term. Furthermore, PO's

attempt to import a specific embodiment into the claims should be rejected. *Laitram, LLC v. Ashworth Bros.*, No. 2022-1044, 2023 WL 3449148, at *6 (Fed. Cir. May 15, 2023) (stating that a claim’s construction is not “limited to a single embodiment absent some clear indication that a claim relates only to that embodiment.”); *TalexMedical, LLC v. Becon Med. Ltd.*, No. 2021-2069, 2022 WL 2898934, at *6 (Fed. Cir. July 22, 2022) (stating that “[a]bsent limiting language,” the written description cannot be imported into the claims.). Regardless, Dr. Lo’s supplementary declaration accompanying this Reply makes his position regarding construction of “in-sequence timer” clear.

PO’s expert opinion is conclusory: Dr. Min’s opinions (EX2012, ¶¶94-101) are conclusory with no analysis whatsoever. EX1056, ¶7. For example, Dr. Min cites to no evidence in paragraphs 94-97 and 101 of his declaration. In paragraph 98, he simply quotes the ’573 patent’s specification, saying it “provides multiple helpful descriptions that are consistent with this definition.” In paragraph 99, he states there are “helpful and consistent disclosures at 13:56-14:2 and 15:51-65,” but again provides no explanation about what is helpful. Dr. Min’s unsupported and conclusory opinions should be given little to no weight. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15 (Aug. 24, 2022) (precedential) (giving little weight to Petitioner’s expert because the expert declaration merely offered conclusory assertions without underlying factual support).

For at least the above-noted reasons, the Board should reject PO's narrow construction and adopt its preliminary interpretation.

III. DEENOO IS PRIOR ART

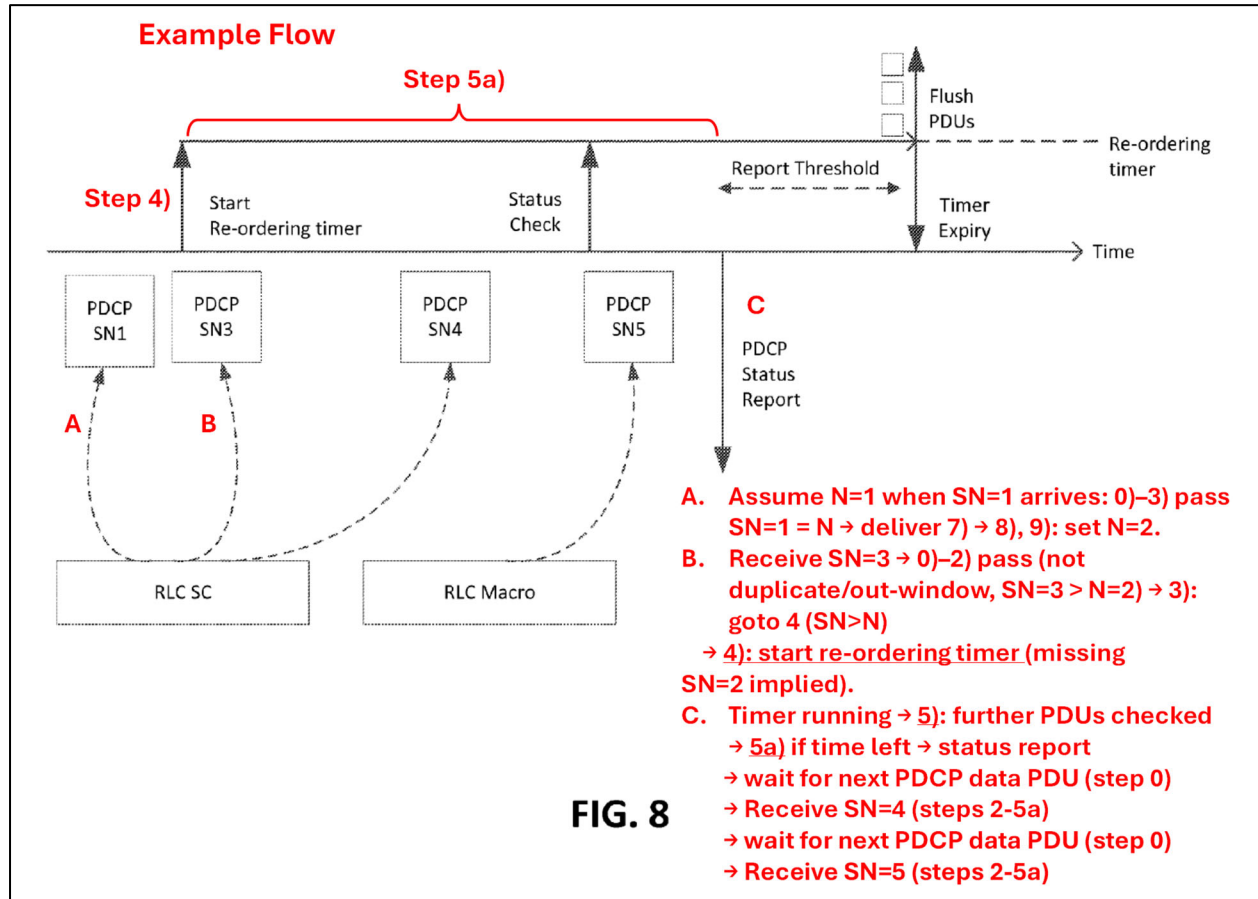
Deenoo claims priority to the '867 Provisional App (EX1054), filed January 17, 2013, and the '233 Provisional App (EX1055), filed April 12, 2013. Both provisional applications predate the '573 patent's earliest possible priority date of May 10, 2013.

