

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ONEPLUS TECHNOLOGY (SHENZHEN) CO., LTD.,

Petitioner,

-against-

Case No.:
IPR2025-00762

PANTECH CORPORATION,

Patent Owner.

U.S. Patent No. 10,863,573

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DATE: December 18, 2025
TIME: 12:00 p.m.

DEPOSITION of TITUS LO, Ph.D.,
taken by the Patent Owners, pursuant to a
notice and to the Federal Rules of Civil
Procedure, held remotely via Zoom
Videoconference, before Suzanne Pastor, a
Notary Public of the State of New York.

1 A P P E A R A N C E S:
2 (All appearances via Zoom)

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* * *

1 THE REPORTER: Good morning.

2 The attorneys participating in this
3 deposition acknowledge that I am not
4 physically present in the deposition
5 room and that I will be reporting
6 this deposition remotely.

7 They further acknowledge that
8 in lieu of an oath administered in
9 person, I will place the witness
10 under penalty of perjury.

11 The parties and their counsel
12 consent to this arrangement and waive
13 any objections to this manner of
14 reporting. Please indicate your
15 agreement by stating your name and
16 your agreement on the record.

17 MR. STANFORD: My name is
18 Matthew Stanford from Mayer Brown on
19 behalf of the patent owner Pantech
20 Corporation, and I have no
21 objections.

22 DR. MOULDER: Chris Moulder,
23 Perkins Coie on behalf of petitioner,
24 and I have no objections.

25 THE REPORTER: Dr. Lo, please

1 raise your right hand.

2 Do you swear or affirm that the
3 testimony you are about to give will
4 be the truth, the whole truth, and
5 nothing but the truth?

6 THE WITNESS: Yes, I do.

7 THE REPORTER: Thank you.

8 You're all set, counsel.

9 MR. STANFORD: Thank you.

10 EXAMINATION

11 BY MR. STANFORD:

12 Q. Well, good morning or good
13 afternoon, depending on where you are. I
14 believe you're on the West Coast, Dr. Lo?

15 A. Yes, in Seattle. Good morning.

16 Q. Could you please state and
17 spell your name for the record.

18 A. My name is Titus Lo, T-I-T-U-S,
19 and last name is L-O.

20 Q. Thank you. Is anyone else in
21 the room with you right now?

22 A. No. It's only me.

23 Q. And do you have any physical
24 documents in front of you or on the desk
25 around you?

1 A. Yes, I have the whole pile of
2 exhibition papers. Yes.

3 Q. And this will be just the
4 documents that have been filed in this IPR
5 proceeding, correct?

6 A. Correct. Yes. All the
7 exhibition, clean.

8 Q. Clean. That was going to be
9 the next question, so thank you.

10 Do you have any electronic
11 devices around you, a cellphone, anything
12 besides your computer?

13 A. Yes. I have a cellphone, it's
14 turned off. And I have a landline phone,
15 and that's it. Of course the computer.

16 Q. Yes. And any other
17 applications open on the computer besides
18 this Zoom chat? Or the Zoom meeting?

19 A. Yes. It's the PDF that is
20 opened up for the file.

21 Q. Okay, so if you have any open
22 applications, please close them. As we go
23 through this, any documents I want you to
24 take a look at, I'll add them into the chat
25 function.

1 Have you done a deposition that
2 way before?

3 A. No, for remote, this is the
4 first time.

5 Q. It's pretty straightforward.
6 Like I said, I'll just add these documents
7 into the chat function and you can open
8 them in native PDF. You said you have the
9 paper copies of many of these documents as
10 well in front of you, so you can look at
11 either one. They should be all identical,
12 but just for the record, we'll be using the
13 electronic versions for all citations.

14 A. Okay.

15 Q. So it sounds like you've been
16 deposed before. About how many times have
17 you been deposed?

18 A. A few times. I don't remember
19 exactly.

20 Q. Can you give me just a
21 ballpark? More than ten?

22 A. No, no, it's long time ago. So
23 probably -- I could not remember how many
24 times. Maybe two times, three times,
25 something.

1 Q. But you said it's been a while?

2 A. Yes. It's been a while, yes.

3 Q. And if you recall, do you know
4 what kind of cases those were? Were they
5 patent infringement cases or something
6 different?

7 A. It's not about IPR.

8 Q. So since it's been a while, I'm
9 just going to go briefly through some of
10 the guidelines for the deposition today.

11 As you know, we have a court
12 reporter here so we want to make sure we
13 speak slowly and clearly so that she can
14 keep a clean record of everything that we
15 say today. Do you understand?

16 A. Yes.

17 Q. And because of that, let's also
18 try and keep all of our answers verbal. So
19 avoid shaking your head or nodding or any
20 other sort of hand gestures that won't show
21 up in a written transcript. Okay?

22 A. Yes.

23 Q. So the format today will be
24 fairly straightforward. I will ask you
25 questions and you'll provide an answer. If

1 a question that I ask is confusing or,
2 because we're doing this remotely, if you
3 just don't hear it because of a connection
4 issue, please ask me to say it again or to
5 rephrase it and I'll be happy to do so,
6 okay?

7 A. Okay.

8 Q. But if I ask you a question and
9 you do answer, I'm going to assume that you
10 understood it and you fully heard it, okay?

11 A. All right.

12 Q. After I ask a question your
13 attorney may object from time to time.
14 Unless your attorney objects for privilege,
15 you will still need to answer the question
16 despite the objection, okay?

17 A. Right.

18 Q. And we'll try and take a break
19 about every hour or so. I'll try and keep
20 an eye on the clock, but if you need to
21 take a break at any time, just let me know,
22 be happy to stop for ten minutes or so for
23 a break.

24 And I'm going to try not to
25 keep you here all day, like I said before

1 we jumped on the record. So I'm happy to
2 take a break at any time, okay?

3 A. Okay.

4 Q. Is there any reason that you
5 can't testify truthfully and accurately
6 today?

7 A. No.

8 Q. What did you do to prepare for
9 today's deposition?

10 A. What do I do?

11 DR. MOULDER: I'll just caution
12 you not to reveal any attorney-client
13 communications.

14 A. I reviewed all the exhibition,
15 review all the documents available to me
16 relevant to this deposition.

17 Q. And about how long did you
18 spend preparing for this? In hours.

19 A. I did not -- actually, probably
20 ten hours, something more than that, maybe
21 less than that.

22 Q. And besides counsel, did you
23 meet with anyone else in preparing for the
24 deposition today?

25 A. No.

1 Q. Anyone from the petitioner,
2 OnePlus?

3 A. No.

4 Q. When were you first retained to
5 work on this IPR proceeding?

6 A. I don't remember the exact
7 date. Probably the beginning of the year
8 or maybe -- sometime in the first half of
9 the year.

10 Q. Have you done any work for
11 OnePlus before working on this IPR
12 proceeding?

13 A. No.

14 Q. Before this had you heard of
15 OnePlus? Before this proceeding.

16 A. Yes, I heard of them. They are
17 one of the cellphone manufacturers.

18 Q. Had you heard of the Pantech
19 Corporation?

20 A. No. Not before this one.

21 (Whereupon, CV of Dr. Lo was
22 marked as Lo Exhibit 1 for
23 identification as of this date by the
24 Reporter.)

25 Q. I just dropped a document into

1 the chat. Do you see it?

2 A. Yes.

3 Q. Go ahead and open that and let
4 me know once you've got it open on your
5 computer.

6 A. All right, okay, I see it.

7 Q. I'll represent to you this is a
8 copy of your CV that you submitted along
9 with your declaration, which has been
10 previously marked in this case as Exhibit
11 1004.

12 Does this, to the best of your
13 recollection, look like a true and accurate
14 copy of your CV?

15 A. Yes.

16 Q. Let's take a look at the second
17 page which starts with the header
18 "Employment history." Do you see that?

19 A. Yes.

20 Q. So the first entry of
21 employment history appears to be the
22 current one, it states "free-lance wireless
23 technology consultant." Do you see that?

24 A. Yes.

25 Q. So is that your current

1 position?

2 A. Yes.

3 Q. And is the free-lance wireless
4 technology consultant, is that part of a
5 company that you formed?

6 A. No. It's just a very generic
7 title. It means I work for -- if I -- for
8 clients on my own.

9 Q. Is there a company associated
10 or a corporation that you formed as part of
11 your work as a consultant?

12 A. I have an LLC as a business.

13 Q. What's the name of that LLC?

14 A. It's S-O-L-U-T-T-I, LLC.

15 Q. Solutti?

16 A. Yes.

17 Q. And you've had this LLC since
18 January of 2014, is that right?

19 A. I don't remember the exact
20 year. Maybe earlier or maybe later, I have
21 to check. I don't have that on top of my
22 head.

23 Q. Okay, I'm using the date on
24 your CV as a basis for the January 2014
25 date, but is it fair to say that you've

1 been acting as a free-lance consultant
2 since January of 2014? Is that correct?

3 A. Yes.

4 Q. What's been the nature of your
5 consulting?

6 A. Basically provide my clients
7 with wireless technology background,
8 provide the ecosystem background, provide
9 technology development, provide
10 technology -- the state of the technology.
11 So it depends on the clients' needs. So
12 sometimes they need to understand the
13 technology background, sometimes they need
14 to understand the ecosystem, sometimes they
15 need to understand the technology
16 development and sometimes regarding some
17 technology guidance, and sometimes
18 understand the market itself, the
19 technology market itself.

20 So it depends on their need.

21 So basically around wireless technology.

22 Q. Without giving me any specific
23 names, in general, who are your clients?
24 Are they corporations needing assistance
25 with industry?