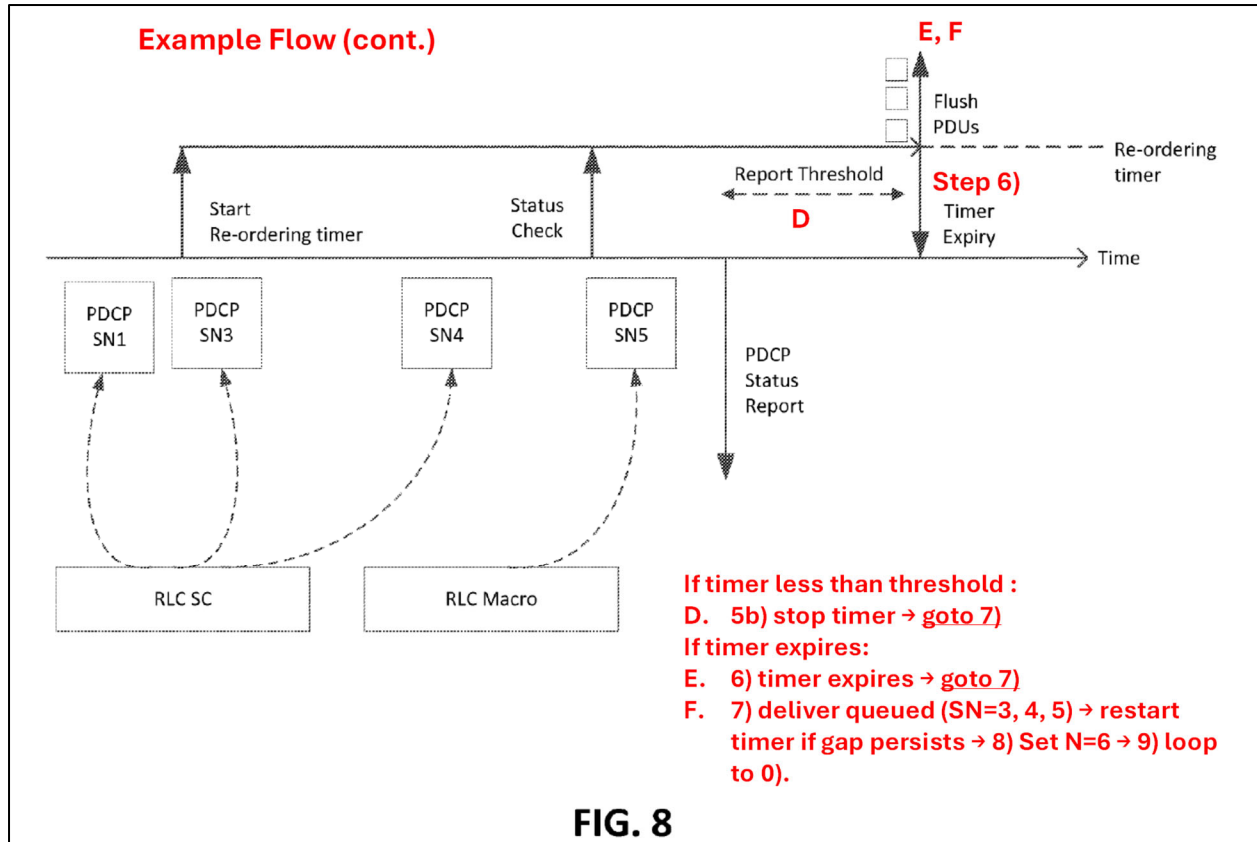
PO identifies only Deenoo's paragraph 211 and Figure 8 as "particularly striking" omissions. POR 41 (citing EX2012, ¶¶151-54). PO argues (1) "Dr. Lo does not provide any evidence...that 'Figure 8 and paragraph 211 of Deenoo are based on and describe the sequence of events described in paragraphs 208-210 of Deenoo'" and (2) "both paragraph 211 and Figure 8 of Deenoo go beyond the teachings of paragraphs 208-210 of Deenoo." *Id.* As explained below, Deenoo's provisional applications fully support Deenoo's disclosure relied upon by the Petition.