1 A. Yes, some -- okay, some are
2 technology company, some are law firms
3 dealing with patents, sometimes investment
4 entity for buying IPs or selling IPs. And
5 some are startup companies looking at the
6 technology itself and see what type of --
7 what are on the market and what are the
8 directions.

9 Q. Has your consulting focused on
10 the IP aspects of wireless technology?

11 A. Depends on what you mean by
12 "focus." So yes, a large portion is on IP.
13 But also a large portion on technology
14 itself.

15 Q. So have you served as an expert
16 witness as part of your consulting?

17 A. Yes.

18 Q. Is that frequently part of your
19 consulting duties?

20 A. Well, as you heard, I talk
21 about -- you asked about a deposition.
22 This is one I didn't -- I haven't been
23 doing it for a long time, so it's not often
24 as a witness.

25 Q. You mentioned that some of your

1 clients are law firms where you're doing
2 work related to patents.

3 When you're not serving as an
4 expert witness, what kind of services are
5 you performing for those clients?

6 A. The last corporation, they hold
7 a huge portfolio and they would hire a law
8 firm to use inventory and show what are
9 useful, what are not. So when they hire
10 law firm, a law firm may consult with me
11 how to provide some background in terms of
12 the market, provide what technologies
13 are -- in terms of the portfolio, which
14 part are more available, which part are not
15 based on the -- where the technology used,
16 in which sector, which area.

17 Q. Okay, thank you.

18 Now, you mentioned wireless
19 technology several times speaking about
20 your consulting experience. Were you often
21 involved in 3GPP specifications as part of
22 your consulting?

23 A. Yes.

24 Q. Just generally, what areas of
25 3GPP do you have experience in?

1 A. When you say "area," can you be
2 more specific? Like in terms of
3 technology, using in application? Or are
4 you talking about the technology itself,
5 are you talking about something else?

6 Q. Well, really I guess both, so
7 let me ask it a different way.

8 So in 3GPP, oftentimes
9 specifications are based on different
10 layers, right?

11 A. Okay, mm-hmm.

12 Q. So generally, do you have
13 experience -- which layers of 3GPP do you
14 have experience in?

15 A. I have been study -- or work
16 with 3GPP LTE for long time. So I have
17 been deal with the physical layer, the MAC
18 layer, the RLC layer, the PDCP layer, the
19 RRC layer, application layer. So that is
20 pretty much of the LTE of 4G/5G
21 specifications.

22 Q. Have you ever participated in
23 any of the 3GPP meetings?

24 A. No, I have not participated in
25 any 3GPP meetings or any standard-setting

1 bodies' meetings regarding 3GPP technology.

2 Q. Have you ever consulted with a
3 company for the purpose of contributing to
4 these 3GPP meetings or standard-setting
5 functions?

6 A. No, I don't think so.

7 Q. So have you ever worked in the
8 industry where you were actually the one
9 hands-on implementing wireless technology?

10 A. Yes.

11 Q. And was that LTE-based or
12 3G/5G?

13 A. It's 4G technology.

14 Q. And looking at your CV here,
15 what company were you working for at that
16 time?

17 A. Okay, if I look at my CV, the
18 first one is the Waltical Solutions.
19 That's from 2003 to 2005. And the second
20 one is Neocific Corporation from 2005 to
21 2013. Actually, I think the early on, AT&T
22 Wireless, we -- okay, so we have implement
23 some technology related to 4G.

24 Q. Let's just briefly go through
25 each of those then, so starting I guess

1 oldest to most recent. For AT&T Wireless,
2 what was the nature of your experience
3 there implementing I believe you said 4G?

4 A. Yes, I was system engineer at
5 the time. We developed the first
6 commercial OFDM system. That was deployed
7 in -- commercially deployed in couple
8 cities by AT&T Wireless. Actually, you may
9 know OFDM is the core technology of 4G and
10 5G.

11 Q. Just for the record, will you
12 say what OFDM stands for?

13 A. OFDMA is orthogonal frequency
14 division multiple access.

15 Q. Thank you. I was not trying to
16 put you on the spot with a test.

17 A. Luckily I remember this, but I
18 don't remember all the acronyms.

19 Q. That's okay, there's a lot of
20 them.

21 So moving on to your next job
22 after that was NextComm, correct?

23 A. Yes.

24 Q. What kind of wireless
25 technology were you implementing at that

1 time?

2 A. At the time it is the early
3 stage of WiFi development. And so that was
4 the beginning of WiFi, and at the time it's
5 called wireless local area, LAN -- area
6 networks. And we designed and developed a
7 WiFi chip set, so the silicon chips that
8 perform transmission/receiving WiFi
9 signals, the IEEE A02.11 A and C standards
10 or specifications by the chip set.

11 Q. Did you do any work with LTE or
12 any 3GPP related technologies while you
13 were at NextComm?

14 A. No. The company focused on
15 WiFi or wireless LAN technology. And at
16 the time there's no LTE, there's no 4G. So
17 probably at the beginning of WDMA,
18 something like that.

19 Q. Okay, then moving on to
20 Waltical, is that how you say it?

21 A. Yes, Waltical.

22 Q. While you were at Waltical,
23 what were your responsibilities there?

24 A. I was in charge of systems
25 engineering, the entire engineering team.

1 We developed 4G technology. That's very
2 early on. There's no LTE at the time. But
3 we -- at the time we saw 3G WCDMA -- or the
4 CDMA 1 made by Qualcomm or WCDMA by the
5 European standard, they did not meet --
6 they would not meet the future need of the
7 market. So we were thinking at the time we
8 should have new technology to meet the need
9 of the market, so we designed and actually
10 have built prototype to demonstrate 4G
11 technology.

12 Q. What were you trying to
13 demonstrate with 4G?

14 A. Well, it demonstrate the speed.
15 In terms of data rate, it demonstrate the
16 multiple access technology itself based on
17 packet data, and it demonstrate the
18 capacity. It demonstrate the coverage. So
19 this new system that will provide the need
20 of the market in the future.

21 Q. Now, looking at your -- the
22 next job after that was Neocific, correct?

23 A. Yes.

24 Q. So what were your
25 responsibilities at Neocific?

1 A. Neocific is -- was focused on
2 the development of silicon chip. And at
3 the time the company was looking to develop
4 the chip set to implement 4G technology.
5 So I was leading the engineering team to --
6 for this effort.

7 Q. Your CV mentions that you are
8 also managing the development and
9 maintenance of intellectual property
10 portfolio. Can you tell me a little bit
11 about that?

12 A. Yes. When you develop 4G
13 technology, we -- as a startup it's very
14 common to develop patents or file patents
15 to protect the technology. So we filed
16 quite a few number of patents regarding the
17 technology itself.

18 So I have to manage that
19 because you have to deal with the law
20 firms; we filed patents and hired the law
21 firm to manage that and writing the patents
22 and write the claims. And also we have to
23 pay -- maintain the patents and you pay
24 fees and that kind of thing. So we have
25 to -- so that's what I meant by

1 "management."

2 Q. Your CV also mentions that you
3 provided consulting -- or that as part of
4 Neocific, you provided consulting services
5 to clients with analysis and evaluation of
6 wireless technology, IP portfolios. Can
7 you tell me a little bit about that as
8 well?

9 If it helps, I'm looking on
10 page 2 of your CV.

11 A. I don't remember what did we do
12 at the time. At the time this big
13 corporation came to us if the wireless
14 technology portfolio is useful or not. So
15 that is one of the consulting activity we
16 have.

17 Q. So at Neocific, other companies
18 would come to you, to Neocific, and ask you
19 to evaluate their patent portfolios. Am I
20 understanding you correctly?

21 A. Yes, okay, let me provide a
22 little bit background.

23 Now, the startup is from 2005.
24 So we worked and then we find fundings --
25 we tried to find funding and then we

1 actually talked to VC at the time and
2 almost get the money at the time. But then
3 2008, the financial crisis, everything fell
4 out.

5 And so basically the company
6 fall back to a survival mode, so we
7 actually laid off substantial number of
8 employees. So we just retained the core
9 employees and then we switched to a
10 consulting mode. And that's how we -- why
11 we doing consulting later on, after the --
12 sometime in 2009/2010.

13 Q. Okay. So is it fair to say
14 that around 2008, that was the last time
15 you were doing sort of hands-on
16 engineering, and then you switched to
17 consulting as part of Neocific and then
18 part of your own freelancing after that,
19 from that point going forward, from around
20 the 2008 point going forward? Is that fair
21 to say?

22 A. Yes, you can -- okay, if you --
23 it depends on what you mean by "hands on."
24 If you say hands on by -- by "hands on" you
25 mean coding, you mean soldering or you mean

1 that kind of things, or if you -- I'm
2 doing -- my background is systems
3 engineering. Systems engineering is
4 thinking about whole system. By hands on,
5 if that's what you mean -- that's what I
6 mean. By hands on, you're looking at the
7 system, you think about the system, you
8 think about the programs and what kind of
9 solutions it should be. So you don't stop
10 at the level of soldering or coding.

11 So even when you're doing
12 consulting, you're still thinking about the
13 system in terms of system engineering. The
14 client come to you and say okay, we have
15 this problem, then you think the whole
16 thing, right? So I think about whole thing
17 and say what was the problem, what should
18 be the solution. So that is hands on to
19 me.

20 So it's not like just start at
21 the time. Any consulting activity, that
22 requires my hands-on activity.

23 Q. Okay, fair enough.

24 When was the first time you
25 began working with 3GPP specifically as

1 opposed to prior to the standards being
2 established?

3 A. Let me clarify this. So in
4 terms of standard, you meant 3GPP standard?

5 Q. Yes.

6 A. Okay, the 3GPP standard
7 actually -- it goes back to the 2G system,
8 so CSM. So and then you have the 3G
9 system, that's CDMA, and so we did not
10 actually directly deal with CSM or WCMA
11 because I don't -- at the time we are not
12 working on those things.

13 So in the declaration I state
14 that I started work on 4G in 2003. And at
15 the time the LTE standard, okay, the 4G
16 standard was not actually existing yet. So
17 I was aware the LTE activity beginning 2005
18 or 2006, in that time frame. So as a
19 practitioner you're aware of this kind of
20 thing, and so when there's new activities,
21 new standard activity started, we try to
22 monitor it.

23 So if by "monitor," I would say
24 that is something we started to deal with
25 LTE at the time.

1 Q. So around 2005.

2 A. Yes, 2005 or 2006. It depends
3 on when the activity started. So that's
4 why I remember that time frame.

5 Q. Okay, thank you.

6 I just added to the chat
7 another document that we'll mark as Exhibit
8 2.

9 (Whereupon, Declaration of Dr.
10 Lo was marked as Lo Exhibit 2 for
11 identification as of this date by the
12 Reporter.)

13 Q. Let me know once you have it
14 open.

15 A. This is Exhibition 1003?

16 Q. 1003, yes, that's right.

17 A. Okay.

18 Q. Do you recognize this document?

19 A. Yes.

20 Q. What is it?

21 A. My declaration.

22 Q. And if you jump to the last
23 page of the PDF you should see a signature
24 there. Does that appear to be your
25 signature?

1 A. Yes, it is.

2 Q. So to the best of your
3 understanding, this is a true and accurate
4 copy of the declaration you submitted as
5 part of this IPR proceeding, correct?

6 A. Correct.

7 Q. And does this declaration
8 contain all of the opinions that you have
9 prepared regarding the validity of U.S.
10 Patent No. 10,863,573?

11 A. Yes.

12 Q. And if I just call this the
13 '573 patent, will you know what I'm talking
14 about?

15 A. Yes.

16 Q. Did you write this declaration
17 yourself?

18 A. You mean all by myself?

19 Q. Yes. Did you write it all by
20 yourself or did you write it with the
21 assistance of either someone else or with
22 counsel for OnePlus?

23 A. Yes, it was a team effort.
24 With my counsels.

25 Q. Can you on a high level

1 describe the drafting process for the
2 declaration?

3 DR. MOULDER: I'll caution you
4 just not to reveal attorney-client
5 privilege.

6 A. We -- this is some time ago.
7 We worked together. I don't actually
8 remember how or which is which. So we all
9 have contribute to this. But the important
10 thing is I agree all the statements here
11 and this is my opinion.

12 Q. So it was a collaborative
13 process, but ultimately you stand by all of
14 the statements and opinions made in this
15 declaration, correct?

16 A. Correct.

17 Q. About how many hours did you
18 spend preparing the declaration? To the
19 best of your memory. I know it's been a
20 little while.

21 A. I really can't remember how
22 many hours. I will guess something in the
23 ballpark of 100 hours, plus/minus 50 hours.
24 Something like those. I cannot give you an
25 exact number.

1 Q. So somewhere between 50 and 150
2 hours?

3 A. Yes, something, yes.

4 Q. So let's talk a little bit
5 about some of the opinions you have in
6 here. To start just on a high level,
7 you're a very well-credentialed person.
8 You've had quite a bit of experience.
9 About what level education and experience
10 do you think one would need to understand
11 this technology that's in the '573 patent?

12 A. Are you talking about education
13 level?

14 Q. Yes, education or education and
15 experience. What level of skill would
16 someone need to have?

17 A. For this, in terms of articles,
18 basically it's logic so it can -- so
19 bachelor degree in terms of electrical
20 engineering or computer engineering or
21 computer science should be sufficient to
22 understand the technology.

23 And if somebody have two years
24 or more experience, that is very good --
25 the person should have a very good

1 understanding of the technology.

2 Q. And have you worked with people
3 who have about this level of skill with a
4 bachelor's in computer science or computer
5 engineering and have a couple -- or at
6 least call it two years or so of
7 experience?

8 A. Yes. I have worked with those
9 people.

10 Q. And you would say that those
11 people that you've worked with have the
12 requisite skill level to be able to fully
13 understand the technology that's at issue
14 in the '573 patent?

15 A. Yes. I would say that.

16 Q. And I realize I should have
17 pointed this to you first, I wasn't trying
18 to make you go off the top of your head.
19 The paragraph we're talking about in your
20 report, if you don't have it already in
21 front of you, is the section that starts in
22 paragraph 19, which has the heading "Level
23 of ordinary skill in the art."

24 One thing I wanted to ask you
25 about, in paragraph 21 where you describe

1 basically exactly what you just talked to
2 me about, you mention in the third to last
3 line or so, second to last sentence where
4 you say that, after giving the bachelor's
5 degree, you say "and at least two years of
6 practical experience working in the field,"
7 you say that the field is video processing
8 systems. Do you see that?

9 A. Yes. I don't know how the word
10 "video processing" is there. So it should
11 not be there. I think it's -- it is a
12 typo.

13 Q. Ah, okay. So just to be clear,
14 someone does not need to have experience in
15 video processing systems to meet the
16 requisite level of skill in the art for the
17 '573 patent in your opinion, correct?

18 A. No, no, it's not video
19 processing. I think the correct word would
20 be "wireless communication system" or
21 "telecommunication system."

22 Q. Thank you. Thank you for
23 clarifying that.

24 So I'm adding another document
25 that -- keep your declaration open but you

1 can also pull up what I just added, which
2 we'll mark as Exhibit 3.

3 (Whereupon, '573 Patent was
4 marked as Lo Exhibit 3 for
5 identification as of this date by the
6 Reporter.)

7 Q. This is a copy of the '573
8 patent, which was designated as Exhibit
9 1001 in the IPR.

10 Let me know once you have it
11 open.

12 A. Okay, all right.

13 Q. Generally, what is your
14 understanding of what the '573 patent is
15 describing?

16 A. Basically this patent states
17 the problem of -- a common problem
18 encountered in multi-flow operation in LTE.
19 And when you have dual connectivity, you're
20 trying to do multi-flow (inaudible) and
21 when you receive the data unit, often it
22 could be out of order because there is a
23 difference in terms of propagation or
24 processing timing.

25 So when you encounter the

1 out-of-order data unit, you need to reorder
2 them. But often when you don't receive the
3 data unit that is missing, so that will
4 block the whole receiving processing.

5 In order to resolve that, this
6 patent proposes using a timer to -- as a
7 solution to the problem. That is the
8 purpose of this patent.

9 Q. In a multi-flow system like
10 this, why do you receive packets -- or why
11 would an entity such as the UE receive
12 packets out of order?

13 A. Okay, actually, I talk about
14 this in the declaration. So I believe I
15 summarize the problem in the section of
16 "technical background."

17 Basically you have -- in the
18 multi-flow application there's a master
19 base station and there's a secondary base
20 station. And so the mobile device or the
21 user equipment will connect with the two
22 base stations to receive data. But since
23 the distance from the -- between the master
24 and the secondary are different, so either
25 you will -- there's no guarantee you

1 receive the units, the data units in order.
2 And so that is how this phenomenon often
3 occur.

4 And then also you have the
5 processing time. The master unit -- master
6 base station will connect to the network,
7 okay, and the data is from the network
8 itself. And then the master base station
9 will distribute some of the data unit to
10 the secondary base station to transmit. So
11 often you don't -- in that process also
12 create some -- it's the cause of
13 out-of-order reception.

14 So that is the -- as I said,
15 there's two problems: Propagation time
16 difference and also processing time
17 difference. So that's how you encounter
18 the out-of-order data unit reception.

19 Q. It's been about an hour. Maybe
20 now is a good time to take maybe a
21 ten-minute break if that's all right with
22 the two of you.

23 DR. MOULDER: Yup.

24 A. Okay, fine.

25 Q. Want to come back, I guess my

1 time it's 1:10, so I guess it would be
2 10:10 a.m.

3 (Whereupon, a short recess was
4 taken.)

5 BY MR. STANFORD:

6 Q. Before we took our break we
7 were talking about generally what the '573
8 patent is talking about for the problem and
9 solution.

10 I'd now like to jump to the
11 claims. And let's start with claim 1 which
12 starts on column 18. I guess it starts at
13 the very bottom of column 17, but let's
14 look at the first limitation after the
15 preamble, which is starting on line 4 of
16 column 18. Do you see that?

17 A. Yes.

18 Q. So this is the claim element,
19 it says, "Receiving packet data convergence
20 protocol, PDCP, packet data units, PDUs,
21 through the macro base station and the
22 small base station." Do you see that?

23 A. Yes.

24 Q. What is your understanding of
25 this claim element?

1 DR. MOULDER: Objection; form.

2 A. To me it's very generic
3 statement of the reception from two base
4 stations. Because the PDCP packet data is
5 the data you receive.

6 Q. What is your understanding of
7 the PDCP, the packet data convergence
8 protocol?

9 A. The PDCP data is the data
10 handled at the PDCP layer. So that handles
11 encryption.

12 So if you go to my declaration,
13 paragraph 71, paragraph 71, "The user plane
14 is responsible for transmitting user data,
15 such as voice, video and internet traffic
16 between the UE and the RAN," that's the
17 radio access network. "Its protocol stack
18 includes multiple layers: The PDCP, data
19 packet convergence protocol, ensures
20 in-sequence delivery of upper layer
21 protocol of data units, handles
22 encryption/decryption, or
23 ciphering/deciphering, header
24 compression/decompression, and robust
25 header compression, and duplicate detection

1 of lower layer service data and
2 transmissions of PDCP SDUs at hand-over,
3 and reordering. It acts as an interface
4 between the IP layer and lower layers,
5 facilitating convergence of data from
6 different sources."