First, Deenoo explicitly states: "FIG. 8 illustrates an example representation of *the aforementioned sequence* that captures the triggers for status check and the actions related to reordering timer." Deenoo, ¶211 (emphasis added). The "aforementioned sequence" refers to and is disclosed in paragraphs 208-210. EX1057, 114:11-115:16. Accordingly, at the very least, Deenoo itself confirms that

Figure 8's pictorial representation is supported by the sequence in paragraphs 208-210. EX1056, ¶25.

Furthermore, Dr. Lo explains and provides annotated figures (below) showing how each step in paragraphs 208-210 is illustrated in Deenoo's Figure. *Id.*, ¶¶26-31. Moreover, the sequence of Deenoo's paragraphs 208-210 is identically disclosed at paragraph 128 in each of Deenoo's provisional applications. *Id.*, ¶25. Thus, the subject matter of Figure 8 is also disclosed at paragraph 128.





Figures B and C (EX1056, ¶¶27-31)

Second, the Petition and Dr. Lo’s declaration rely only on the first two sentences in Deenoo’s paragraph 211. EX1056, ¶¶36-37; EX1057, 119:7-139:3 (Dr. Min generally agreeing). The relied-upon sections in paragraph 211 merely state Figure 8 shows the sequence and starting a timer when an out-of-sequence packet is received, which are fully supported by paragraphs 208-210.

PO nonetheless points to another part of paragraph 211—its last sentence—arguing it “is not disclosed in any of paragraphs 208-210 of Deenoo.” POR 41-42. But as Dr. Lo explains, POSITAs would have understood the concepts described in that and other sentences of paragraph 211 are disclosed by the sequence in

paragraphs 208-210. EX1056, ¶¶33-44. Thus, the relied-upon sections of Deenoo have clear support in both provisional applications. EX1056, ¶45; 35 U.S.C. §102(d)(2); *Penumbra, Inc. v. RapidPulse, Inc.*, IPR2021-01466, Paper 34, 29-35 (Mar. 10, 2023) (requiring only the “provisional applications describe the subject matter relied on” in the prior art and, for AIA patents there is no need to determine support for a prior art claim); MPEP §2151 (9th ed. Jan. 2024). Furthermore, given that paragraph 128 in each of Deenoo’s provisionals identically discloses Deenoo’s paragraphs 208-210, any minor difference is a difference in form, not in substance, and is immaterial to the Petition. EX1056, ¶45.

IV. PO’S PRIOR-ART ARGUMENTS ARE UNAVAILING

Nearly all of PO’s alleged prior art “deficiencies” rely upon incorrect claim interpretations and should be rejected.

A. PO’s Arguments Against Grounds 1-2 are Erroneous

1. Claims 1 and 8

a. 1[c], 8[b]

PO first argues that Koskinen’s timer does not teach the claimed “in-sequence timer” because allegedly “[t]here is a clear and meaningful difference between ‘observing a gap in a sequence of protocol data units’ and any ‘detection of an out-of-sequence SDU.’” POR 25. PO argues the former is the purpose of Koskinen’s timer, which “allow[s] for ‘all possible HARQ and ARQ retransmissions at MAC

and RLC level therein.” *Id.*, 25-26. In contrast, according to PO, the claimed in-sequence timer accounts for the differences in the small and macro base station latencies (*id.*, 26), and PO’s expert, without any further explanation, concludes “Koskinen’s reordering timer is **not** the same as the claimed ‘in-sequence timer.’” *Id.* (citing EX2012, ¶¶110-13) (emphasis in original). Relatedly, PO further argues that Koskinen’s timer value can be set to be long enough, but “Koskinen does not teach a POSITA the meaning of ‘long enough’ or how a POSITA could arrive at the claimed in-sequence timer.” *Id.*, 28. PO is wrong on all accounts.

PDUs and SDUs: PO’s argument regarding “observing a gap in a sequence of protocol data units” and “detection of an out-of-sequence SDU” is a distinction without a difference. As the Petition explains, Koskinen contemplates its UE receiving PDCP PDUs out-of-order. Pet. 26-27. The Petition and Dr. Lo further explain SDUs and SNs are part of PDUs and thus when a PDCP PDU is missed, it would have been obvious that a gap in the corresponding SDU is observed. Pet. §V.A.2, EX1003, ¶¶75, 143, 161-62; EX2013, 65:15-67:4; EX1056, ¶¶46-47. Moreover, a gap in SN means that PDUs are out-of-sequence, and by extension also are SDUs. *Id.*; *accord* ’573Pat, 14:23-30 (when a PDU is not received, the corresponding SDU is also not received)