7 So basically, that layer, these
8 this type of things are handled at that
9 layer. Now, when the receiver -- logically
10 the transmitter transmits the PDCP data and
11 at the receiver, you receive this at the
12 receiver unit.

13 So basically, that limitation
14 is very generic to me. Basically what it
15 says is the receiver receives the data
16 units from the macro and the small base
17 stations.

18 Q. What's the difference between a
19 PDU and SDU?

20 DR. MOULDER: Objection to
21 form.

22 A. Okay, I think I talk about that
23 in my declaration in the background. So if
24 you go to paragraph 74, "In transmission
25 from the eNB, data flows from the PDCP

1 layer down through each protocol layers,
2 with each layer adding its own headers and
3 control information. This process
4 continues until the data reaches the
5 physical layer where it is transmitted over
6 the medium. In reception by the UE, data
7 flows in reverse, starting at the physical
8 layer and moving up through each layer,
9 with each layer removing its corresponding
10 headers and control information until the
11 data reaches PDCP layer, depending on if
12 the data is being received or sent,
13 respectively."

14 So "each layer interacts with
15 its adjacent layers using service data
16 units and protocol data units. When data
17 is passing through -- between layers, the
18 sending layer refers to it as SDU, while
19 the receiving layer treats it as PDU. So
20 each layer processes the PDU according to
21 its specific functionality and then sends
22 the processed data unit as SDU to the next
23 adjacent layer. The process continues
24 until the data reaches either uppermost or
25 lowermost layer."

1 So that's how the SDU and PDU
2 defined in this convention.

3 Q. Yes, I did see those paragraphs
4 in your declaration. Just to confirm then,
5 in your mind a PDU and SDU are different
6 units, correct?

7 DR. MOULDER: Objection to
8 form.

9 A. I don't interpret it that way.
10 Basically, the difference is the control
11 information and the header between the two.

12 Q. And what is the difference in
13 the control information?

14 A. Control information depends on
15 layer. So say, for example, the PDCP data
16 unit, there's control information regarding
17 the PDCP added to the actual data itself.
18 And also the header also added to the data
19 unit itself.

20 So the data are the same. The
21 difference is just the control information.

22 Q. And you said the other
23 difference was the header, correct?

24 A. Yes, the header. Well, I guess
25 depends how you -- okay, sometimes the

1 header would be the -- you can also say
2 that's the control information.

3 Q. So are you saying in your
4 opinion, the header is the same as the
5 control information?

6 A. Well, okay, I would say it's a
7 different thing. But the header also can
8 be control. So basically it doesn't matter
9 if you distinguish the header and control
10 information. The difference of the two is
11 just the additional information for the
12 control functionality purposes. How you
13 distinguish whatever the control
14 information, that's not important in this
15 context.

16 Q. Sorry, I just want to make sure
17 I'm understanding what you just said. Are
18 you saying that the difference between the
19 header information and the control
20 information doesn't matter?

21 A. No, I did not say that.

22 Q. Can you please re-explain what
23 you were testifying about the differences
24 between the header information and the
25 control information? I may have

1 misunderstood you.

2 A. What I'm saying is between the
3 SDU and the PDU, it's just additional
4 control information. Right? So it's not
5 important in this context to say whether
6 you classify header as the control
7 information or the whole thing is just
8 control information, that's not important
9 here. The important thing is the data, SDU
10 and PDU essentially, those data are the
11 same. The difference between PDU and SDU
12 is just additional control information.

13 Q. When you say "in this context,"
14 what do you mean?

15 A. You asking me whether -- the
16 difference between PDU and SDU in this
17 context.

18 Q. Yes, what do you mean when you
19 say "in this context"? Are you referring
20 to the '573 patent?

21 A. Okay, let's back up.

22 You asking the question the
23 difference between SDU and PDU. I assume
24 you refer to this patent, the '573 patent.
25 Is that correct?

1 Q. I was initially asking
2 generally, not specifically to this patent.
3 If I clarify and say -- let me ask the
4 question a different way.

5 In general, what is the
6 difference between a PDU and a SDU?

7 A. In general, the difference just
8 additional information between -- control
9 information between PDU and SDU. And so
10 when you look -- it depends on which
11 direction you're looking at. So if you
12 talk about receiving, then the PDU at the
13 layer, at the receiving layer will have the
14 control information. And the SDU does not
15 have the control information.

16 Q. Okay, and in what circumstance
17 does the SDU have control information?

18 A. In the reverse direction. So
19 when I transmit, when the layer receives
20 PDU and then the header -- or control
21 information to the SDU -- PDU, sorry. That
22 would become SDU and send it to the lower
23 layer.

24 I know it's a little bit
25 confusing. So it depends on the direction

1 of the receiving and transmission.

2 Q. I understand. Is there a
3 difference between control information and
4 header information when we were referring
5 to PDUs and SDUs?

6 A. Well, if you really want to
7 delve into it, yes, there's a header and
8 there's control information. So the
9 header, for example, you will attach the
10 sequential number regarding to the layer
11 itself. And then the control information
12 will have some decryption or encryption
13 information with it. So that's for
14 example, right?

15 But the header and the control
16 information here is for the control. It's
17 nothing to do with the data. So if --
18 depends how you want to work with. So if
19 you are concerned about control
20 information, yes, you separate the header
21 and the control information. With the
22 control information you have different
23 field and put in different control
24 information then.

25 But if I only look at the data

1 unit itself, I have control information, I
2 have the data itself. Right? So I just --
3 so in that sense it doesn't matter whether
4 you -- I care about the header is a
5 different field in the control information
6 because I don't deal with it because I
7 treat it as control information and I just
8 care about the data unit. So it depends in
9 general, in a sense.

10 Q. So in your opinion, each of
11 these pieces of information is an
12 information element or may comprise
13 multiple information elements. And -- I
14 want to make sure I'm understanding.

15 DR. MOULDER: Objection to
16 form.

17 A. Hold on.

18 Q. I didn't ask the question. So
19 let me start over because I haven't asked
20 the question yet.

21 A. Okay --

22 Q. For the control information and
23 the header information, does the control
24 information and the header information
25 include information elements?

1 DR. MOULDER: Objection; form.

2 A. You are confused with the RRC
3 control information. So that's different
4 thing. So the PDU control information is
5 different thing. It's nothing to do with
6 the RRC control information. So control
7 information regarding that -- okay, the
8 PDU -- the control information is actually
9 only to do with that PDU unit, okay? It's
10 nothing to do with the layer configuration.
11 It's nothing to do with the RRC control
12 message.

13 Q. So what I'm trying to
14 understand is your opinion on the
15 difference between the control information
16 and the header information. So you have
17 stated that there aren't technically
18 differences but that the -- again, this is
19 what I'm trying to clarify, that the
20 differences don't seem to matter in the
21 context that we're discussing here today.
22 So that's what I'm just trying to drill
23 down on here. So let me ask this.

24 When I'm viewing the data, is
25 there a way to tell whether or not

1 information is control information or
2 whether or not data is header information?

3 DR. MOULDER: Objection; form.

4 A. Okay, would you provide a
5 context here so that I can answer your
6 question better?

7 Q. Yes. You testified that header
8 information is different than control
9 information, is that correct?

10 DR. MOULDER: Objection; form.

11 A. Okay, I want you to clarify.
12 When you say "control information," what
13 are you referring to?

14 Q. This is your term from your
15 explanation of the difference between a PDU
16 and an SDU. And I'm trying to understand
17 your explanation of the distinction between
18 the two.

19 So let me ask you, when you say
20 "control information" what do you mean?

21 A. In that sense the control
22 information regarding to that particular
23 data unit. So it's nothing to do with RRC
24 control information. It's nothing to do
25 with any other information, but it's only

1 regarding to that unit, data unit. That's
2 the control information.

3 So for example, how many bits
4 is that unit, how long it takes. Those are
5 the control information, only related to
6 that data unit.

7 And the header is the same
8 thing. The header will or may contain
9 sequence number. That sequence numbers
10 only relate to that data unit.

11 So it depends how you look at
12 it, okay? So you can say this is the
13 header plus the other control information,
14 it is control information regarding to that
15 data unit. Or you can separate, okay, is
16 the header related to the data unit, and
17 all the control information is also related
18 to this data unit but it's very
19 exclusively. The data plus the control
20 information are the overall information is
21 related to this data unit. It's nothing
22 else. It's nothing to do with RRC control
23 information, it's nothing to do with any
24 other information.

25 Q. Okay, thank you.

1 Let's move back to claim 1 of
2 the '573 patent. So we're looking at
3 column 18. Let's look at the claim element
4 that starts on line 9 of column 18, which I
5 believe we've referred to, element 1-C that
6 begins with "receiving from the macro base
7 station information related to an
8 in-sequence timer for the PDCP SDUs through
9 a radio resource control (RRC) message."

10 Do you see that?

11 A. Yes.

12 Q. And if I refer to this as
13 element 1-C, will you know what I'm talking
14 about?

15 A. Yes. Okay, I don't want to
16 confuse myself. Element 1-C is consistent
17 with my declaration? Or are they
18 different?