Timer Duration: PO’s argument about the timer duration misread both Koskinen and the ’573 patent. **First**, the claims do not recite any timer duration

requirements. *See* §II.B. Even PO’s proposed construction states the timer “lasts for a period of time,” without explaining how long is “a period of time.” POR 17-18. Therefore, PO’s argument about Koskinen’s timer duration is not part of claim limitations and contradicts PO’s own claim construction. ***Second***, PO’s assertion that Koskinen’s timer accounts for “all possible HARQ and ARQ retransmissions” and thus allegedly has a longer duration, even if true, is part of an optional feature. Koskinen, ¶39 (accounting for HARQ and ARQ transmissions is just an example). ***Third***, PO is simply wrong. Koskinen explains its timer is set longer than the normal delay in transmission from the small-cell node. Pet. 30; EX1003, ¶167. This is no different than the ’573 patent’s explanation that “the duration of the in-sequence timer [is] determined by considering the receiving delay of the transmission path of the PDCP PDU in the case of the multi-flows” and “by considering an overall situation of the system.” ’573Pat., 13:48-53; EX1056, ¶46. And ***Fourth***, as explained above in §II.B, the range of durations of Koskinen’s timer, as disclosed in 3GPP TS 36.331, completely overlaps the ’573 patent’s example in-sequence timer durations. EX1056, ¶13 (comparing ’573Pat., Table 1 (20-60ms) to EX1014, 219-20 (0-200ms)).

Koskinen’s PDCP layer timer implementation: PO faults the Petition for stating that Koskinen describes re-purposing an RLC timer in the PDCP layer, arguing the Petition “conflates a layer-specific RLC t-Reordering timer with the

claimed in-sequence timer for PDCP SDUs.” And according to PO, “[t]he mere suggestion that PDCP could repurpose RLC state variables is not a disclosure of the claimed PDCP in-sequence timer.” POR 26-27.

But Koskinen offers more than a “mere suggestion” and explains how state variables from the PDCP and RLC layers can be repurposed in the PDCP layer to implement Koskinen’s reordering timer. EX1005, ¶38; Pet. 10; EX1003, ¶¶123, 140; EX1056, ¶49. Furthermore, Koskinen (and 3GPP TS 36.322 (EX1013) and 3GPP TS 36.323 (EX1011), which define and describe the variables)² explains these variables are used to deliver SDUs to upper layers. EX1056, ¶49 (citing EX1011, 26 and EX1013, 13-15). Thus, PO’s complaint that Dr. Lo does not explain how POSITAs would have used Koskinen’s teachings regarding an RLC timer to implement the PDCP timer (POR 27-28) falls flat because, as Dr. Lo explained at his deposition, Koskinen and the 3GPP specifications provide the required information. EX2013, 94:2-97:2.

Prior Art timers cited during prosecution: PO argues, during prosecution of the ’573 patent, Applicant distinguished a “cell activation/deactivation timer” and

² Koskinen incorporates these specifications by reference, further explaining the operation of the state variables in the respective layers and how SDUs are delivered to higher layers. Koskinen, ¶¶8-17.

“discard timer” from the claimed “in-sequence timer” and “[t]he reordering timer of Koskinen is no different.” POR 29. But PO’s conclusory statement fails to explain why Koskinen’s timer is purportedly no different than those discussed in the prosecution. Regardless, PO is clearly wrong as Koskinen’s reordering timer is quite different given that it (just as the claimed in-sequence timer) is implemented in the UE (and thus not a discard timer),³ and does not control activation/deactivation of a “configured BS-associated cell.”⁴ EX1056, ¶¶50-51.

b. 1[e], 1[f], 8[e], 8[f]

PO reiterates its POPR arguments that “Petitioner and Dr. Lo rely solely on [Koskinen’s] broad teachings of RRC and its use of IEs in a general sense” in asserting claim 1’s obviousness. POR 31. But as the Petition and Dr. Lo explained, POSITAs would have been more than able to configure Koskinen’s PDCP timer using RRC information elements based on the disclosure of Koskinen and 3GPP technical specifications (incorporated by reference in Koskinen). Pet. 21-24. Moreover, the Board has already rejected PO’s arguments by correctly stating:

³ Dr. Min admits a “discard timer [is] implemented at the transmitting base station.” EX2012, ¶57; EX1003, ¶44.

⁴ EX1002, 42 (“The disclosed timer of Hong relates to a controlling activation or deactivation [of] a cell”).

“[g]iven that Koskinen teaches a reordering timer (Ex. 1005, ¶¶ 16–17, 36–37), Petitioner has sufficiently shown why a person having ordinary skill in the art would use that general knowledge to place duration information about the timer in the IE, exactly as is taught by 3GPP TS 36.331.” DI, 14. PO provides nothing new for the Board to consider.

Nonetheless, PO argues the Petition’s reliance on 3GPP specifications “is insufficient.” POR 32. But Contrary to PO’s assertions, Koskinen itself provides specific teachings on reconfiguring the RLC t-Reordering timer and state variables for use in the PDCP. §IV.A.1.a.

Finally, PO argues Koskinen describes a timer and its related IE are implemented at the RLC layer, and not at the PDCP layer. POR 32-33. PO appears to ignore the Petition’s reliance on obviousness and that Koskinen expressly discloses to use a timer in the PDCP layer (and how to do it). Pet. 18-19; Koskinen, ¶¶36-38; §IV.A.1.a.

2. Dependent Claims 2-5, 9-12

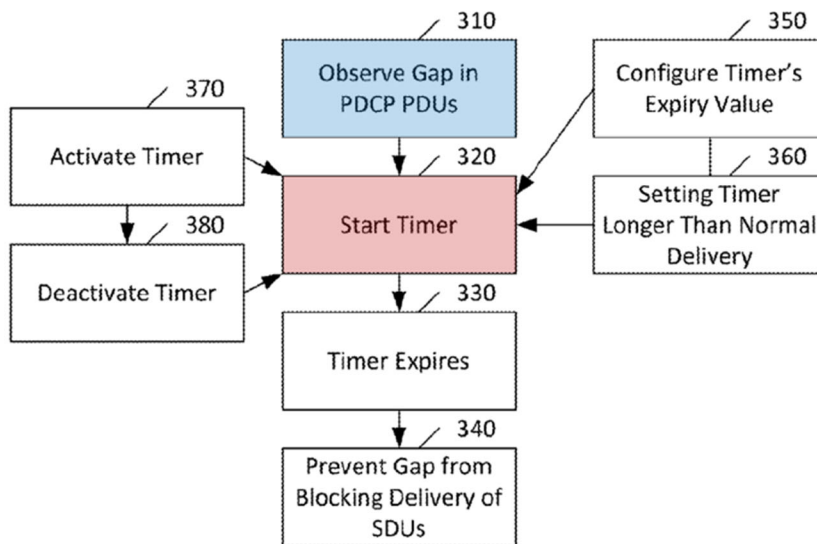
PO makes no additional arguments for claims 2, 5, 9, and 11.

Claims 3/10: PO argues (1) “Koskinen does not teach ‘confirming’ that a PDCP SDU has been missed” because “Koskinen does not teach that this gap [described in ¶38 and Figure 2] is confirmed” and (2) Koskinen does not teach “reordering timer is with respect to a PDCP SN #n when there is a PDCP SN #n–1

that is missed.”⁵ POR 34-35. *First*, semantics aside, Koskinen describes observing a gap (Koskinen ¶¶18, 21, 24, 35-36, 38, FIG. 2 (annotated below); Pet. 27, 29), and

⁵ While absent in the POR, PO’s expert appears to advance a fundamentally flawed interpretation that the claims cover only a specialized packet flow scenario for multiple PDCP entities with specialized SDU sequence numbers (EX2012, ¶51) and multiple in-sequence timers tied to those specialized sequence numbers. EX2012, ¶187; EX1057, 101:18-21. In this scenario, PO’s expert appears to argue that multiple in-sequence timers are needed. *Id.* Notwithstanding the above, Dr. Min admitted, the claims also cover the scenarios of multi-flow systems with a single PDCP (EX1057, 55:21-57:4), and the claims only require a single in-sequence timer. This is also clear from the plain language of the claims, where claim 1 recites “an” in-sequence timer and later refers to “the” in-sequence timer. EX1056, ¶56; ’573 patent, cl. 1. Therefore, the Petition’s Grounds render the Challenged Claims obvious because they teach or suggest a single in-sequence timer and associated operations. Furthermore, PO has not raised in the POR, and thus waived, an argument that multiple “in-sequence” timers are required by the claims. Regardless, Koskinen expressly discloses that the timer is started “whenever a gap in the received [PDUs] is observed” and “*the at least one* identified [PDU]” can be prevented from “blocking delivery of service data units to a higher layer.” Koskinen, ¶¶38, 41.

POSITAs would have understood “observing a gap” in the sequence is equivalent to (or at least renders obvious) “confirming” the gap, particularly since an action is taken (starting the timer) when the observation is made. EX1056, ¶¶53. PO and Dr. Min do not suggest otherwise.



Koskinen, Fig. 2 (annotated).

Second, as the Petition explains, observing a gap means a PDCP SDU with a previous SN (as contained in the PDCP PDU) was not received relative to the PDCP SN that was received, which triggers the timer to start. Pet. 28-29; Koskinen, ¶¶37-

Deenoo also discloses determining *one or more* missing sequence numbers. Deenoo, ¶14. A POSITA would have understood that Koskinen (and Deenoo), therefore, are not limited to a single reordering timer or detecting a single out-of-sequence sequence number. EX1056, ¶¶55-56; EX1057, 106:18-107:2.