19 Q. I believe that should be
20 consistent, but we can -- let me point you
21 to the paragraph.

22 So if you'll look just before
23 paragraph 139 on page 78 of your
24 declaration, so 1-C is the claim element I
25 just read to you that starts with

1 "receiving from a macro base station.

2 A. Okay.

3 Q. What is your understanding of
4 element 1-C in claim 1?

5 DR. MOULDER: Objection; form.

6 A. Can we break it down into
7 different -- when you -- okay, when you say
8 my understanding, that would be a lot of
9 things there. And so maybe you can make it
10 more simpler, maybe you can break it down
11 so I can address this limitation in a more
12 easier way or more -- so I can better work.

13 Q. Yes, we can break it down.
14 Let's start from the beginning of the claim
15 element. The first portion reads
16 "receiving from the macro base station
17 information related to an in-sequence
18 timer."

19 What is your understanding of
20 this portion of element 1-C?

21 DR. MOULDER: Objection to
22 form.

23 A. The plain meaning here, the
24 receiver in this case, I think it's
25 referring to the -- the UE here receive

1 information from the macro base station the
2 information related to in-sequence timer.

3 So I think it's plain and simple.

4 Q. And if we continue on just a
5 few words more in element 1-C, it states
6 that the in-sequence timer is for PDCP
7 SDUs. Do you see that?

8 A. Yes.

9 Q. What is your understanding of
10 the claim element stating that the UE
11 receives information related to the
12 in-sequence timer for PDCP SDUs?

13 DR. MOULDER: Objection; form.

14 A. In this case you have to look
15 at the preamble there. So basically we are
16 talking about dual connectivity, especially
17 dealing with the multi-flow. So the timer
18 information for the PDCP SDU is regarding
19 the scenario here. So it's regarding the
20 timer. So the timer for reordering the PDU
21 or SDU.

22 Q. In claim element 1-C we're
23 talking about the timer for SDUs, correct?

24 A. Generally speaking, you --
25 okay. The SDU by strict sense is

1 already -- the sequence number is already
2 stripped from the data unit. It's the only
3 PDU have the sequence number. So, but in
4 this sense, to anyone with -- or any POSITA
5 who understand SDU or PDU, they are not
6 distinct for here.

7 Q. In claim element 1-C, do you
8 see the term "PDU"?

9 A. I don't see -- I see the PDU in
10 the limitation.

11 Q. But do you see it in element
12 1-C?

13 A. In the element 1-C I will
14 understand the SDU is corresponding to the
15 PDU of the previous. Otherwise it doesn't
16 make sense.

17 Q. I'm asking you if in element
18 1-C you see the letters "PDU."

19 A. I don't see it. So that's why
20 I'm telling you it doesn't make sense if
21 you interpret by itself. So you have to
22 understand the PDU has to corresponding to
23 the SDU. Otherwise it doesn't make sense
24 because SDU by itself, it doesn't have the
25 sequence number.

1 Q. So in element 1-C the claim
2 recites "receiving from the macro base
3 station information related to an
4 in-sequence timer for the PDCP SDUs,"
5 correct?

6 A. Yes.

7 Q. So it's fair to say then, based
8 on the words written on the page for
9 element 1-C, that the in-sequence timer is
10 for PDCP SDUs, correct?

11 DR. MOULDER: Objection; form.

12 A. Okay. Can you -- literally,
13 yes, okay, what you say is correct, but it
14 doesn't make sense to me because I have to
15 use -- consider the limitation. Otherwise
16 the whole limitation does not make
17 technical sense.

18 Q. I'm not asking you to read it
19 out of context. I'm just asking a very
20 straightforward question. If when you look
21 at element 1-C, you agree with me that the
22 words on the page in element 1-C state that
23 there's an in-sequence timer for PDCP SDUs,
24 correct?

25 DR. MOULDER: Objection; form.

1 A. Did you say just for PDCP SDU?
2 That's what you're saying?

3 Q. I'm just asking you to confirm
4 that element 1-C recites that the UE
5 receives information related to a
6 in-sequence timer for PDCP SDUs.

7 DR. MOULDER: Objection; form.

8 A. No, I think this limitation has
9 to relate to the upper -- the previous
10 limitation. Basically, the timer receives
11 information related to in-sequence timer
12 for the PDU SDUs corresponding to the PDCP
13 PDUs. Because the previous limitation you
14 kind of omit the modification.

15 Q. I'm unclear from your answer
16 whether or not you were agreeing with me or
17 not so I'll ask it one more time.

18 In element 1-C, do you agree
19 that the in-sequence timer is for PDCP
20 SDUs? Yes or no.

21 DR. MOULDER: Objection; form.

22 A. I agree with you if you
23 consider the previous limitation. Only if
24 you consider the previous limitation.

25 Q. Fair enough. So let's go take

1 a look at how the patent itself discusses
2 this claim element. Maybe that will help
3 us both out here.

4 If you would navigate to column
5 13 of the '573 patent, and we'll look to
6 the paragraph that starts on line 43. The
7 number looks like it got a little bit off
8 on the patent, so I believe it's the
9 paragraph that begins with "the PDCP
10 sequence number (SN)." Do you see that
11 paragraph in column 13?

12 A. Yes.

13 Q. So I'd like to take a couple
14 minutes to talk about this paragraph and
15 actually the couple paragraphs that follow
16 up to try to get an understanding -- or
17 trying to get your understanding of what
18 the in-sequence timer is in the context of
19 the '573 patent.

20 So if you'll just take a moment
21 here, will you just go ahead and read to
22 yourself this first paragraph that runs on
23 column 13 that runs from line 43 to I
24 believe it's 53, the end of that paragraph.
25 Line 53. Let me know when you're done.

1 A. (The witness reviews the
2 document.)

3 Okay.

4 Q. Let's start with the first
5 sentence. In the first sentence, I believe
6 it would be the third line of the paragraph
7 or so, it states that "if the PDCP SN of
8 the PDCP SDU is not sequential," and then
9 it gives a parenthetical that says "that
10 is, when the SN," and it's my understanding
11 earlier in this paragraph SN refers to
12 sequence number, "when the SN prior to the
13 PDCP SN of the PDCP SDU is missed, an
14 in-sequence timer for the PDCP SDU is
15 driven." Do you see that?

16 A. Yes.

17 Q. So is it fair to say that we're
18 talking about -- this paragraph is
19 describing that the in-sequence timer for
20 the PDCP SDU is driven if there is a missed
21 SDU or a non-sequential SDU?

22 DR. MOULDER: Objection; form.

23 A. Can I ask a question? Why do
24 you skip the first sentence?

25 Q. I'm talking about the first

1 sentence. I'm sorry if that was unclear.
2 This is all within the first sentence of
3 that paragraph starting on line 43.

4 A. Yes, but the first sentence
5 says, "The SDU corresponding to the PDU,"
6 right?

7 Q. We'll walk through it.

8 A. Okay.

9 Q. So the first sentence, if you'd
10 like to start at the beginning, the first
11 sentence says that "the PDCP sequence
12 number (SN) of the PDCP SDU corresponding
13 to the PDP PDU received" from the entity is
14 confirmed.

15 A. Yes.

16 Q. And if it's all right with you,
17 I'll skip saying PDCP because we have to
18 say it so many times here.

19 A. Okay.

20 Q. If the sequence number, the SN
21 of the SDU is not sequence (that is, when
22 the sequence number SN prior to the SN of
23 the SDU is missed), an in-sequence timer is
24 driven.

25 A. Yes.

1 Q. Okay, so is it fair to say that
2 the in-sequence timer is driven based on an
3 out-of-sequence SDU?

4 DR. MOULDER: Objection; form.

5 A. No, the premise is here in the
6 first phrase of the sentence, the sequence
7 number of the SDU corresponding to the PDU.
8 That's very important there because the
9 sequence number is -- resides in the PDU.
10 So that's why it's important to realize the
11 SDU corresponding to the PDU. So basically
12 the sequence number first is related to the
13 PDU, and logically corresponding to the
14 SDU.

15 So in a sense, without the PDU
16 it doesn't make sense, the whole thing.
17 But with the PDU, then yes, everything --
18 the POSITA will understand the SN is for
19 PDU but logically it can tie to the SDU.
20 Okay?

21 So then the POSITA will
22 understand, okay, when you mention SDU, it
23 actually corresponding to the PDU. So
24 whether you -- okay, in the sense whether
25 you're saying the SN for the SDU or PDU,

1 they are the same. So -- and when you say
2 the SDU is missing, it's actually the PDU
3 also missing. Right? So if you swap
4 everything in the PDU it makes sense, it
5 makes perfect sense, okay?

6 So in a sense, my opinion here
7 is the SDU and PDU, the same thing here
8 you're talking about.

9 Q. That was not my question. My
10 question is about the trigger for the
11 in-sequence timer, when the in-sequence
12 timer is to be driven. Is it your
13 understanding from the sentence we're
14 reading starting on line 43 of column 13
15 that when the sequence number of an SDU is
16 confirmed and there is a non-sequence SDU,
17 the in-sequence timer is driven?

18 DR. MOULDER: Objection; form.

19 A. You see, to a POSITA, the SDU
20 or PDU -- whether SDU or the corresponding
21 PDU they're missing, yes, the timer is
22 driven. So you insist it's only here it's
23 SDU, but to a POSITA, they are the same,
24 PDU and SDU. That's my opinion here, okay?

25 But if you insist, okay, only

1 SDU missing, the timer is driven, that's
2 not correct. I mean, that doesn't make
3 sense at all. But if you say okay, only
4 from the surface of the meaning, yes, okay,
5 that's what it says.

6 Q. So let's break down the first
7 sentence. Maybe that will help here.

8 Do you agree that there are two
9 conditions being laid out in this first
10 sentence that relate to when the
11 in-sequence timer is driven?

12 A. Okay, let me back up. First of
13 all, the condition is SDU, let's say --
14 okay, the first condition, SDU
15 corresponding to PDU. So this is what we
16 have, okay. Basically SDU equals PDU in
17 logical sense. Right?

18 Q. Before we get to that, let's
19 just start at a baseline. We agree that
20 there are two conditions here. Regardless
21 of what they are, let's just agree that
22 there are two --

23 A. Yes, let's say, yes.

24 Q. Now let's start with the first
25 one.

1 A. Okay.

2 Q. The first condition being, I'm
3 just going to read the text off here to
4 make sure we're talking about the same
5 portion of the patent since we're not in
6 the room together. The first condition
7 would be based on the language in the
8 patent that says, "The PDCP sequence number
9 (SN) of the PDCP SDU corresponding to the
10 PDCP PDU received in the PDCP entity is
11 confirmed."

12 Can we agree that that is what
13 we'll call it the first condition?

14 A. Mm-hmm.

15 Q. Okay. And can then can we
16 agree that the second condition is, based
17 on the text here, I'll read it again, "If
18 the PDCP SN of the PDCP SDU is not
19 sequential (that is, when the SN prior to
20 the PDCP SN of the PDCP SDU is missed),"
21 that would be the second condition. And
22 the remainder of that sentence provides
23 that the in-sequence timer is driven. Can
24 we agree on that?

25 DR. MOULDER: Objection; form.

1 A. Agree on what?

2 Q. Those are the two conditions we
3 are going to talk about.

4 A. Yes.

5 DR. MOULDER: Objection; form.

6 A. Okay, you have A or B. If A
7 missing, timer is driven, right? That is
8 what it says, right?

9 Q. I didn't get to what they are
10 yet. I'm just trying to set a baseline for
11 us to be able to talk about this in a
12 logical manner.

13 A. Okay.

14 Q. So let's start with the first
15 condition here.

16 A. Mm-hmm.

17 Q. This is what we just spoke
18 about, which is the first portion of the
19 first sentence here. It runs from lines 43
20 to 45 of column 13.

21 A. All right.

22 Q. Is it your understanding that
23 this portion of the first sentence is
24 saying that the sequence number of the SDU,
25 which corresponds to the PDU, received from

1 the PDCP entity needs to be confirmed?

2 DR. MOULDER: Objection; form.

3 A. Okay, so this is a statement,
4 right? It's not a condition.

5 Q. Okay, fair enough. So this
6 statement is -- would you agree that this
7 statement is saying that the sequence
8 number of the SDU is confirmed?

9 A. To me there's two here. So the
10 first is the sequence number, and then the
11 second is the PDU and SDU. So the sequence
12 number is for PDU and SDU. So actually,
13 there's no separation here. SDU and PDU,
14 they are the same.

15 Okay, so what I'm saying here,
16 to a POSITA, they have a technical
17 background or the standard background, so
18 basically when you mention this, PDU/SDU,
19 the background is there. So the SDU and
20 PDU, they are the same regarding the
21 sequence itself.

22 So basically, the sequence
23 number is confirmed for PDU or SDU.
24 There's no difference there. So that is
25 the statement here.

1 Q. Would you agree that the
2 inventors of this patent had the technology
3 background that you're referring to that a
4 POSITA would have?

5 A. Yes.

6 DR. MOULDER: Objection; form.

7 Q. So then we look at the sentence
8 which they wrote that says "the PDCP
9 sequence number of the SDU corresponding to
10 the PDU received by the PDCP entity is
11 confirmed." So as you said, this is a
12 statement. And do you agree that what this
13 statement is saying is that the sequence
14 number of the SDU is confirmed?

15 A. The sequence number is
16 confirmed. I agree. But if you're
17 assessing sequence number of the SDU is
18 confirmed, that is not what it says here.
19 The sequence number of SDU correspond --
20 has to be corresponding to the PDU is
21 confirmed.

22 Q. But the statement is still
23 saying that it is the sequence number of
24 the SDU.

25 A. Corresponding to the PDU.

1 Q. Then it's confirmed, correct?

2 A. Yes, correct.

3 Q. Next in the sentence it states
4 that "if the PDCP sequence number (SN) of
5 the SDU is not sequential, an in-sequence
6 timer for the PDCP SDU is driven," correct?

7 A. Correct.

8 Q. So would it be fair, as another
9 way of saying that, that the in-sequence
10 timer is driven upon detecting an
11 out-of-sequence SDU?

12 DR. MOULDER: Objection; form.

13 Q. I'm just trying to get this
14 into a little more digestible format
15 because there's a lot of acronyms going on
16 right now. That's why I ask.

17 Would it be a fair
18 characterization of this portion in column
19 13 of the '573 patent to say that the
20 in-sequence timer is a timer that begins
21 upon detection of an out-of-sequence SDU?

22 A. Yes. This condition -- what
23 this is saying is -- yes, this is what it
24 says, but what I'm also saying is it's the
25 same -- equivalent to PDU. If PDU missing,

1 the timer is driven. That's an equivalent
2 operation because they are the same. The
3 PDU and SDU are the same.

4 Q. Okay. And stepping away from
5 the in-sequence timer aspect of this, in
6 your mind, in the context of the '573
7 patent, PDU and SDU are the same. Am I
8 understanding your testimony correctly?

9 DR. MOULDER: Objection; form.

10 A. Okay, one I know -- okay,
11 you -- okay, so when you ask this question,
12 are you talking about this paragraph or are
13 you talking -- are you -- or in a general
14 sense?

15 Q. I'm referring to within the
16 context of the '573 patent. When the '573
17 patent refers to SDUs and PDUs, is it your
18 testimony that they are interchangeable?

19 DR. MOULDER: Objection; form.

20 A. They are interchangeable in the
21 sense that sequence number are for both.
22 And in fact, only the PDU has the sequence
23 attached to it, sequence number attached to
24 it. But they are correspond to each other.
25 So if the SDU and -- one-to-one

1 corresponding between SDU and PDU. As far
2 as the data itself, the data unit, they are
3 the same.

4 Q. I just want to make sure.
5 We'll take a break here in a second. I
6 know we've run a little more than an hour.
7 I just want to make sure before I move on
8 that I'm understanding your position on the
9 '573 patent.

10 So let me just ask you a couple
11 questions. Maybe we'll try to make them
12 really straightforward. When we refer to
13 the sequence number, is it your testimony
14 that the sequence number of the SDU is the
15 same sequence number of its corresponding
16 PDU?

17 A. Strictly speaking, it is. The
18 sequence number resides in the PDU
19 corresponding to the SDU.

20 Q. When the patent says "the
21 sequence number of an SDU," do you
22 understand what the patent -- the '573
23 patent is stating?

24 A. Yes. That's what I said. So
25 my understanding, okay, or a POSITA will

1 understand when it says the sequence number
2 of SDU is actually the sequence number that
3 resides in the PDU, which corresponds to
4 the SDU.

5 Q. Okay. And then putting
6 sequence number aside, an SDU and a PDU are
7 different from each other. They are not
8 synonymous terms, correct? In the context
9 of the '573 patent. Correct?

10 DR. MOULDER: Objection; form.

11 A. Can you repeat the question
12 so --

13 Q. Sure. Sorry, I sort of split
14 that up into two.

15 In the context of the '573
16 patent, a PDU and an SDU are not synonymous
17 terms; they mean two separate data units,
18 correct?

19 DR. MOULDER: Objection; form.

20 A. No. They are the same.

21 Q. So does that mean it's your
22 understanding that any time "SDU" is used
23 in the patent, PDU could be interchanged
24 for that same term?

25 A. How I -- I'm just thinking

1 about how I explain this. You are speaking
2 in the sense they are separate thing,
3 right? But it's not. It's not my
4 understanding.

5 I give you a candy. That's the
6 PDU. And then you unwrap it and you have
7 the candy now. That's your SDU. They are
8 not -- we are not talking about two
9 different entities. We are talking about
10 the same entity. It's just when I give you
11 the candy there's a wrapper there. Do you
12 see what I mean here?

13 Q. I understand your analogy, yes,
14 thank you.

15 A. Okay.

16 Q. So I just want to make sure
17 because you said it multiple times now, I
18 just want to make sure that it's clear.

19 There is a difference -- is it
20 your testimony that there is a difference
21 between an SDU and a PDU?

22 A. Yes. There's a difference
23 there, okay?

24 Q. Okay. That's all, thank you.

25 MR. STANFORD: We can take a

1 break now. Thank you for going a
2 little bit past the hour. I
3 appreciate it. We can move on from
4 this when we come back from the
5 break.

6 Let's take ten minutes. 2:40,
7 or 11:40.

8 (Whereupon, a short recess was
9 taken.)

10 BY MR. STANFORD:

11 Q. Okay, Dr. Lo. Let's move on to
12 talk about the grounds that you relied on
13 in your declaration.

14 So I'm uploading now what we'll
15 mark as Exhibit 4. Just go ahead and open
16 that document.

17 (Whereupon, Koskinen Reference
18 was marked as Lo Exhibit 4 for
19 identification as of this date by the
20 Reporter.)

21 MR. STANFORD: For the record,
22 this is U.S. Patent application
23 publication number 2014/0301362,
24 which was previously designated as
25 Exhibit 1005.