39; Fig. 2. This means, or renders obvious, that a gap was present, it was detected, was acted upon, and thus confirmed. EX1056, ¶54.

Claims 4/12: PO argues Koskinen does not disclose delivering PDCP SDUs to the upper layer prior to expiration of the timer because Koskinen is purportedly not concerned with “what happens when [the timer] does not expire.” POR 35-36. PO further argues “Koskinen neither discloses nor renders obvious” the claims’ recitation of “both reordering received SDUs and delivery of them prior to the expiration of the in-sequence timer.” *Id.*, 36. PO is wrong on all accounts.

As the Petition explains, Koskinen expressly states: “deliver service data units to higher layer” (Koskinen ¶44, Pet. 31); further, Koskinen’s timer is set to be “long enough *so the that the timer does not expire during normal delivery delay* of protocol data units.” Koskinen ¶39; Pet. 30. Therefore, POSITAs would have recognized that in at least some circumstances, the missing SDU would be received prior to expiration of the Koskinen’s timer to allow the delivery of the SDUs to the upper layer. Pet. 30-31. PO’s arguments are further undermined by its own prior assertions that Koskinen’s timer duration is purportedly longer than the claimed in-sequence timer duration, which if true, would result in reception and in-sequence delivery of the delayed SDUs prior to the timer’s expiration.

Further, as explained above in §IV.A.1.a, Koskinen’s timer operates in accordance with 3GPP TS 36.322 and 36.323 (Koskinen, ¶¶37-39), and the 3GPP

specifications and Koskinen clearly show SDUs are reordered and sent to higher layers. *See* EX1056, ¶58; EX1011, 26; EX1013, 13-15; Koskinen ¶¶8, 10, 12, 45. Accordingly, POSITAs would have understood that SDUs are reordered and sent to the higher layer when the missing PDU, with corresponding SN and SDU, is received prior to the timer expiring. Pet. 30-31; EX1056, ¶58.

3. PO Misunderstands Ground 2's Combination

First, Petitioner notes a typo in the Petition's first sentence of Section V.B.2, which should read "POSITAs would have been motivated to extend Koskinen to incorporate Sammour's 'flush timer' [*configuration*] in Koskinen's RRC" (Pet., 39), just as explained in Section V.C.2, regarding the combination of Deenoo and Sammour. This is also clear from the remaining explanations of Section V.B.2, describing how it would have been obvious to rely on Sammour's timer value delivery mechanism (IE delivered via RRC) to provide Koskinen's timer value. *See id.* 39-40 ("POSITAs would have looked to other references providing further details of how to deliver Koskinen's PDCP timer information to the UE"), 40 ("...provide PDCP timer information of Koskinen through an PDCP configuration IE delivered via the RRC message"), *id.* ("...using the PDCP configuration IE delivered via the RRC message to set parameters in a UE"). Nonetheless, PO appears to latch on to the typo in arguing how Sammour's "'flush timer' disclosures...would not render the claimed invention obvious." POR 38.

As the Petition explains, the Koskinen-Sammour combination “renders obvious the *duration of the timer being a variable in the PDCP configuration section of the RRC*” (Pet. 38 (emphasis added)) and that Sammour provides “further details of how to deliver Koskinen’s PDCP timer information to the UE” (*id.*, 39). Notably, the Petition does not rely on Sammour’s flush timer to replace Koskinen’s timer, rather the Petition relies on Sammour’s mechanism to deliver a timer value. The Board correctly understood “Petitioner is not arguing that Sammour’s flush timer is an in-sequence timer,” rather the Petition “is simply arguing that a person having ordinary skill in the art would have combined Sammour’s teaching of using a PDCP IE to transmit a value of a timer in order to transmit a value relating to Koskinen’s reordering timer, thus rendering limitations 1e and 1f obvious.” DI, 19; *see Milwaukee Elec. Tool Corp. v. Irwin Indus. Tool Co.*, IPR2015-01462, Paper 13, 2 (Jan. 15, 2016).

PO further argues “Sammour also does not disclose that the ‘PDCP Flush Timer IE’ might indicate a time ‘long enough’” for Koskinen’s timer. POR 39 (internal citation omitted). But as explained above, the ’573 patent claims do not require any specific timer duration value, and even if they did, Koskinen renders those durations obvious. *See* §II.B.

PO’s attempts to somehow leverage Dr. Lo’s deposition testimony regarding Sammour’s Flush Timer (POR 39-40) also fail, because Dr. Lo consistently testified

that the actual operation of Sammour's Flush Timer did not matter. EX2013, 98:6-102:11.

Finally, PO argues the Koskinen-Sammour combination would not have been obvious. POR 40; *see also id.* 37-38. But, the Petition lays out clear motivation to combine Koskinen and Samour. *Id.* 39-43. ***PO addresses none of this*** and instead focuses on irrelevant aspects of Sammour, such as whether it's Flush Timer is handover-specific and how the WRTU (UE) receives the sequence number length⁶ (irrelevant because the combination relies on Koskinen's timer and sequence number). *Id.* 38-39. PO's expert simply parrots the POR without providing any meaningful explanation. EX2012, ¶¶146-47.

PO's lack of motivation to combine arguments should be rejected.

B. PO's Ground 3 Arguments Also Fail

PO argues Deenoo is not prior art (POR 40), which was addressed above in §III. PO further largely rehashes its arguments regarding Koskinen, applying them to the Deenoo-Sammour combination, purporting that the combination is not obvious and allegedly fails to disclose key features of the invention. POR 42-55. To

⁶ Further undermining PO's arguments, not unlike Sammour, Koskinen also relates to handover (Koskinen, Abstract, ¶39) and the incorporated 3GPP PDCP specification addresses PDCP SN length (EX1011, §6; EX1014, 202).

the extent PO's arguments are similar to those in Grounds 1 and 2, they fail for the same reasons discussed earlier in Grounds 1 and 2. Petitioner addresses any differences below.

1. Deenoo-Sammour is Not Hindsight

PO argues the Deenoo-Sammour combination is based on "impermissible hindsight" and the Petition's obviousness rationale is "without support from the references themselves." POR 42. But PO ignores the Petition's (and Dr. Lo's) detailed motivations to combine explanations, such as the rationale that because "Deenoo does not expressly disclose how the expiration time for the reordering timer is received at the UE...POSITAs would have looked to Sammour...providing 'new...PDCP parameters' to enable user equipment to operate properly in 'evolved UMTS systems including LTE systems.'" Pet. 45-46. The Petition further explains "Sammour and Deenoo share applicants, content, and field of use" and they "both seek to enhance LTE system functionality regarding configuration of the PDCP layer in dual-connectivity." *Id.*, 46 (internal footnote omitted). And, as supported by Dr. Lo, POSITAs would have had a reasonable expectation of success in "using Sammour's enhanced RRC information elements to control the activation and expiration of Deenoo's PDCP reordering timer." *Id.*, 47.

PO instead focuses on Deenoo's paragraph 211 regarding retransmission and advancing the PDCP receive window *that the Petition does not rely on*. POR 43.

But Petitioner again ignores Deenoo's disclosure regarding "one or more aspects of reconfiguration of traffic from one small cell node to another small cell node," "PDCP re-ordering," and Deenoo's explanations that in the case of a macro cell with the PDCP and small cells sharing the single DRB, the macro cell can reconfigure the UE using RRC. Pet. 44. Thus, when taking the disclosures of the references into account, the Petition's motivations support a clear case for obviousness.

Finally, PO makes a similar misguided argument as with Koskinen that Sammour's flush timer is "handover-specific" and Sammour "does not disclose how to configure an expiration time of Deenoo's timer."⁷ POR 43-44. **First**, whether Sammour's flush timer is handover specific is irrelevant because the Petition's combination relies on Sammour's teachings regarding PDCP reordering IEs to configure Deenoo's timer. Pet. 46, 55-56. **Second**, Sammour discloses the aforementioned IE, which is precisely for configuring a timer. Pet. 55.

Thus, PO's lack of motivation to combine arguments should be rejected.

⁷ PO overlooks that like Sammour, Deenoo also discusses handovers (*see, e.g.,* Deenoo, ¶¶15-17) and misreads the '573 patent claims as requiring a specific timer duration value.

2. Claims 1 and 8

a. 1[c], 8[b]

PO argues Deenoo's disclosure of UE configuration by RRC is insufficient to lead POSITAs to the claimed "information related to an in-sequence timer." POR 46-47; EX2012, ¶¶166-68. But as the Petition and Dr. Lo's declaration explained, paragraphs 142, 153, 173 and 198 of Deenoo describe "the macro eNB configuring the UE through RRC, where the UE receives the RRC message" and paragraphs 205-212 describe "a 're-ordering algorithm' in the PDCP of the UE utilizing a reordering timer." Pet. 53-54. Given Deenoo already explains using RRC messages for configuring other UE parameters (e.g., measurement parameters/events/triggers), POSITAs would have found it *obvious* to convey Deenoo's timer information to the UE as part of an RRC message. *Id.* The Petition further relies on Sammour's use of an information element in an RRC message to configure its timer. *Id.*, 54-56.