1 A. Okay.

2 Q. Do you recognize this
3 reference?

4 A. Yes.

5 Q. Is this the, we'll call it the
6 Koskinen reference that you relied upon in
7 ground 1 of your declaration?

8 A. Yes.

9 Q. So if I refer to it as the
10 Koskinen reference, will you know what I'm
11 talking about?

12 A. Yes.

13 Q. So before we jump into the
14 reference itself, I just wanted to take a
15 look at a paragraph in your declaration.
16 It's paragraph 128.

17 This is a section about claim 1
18 and about the preamble. And in paragraph
19 128 of your declaration, in the first line
20 you refer to what you call "Koskinen 281
21 (Exhibit 1008)." Do you see that?

22 A. Yup.

23 Q. This is referring to a
24 different reference than the Koskinen that
25 we just marked as Exhibit 4, correct?

1 A. Right.

2 Q. Are you relying on a
3 combination of both Koskinen as we've just
4 marked as Exhibit 4 and this Koskinen '281
5 as part of your invalidity opinion?

6 DR. MOULDER: Objection; form.

7 A. I use this reference here just
8 to illustration -- to illustrate more
9 clearly to the application of multi -- dual
10 connectivity and multi-flow. So in this
11 reference it's another way to look at the
12 case of macro and pico base station when
13 you receive the data -- it's just an
14 illustration here.

15 So I think the rest of the
16 declaration, we don't rely on this. This
17 is only a way to give a clear picture of
18 the multi-flow and dual connectivity.

19 Q. So Koskinen '281 is being used
20 to supplement portions of your initial
21 primary reference to Koskinen where it's
22 unclear in there, for example, about
23 multi-flow or dual connectivity; you are
24 bringing in Koskinen '281 to supplement
25 those teachings, is that correct?

1 DR. MOULDER: Objection; form.

2 A. No, I'm not saying unclear.

3 Koskinen is not connected. I'm not saying
4 that. I'm saying I used this as another
5 way to show it. So probably for people to
6 understand more.

7 So basically, even Koskinen
8 figure 1 on the declaration at page 72,
9 that also illustrate the multi-flow case.
10 So here it's just used to -- another way to
11 look at it. So that's the purpose here, to
12 give a better picture.

13 Q. So how is Koskinen '281 helpful
14 for, as you say, giving a better picture?

15 A. Okay, let me read 1.8. "Also
16 in related Koskinen 281, 281 figure 1 is
17 related to dual connectivity in E-UTRAN and
18 shows distributed radio link control and
19 radio link control options. Here, RLC PDUs
20 are assigned by the macro eNB and a subset
21 of the RLC PDUs are sent to pico eNB, as
22 pictured in figure 1 of Koskinen '281.
23 Accordingly, a POSITA would have recognized
24 based on this that Koskinen eNB and LTE Hi
25 AP are macro eNB and pico eNB, or similar

1 structure, and operate in the same manner."

2 So that is the way we use it to
3 illustrate the application here.

4 Q. I'm trying to understand if
5 Koskinen '281 is supplementing something
6 that is missing from the teachings of
7 Koskinen or is being added in addition to
8 what's in Koskinen to achieve element 1
9 pre, which is the section that this is in.

10 So my question for you is, in
11 your opinion, in order for claim 1 pre to
12 be taught by these references, do you need
13 both Koskinen and Koskinen '281 in order to
14 teach all the limitations of element 1 pre?

15 DR. MOULDER: Objection; form.

16 A. I think paragraph 128 is very
17 clear. So basically, based on this, a
18 POSITA would have recognized based on this
19 that Koskinen eNB and LP are macro and pico
20 eNB and operate in the same manner. So
21 it's just for that purpose it's clear to
22 me.

23 Q. In paragraph 128 when you say
24 the phrase "a POSITA would recognize based
25 on this," is "this" the explanation in the

1 preceding sentences about Koskinen '281?

2 A. Yes. Including figure 1 there.

3 Q. So based on the teachings of
4 Koskinen '281, a POSITA would be able to
5 combine those with Koskinen's teachings to
6 understand that the eNB and LTE Hi AP are a
7 macro eNB and a pico eNB, correct? That's
8 what paragraph 128 is saying, correct?

9 DR. MOULDER: Objection; form.

10 A. The paragraph only say figure 1
11 produced below. So basically we're talking
12 about figure 1 of Koskinen '281.

13 Q. Okay. So combining that into
14 Koskinen to teach the eNB and LTE Hi AP as
15 macro eNBs and pico eNBs, right?

16 DR. MOULDER: Objection to
17 form.

18 A. I'm not sure I agree what you
19 characterize here because I only mention in
20 this paragraph -- I only mention figure
21 1-A. So it's just like -- to me 128, the
22 paragraph 128 is very clear. And however
23 one can interpret it I don't know, that's
24 up to anybody to interpret whatever they
25 want. But to me this is my opinion.

1 Q. All I'm trying to understand is
2 when you say based on "this," what "this"
3 is. When you say "this" towards the end of
4 paragraph 128 you mean figure 1 of Koskinen
5 '281's teachings.

6 A. Yes, this is referring to the
7 previous sentence. And figure 1 is related
8 to distributed radio link control and
9 independent radio link control options. So
10 that is what it refers to.

11 Q. Let's switch over to Koskinen
12 '281 which I marked as Exhibit 4/Exhibit
13 1005 in the IPR proceeding.

14 A. Okay.

15 Q. What is your understanding of
16 the invention that's being described in
17 Koskinen?

18 DR. MOULDER: Objection; form.

19 Q. I apologize, Dr. Lo, before you
20 answer that.

21 MR. STANFORD: Chris, I think
22 your mic moved far away from your
23 mouth.

24 DR. MOULDER: Let's take a
25 break.

1 (Discussion off the record.)

2 Q. Dr. Lo, let me re-ask that
3 question so we have a clean record here.

4 A. Okay.

5 Q. What is your understanding of
6 the invention that's being described in
7 Koskinen?

8 DR. MOULDER: Objection; form.

9 A. I think I summarize it in my
10 declaration, paragraph 120. Start from
11 120. So I can read through it. That's my
12 understanding.

13 Q. Okay, you don't need to read
14 word for word what's in the declaration.
15 I'm asking more generally, in your own
16 words, what is Koskinen describing?

17 DR. MOULDER: Objection; form.

18 A. Okay, as I said, I summarize it
19 pretty good there, okay? If you want a
20 shorter form, basically Koskinen provide
21 the same solution as '573 to the same
22 problem.

23 Q. Okay, so in your opinion, they
24 are addressing the exact same problem in
25 exactly the same way, they are identical.

1 Is that your testimony?

2 DR. MOULDER: Objection; form.

3 A. It provides the same solution
4 to the same problem.

5 Q. Koskinen deals with reordering,
6 the concept of reordering, correct?

7 A. Yes.

8 Q. And this reordering is
9 implemented by an RLC entity, if I recall
10 correctly. Is that right?

11 DR. MOULDER: Objection; form.

12 A. Koskinen different solution,
13 describe the operation, reordering in RLC
14 and reordering a timer. But he actually
15 anticipates the use in the PDCP layer,
16 basically basically you can just use the
17 same method in the PDCP layer. So that is
18 the same solution to the same problem as
19 the '573 patent.

20 Q. And when you're talking about
21 Koskinen anticipating the use of reordering
22 in the PDCP layer, where are you looking in
23 the reference specifically?

24 A. Well, if you look at reference
25 to Koskinen, figure 2.

1 Q. Okay, I'm there.

2 A. So this is the algorithm when
3 you observe a gap in the PDCP layer, a gap
4 in PDU or SDU if you like, and you start a
5 timer, okay? And when the timer expire,
6 then you deliver the SDU to upper layer.
7 So clearly this is same operation and the
8 same solution to the problem, to the same
9 problem.

10 Q. So you're referring to the box
11 labeled 310 at the top of figure 2 that
12 says "observe gaps in the PDCP PDUs,"
13 correct?

14 A. Yes.

15 Q. And then following the flow
16 down through box 320 where it says start
17 timer; 330, where it says the timer
18 expires; and 340 where figure 2 says
19 "prevent gap from blocking delivery of
20 SDUs," correct?

21 DR. MOULDER: Object to form.

22 A. Right. Yes, that's the
23 algorithm I'm talking about.

24 Q. Let's talk a little bit about
25 the timer that's being referred to here in

1 boxes that are labeled 320 and 330. And to
2 do that let's take a look at paragraphs 16
3 and 17 of Koskinen. Page 6 of the PDF.

4 A. Okay, paragraph 16?

5 Q. 16 and 17, yes. Do you see
6 them?

7 A. Yup.

8 Q. In the fifth line of paragraph
9 16 it references something called
10 T-reordering. Do you see that?

11 A. Yes.

12 Q. T stands for timer, correct?

13 A. Yes.

14 Q. So can we refer to this as a
15 reordering timer?

16 A. Okay.

17 Q. Is that accurate, in your
18 understanding?

19 A. Yes.

20 Q. And in paragraphs 16 and 17, in
21 the first line of each paragraph it refers
22 to 3GPPTS 36.322. Do you see that?

23 A. Yes.

24 Q. Is T-reordering defined by this
25 3GP specification 36.322?

1 A. Yes.

2 DR. MOULDER: Object to form.

3 Q. And later on in Koskinen, when
4 it refers to a reordering timer, is
5 Koskinen referring to this T-reordering
6 that's defined by TS 36.322?

7 DR. MOULDER: Objection; form.

8 A. It depends on the context
9 you're talking about. So --

10 Q. Okay, let's put it into some
11 context then.

12 Let's go to paragraph 37 --
13 excuse me, 38. Never mind, 37. That's the
14 bottom of page 2 of the patent, or page 7
15 of the PDF. Paragraph 37.