Next, PO argues without any explanation that Petitioner relies entirely on impermissible hindsight because Deenoo and Sammour do not render obvious the in-sequence timer's construction advanced by PO. POR 48-49. But as explained above, PO's proposed construction is fatally flawed; regardless, the POR does not explain why the combination of Deenoo's re-ordering timer and Sammour's PDCP IEs fails to teach claim 1[c] (or 8[b]). Providing some color, Dr. Min opines "neither Sammour nor Deenoo explicitly teach the use of sequence numbers for the PDCP

SDU.” EX2012, ¶171. This is wrong. Deenoo discloses the “PDCP data PDU SN” is used to trigger the re-ordering timer. Deenoo, ¶¶208-10. And the SN is part of the PDU, which identifies the SDU. §IV.A.1.a; EX1056, ¶¶59-60.

PO further repeats its flawed prosecution history arguments, where prior art timers were distinguished. POR 49. But as explained in §IV.A.1.a, PO’s conclusory statement fails to explain why Deenoo’s timer is no different than the cell “activation/deactivation timer” and “discard timer” discussed in the prosecution. Further, Deenoo’s timer is clearly distinguishable from the timers referenced during the prosecution: a discard timer is in the base station—unlike Deenoo’s UE-based timer—and Deenoo’s timer does not control activation/deactivation of a configured BS-associated cell. EX1056, ¶61.

a. 1[e], 1[f], 8[e], 8[f]

PO’s arguments refer back POR’s prior “Section VII(C)(3),” which fail for the same reasons explained in §IV.B.2.a of this Reply.

Notably, PO argues that Deenoo and Sammour fail to teach PDCP SDU sequence numbers. POR 50, EX2012, ¶181. This is wrong. As the Petition shows, Deenoo’s Figure 8 and paragraphs 208-211 describe using sequence numbers (SNs), which were also well-known in the art and described in multiple 3GPP documents (Pet. 56-57 (referring to *id.*, 52-53)), and the Petition explained, the **combination** of Deenoo and Sammour renders obvious sequence numbers for PDCP SDUs. Pet. 56-

57. Moreover, as explained in §IV.A.1.a, the SDU and SN are part of the PDU and thus when a PDCP PDU is missed, a gap in the corresponding SDU, and the corresponding sequence numbers, is observed. EX1056, ¶47.

PO further argues Deenoo describes “some unspecified information may be configured for the UE by the eNB via RRC messaging” and Sammour describes RRC related IEs. POR 51-52. But, again in conclusory fashion, states “neither Deenoo nor Sammour teaches a POSITA to implement a PDCP-based in-sequence timer....” *Id.* As the Petition, Dr. Lo’s declaration, and §IV.B.2.a explained, Deenoo already discloses using RRC messages for configuring other UE parameters, and thus POSITAs would have found it *obvious* to convey Deenoo’s timer information to the UE as part of an RRC message. Pet. 57-58 (also referring to *id.*, 53-56). Additionally, PO addresses the references individually and not the proposed combination, thus its arguments are without merit. *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).; *In re Universal Elecs., Inc.*, No. 2022-1716, 2023 WL 5219774, at *7 (Fed. Cir. Aug. 15, 2023).

3. Dependent Claims 2-5, 9-12

PO makes no additional arguments for claims 2, 5, 9, and 11.

Claims 3/10: PO makes the same argument that “Deenoo and Sammour do not teach ‘confirming’ that a PDCP SDU has been missed.” Deenoo, however, explains that certain actions are taken based on the missing PDCP data PDU and SN.

Deenoo, ¶¶208-10. POSITAs would have understood this effectively “confirms” that they are missing, or renders it obvious. EX1056, ¶62.

Claims 4/12: PO argues Deenoo and Sammour do not disclose delivering SDUs to the upper layer because they are both silent regarding operations prior to reordering timer’s expiration. POR 54-55. PO is wrong. Deenoo’s paragraphs 208-210 disclose the exact functionality PO argues is missing: in step 3 (going to step 7), the UE delivers “the queued packets to the higher layer.” Pet. 58-60, 62-64; EX1056, ¶64. It would have been obvious that step 3 is done prior to timer’s expiry because it occurs immediately after checking whether the “remaining re-ordering time is greater than threshold.” Pet. 63.

V. CONCLUSION

The Board should find the Challenged Claims unpatentable.

Dated: March 31, 2026

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CERTIFICATE OF WORD COUNT

I hereby certify that the foregoing PETITIONER’S REPLY includes 5,587 words (as calculated by Microsoft Word), excluding those in a table of contents; a table of authorities; a listing of facts that are admitted, denied, or cannot be admitted or denied; a certificate of service or word count; or an appendix of exhibits. Accordingly, this Reply is under the word count limit of 5,600 words.

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I hereby certify that on March 31, 2026 true and correct copies of the foregoing
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