16 A. 37, right.

17 Q. 37, the first line says, "For
18 example, certain embodiments utilize a
19 timer such as a reordering timer as shown
20 in figure 2."

21 Is this reordering timer
22 referred to in paragraph 37 the same as the
23 T-reordering defined by TS 36.322
24 referenced in paragraphs 16 and 17?

25 DR. MOULDER: Objection; form.

1 A. In a sense, okay -- well, to a
2 POSITA, 36.322 is regarding the operation
3 of RLC. And here, based on the figure 2,
4 it's talking about a PDCP and TT. So it
5 would not be the same thing. Here what I'm
6 saying is people -- a POSITA would
7 recognize this reordering timing is on a
8 PDCP layer.

9 Q. So it's different from the
10 T-reordering timer?

11 A. Yes. It's different from the
12 specific timer you're talking about.

13 Q. That's helpful. I just want to
14 make sure we're talking about the same
15 timer when we're reading Koskinen.

16 So now in Koskinen talking
17 about the reordering timer in paragraph 37,
18 it also refers to it in a few other
19 paragraphs that follow; 38 through I
20 believe 39, each refer to a reordering
21 timer.

22 What is your understanding of
23 the meaning of this reordering timer?

24 DR. MOULDER: Objection; form.

25 A. You are talking about paragraph

1 38?

2 Q. It's the timer that's referred
3 to as a reordering timer. It's referenced
4 in paragraph 37, paragraph 38, and
5 paragraph 39, each referring to I believe
6 the same timer, which is a reordering
7 timer. But I'll ask you, do you agree that
8 each of paragraphs 37, 38 and 39 are
9 referring to the same timer?

10 I'll give you a moment to read
11 through them.

12 A. (The witness reviews the
13 document.)

14 Okay, so if you read the
15 paragraph 37, so it says, "For example,
16 certain embodiments utilize a timer, such
17 as a reordering timer." A reordering
18 timer. So obviously it's not the timer.
19 In the previous paragraph that's specified
20 in 36.322, right?

21 Q. Yes.

22 A. A reordering timer as shown in
23 figure 2. Basically, putting in the
24 context of this timer, reordering timer is
25 operate in PDCP entity. Agree?

1 Q. I think you may have
2 misunderstood my question.

3 A. No, no --

4 Q. My question is, is the
5 reordering timer -- when paragraphs 37, 38
6 and 39 refer to a timer, or reordering
7 timer, are those paragraphs talking about
8 the same timer?

9 A. So bear with me, okay? I will
10 get to that. So saying what we're talking
11 about, in figure 2 is the timer. The
12 timer. A reordering timer operate in a
13 PDCP entity, right? So the rest is
14 explaining why.

15 Okay, so basically it talks
16 about the RLC timer can -- reordering timer
17 can be repurposed at the PDCP entity. So
18 the timer talks about -- the operation
19 timer talking about here is the timer that
20 will operate at the PDCP layer. But the
21 operation itself is similar to the timer
22 defined in 36.322. Okay? So this is my
23 interpretation of this paragraph, paragraph
24 37 and 38.

25 Q. Again, that's not my question.

1 My question is, is the timer referred to in
2 paragraphs 37, 38 and 39 the same timer?
3 When it says a timer or the timer or the
4 reordering timer, because it uses multiple
5 terms, are they all talking about the same
6 timer, or is 37, 38 and 39 referring to
7 several different timers but using the same
8 or similar names?

9 DR. MOULDER: Objection; form.

10 A. Okay, now, the 37, paragraph 37
11 and 38, the paragraph 38, they refer --
12 they are referring to figure 2, right? So
13 that -- referring to the timer as a
14 reordering timer in both paragraphs. But
15 it's related to figure 2. So this timer is
16 the same -- these two timers are the same.
17 We are talking about the same thing here.

18 Q. Okay, thank you.

19 A. I explained the same figure,
20 right?

21 Q. I just want to make sure we're
22 on the same page. So paragraph 38 starts
23 out, "As shown in figure 2, a timer, such
24 as a reordering timer, can be started at
25 320 whenever a gap in the received protocol

1 data units is observed at 310, such as by
2 observing a gap in a sequence of protocol
3 data units." Do you see that first
4 sentence of paragraph 38?

5 A. Yes.

6 Q. What does the sentence mean
7 when it says "a gap"?

8 A. It means they are missing
9 protocol data unit, or sequence -- SDU or
10 PDU. Basically it says -- a gap. You have
11 MI is one and then you don't have N and
12 then N plus 1. So that's a gap. So
13 essentially saying there's a data unit
14 missing. And so they are not in sequence.

15 Q. In paragraph 39 there's a
16 discussion about the timer's expiry value.
17 You see the first few words of paragraph
18 39? Do you see that?

19 A. Yes.

20 Q. So in this first sentence, just
21 continuing on, paragraph 39 states, "The
22 timer's expiry value can be configured by
23 radio resource control (RRC) at 350, and
24 can be set at 360 long enough so that the
25 timer does not expire during normal

1 delivery delay of protocol data units sent
2 by the eNB to the user equipment via a
3 small-cell node; for example, including all
4 possible HARQ and ARQ retransmissions at
5 MAC and RLC level therein, respectively."

6 Do you see that first sentence?

7 A. Yes.

8 Q. What is your understanding of
9 when the timer is set to expire, according
10 to Koskinen?

11 DR. MOULDER: Objection; form.

12 A. Can we break it down? This is
13 a long sentence, right? So it's probably
14 more beneficial to break it down.

15 Q. I agree. It's a long sentence,
16 which is why I'm trying to understand what
17 Koskinen is trying to say here. Because to
18 me it's a little bit unclear. So let me
19 ask you. Koskinen states, I'll just read
20 it off again, that "the timer's expiry
21 value can be set at 360 long enough so that
22 the timer does not expire during normal
23 delivery delay of protocol data units."

24 A. Okay.

25 Q. Do you as a POSITA, do you know

1 what Koskinen means when it says "long
2 enough"?

3 A. Here we talk about the delay.
4 So when you transmit the data from the base
5 station, the macro, to the user equipment,
6 that's one delay. And then from the macro
7 base station to the small cell base station
8 and then to the user equipment, there's
9 additional delay there. So basically, it
10 has to be long enough to accommodate the
11 delay itself. And there might be other
12 considerations, but in this, it has to
13 consider the delay.

14 Q. Can you give me some examples
15 of what some other considerations would be
16 in setting the length of the timer's expiry
17 value?

18 A. For example, you're processing
19 delay. So when you receive data, you
20 process it, right, from the physical layer,
21 okay, all the way to the PDCP layer. And
22 so -- now, when -- it depends on the user
23 equipment. If I have a faster process I
24 can process the data. If not, I have to --
25 I have to sequentially process the data

1 received from the macro and received from
2 the small base station.

3 So I have more data to
4 accumulate so I have to process them
5 sequential. So those are other
6 considerations. So it depends on the
7 system design and, say, how long I have to
8 consider.

9 But here the delay -- since we
10 are talking about multi-flow application,
11 you have to consider the additional delay
12 from the macro base station to the small
13 base station to the user equipment. So
14 that's additional delay. You have to
15 consider that.

16 Q. So what entity needs to keep
17 track of all these considerations to set
18 the timer's expiry value?

19 DR. MOULDER: Objection; form.

20 A. It's a very complicated
21 process. So ultimately the control reside
22 in the network. So that's why the expiry
23 value in paragraph 39, the timer's expiry
24 value can be configured by radio resource
25 control, by RRC. So that is the --

1 although it's simple, but there's actually
2 it's relaying a lot of information to a
3 POSITA. But that's all the information
4 there.

5 So the value is sent by the
6 RRC, means the network controls the value,
7 and the RRC itself is -- when you configure
8 by RRC is through RRC message, okay, and
9 the message is structured -- has to be
10 structured. If you understand LTE,
11 understand the specification, has to be a
12 control message. Control message has to be
13 in the form of information elements. And
14 information elements, it depends on what
15 category. You have different type --
16 different information elements and
17 regarding to what.

18 Okay, so that is how you relay
19 the control information. In this case,
20 this is a timer information, it's PDCP, the
21 information is all in there. It's simple.

22 Q. So all of those considerations
23 are done by the network which then uses an
24 RRC -- uses RRC to configure the timer's
25 expiry value. Is that what you're saying?

1 A. Yes.

2 Q. And the way that the timer's
3 expiry value is set, that's not stated in
4 Koskinen, correct?

5 DR. MOULDER: Objection; form.

6 A. Can you ask that, please? I
7 didn't catch it.

8 Q. Sure. So you were just telling
9 me that there are a lot of considerations
10 that go into the timer's expiry value and
11 what the network has to monitor or keep
12 track of in order to set the timer's expiry
13 value.

14 A. Mm-hmm.

15 Q. And then the network uses the
16 RRC to configure that value for the timer.
17 That's all correct so far, right?

18 A. Yes. So far, yes.

19 Q. So my question is, where does
20 Koskinen explain all of those
21 considerations that would need to be
22 accounted for? I don't see that in this
23 paragraph, so where should I look to in the
24 rest of Koskinen to find all of those
25 considerations on how to set the timer's

1 expiry value?

2 DR. MOULDER: Objection; form.

3 A. When you say how to set, you
4 mean -- are you talking about the value or
5 how to calculate the time or --

6 Q. Calculate the time.

7 A. Now, in terms of calculating
8 time, so there's specification probably
9 address some scenarios, okay? So that is
10 probably known to POSITA, right? You don't
11 have to repeat those things. There's some
12 other consideration that is specified in
13 the standard itself.

14 Now, here we are talking about
15 in this context, in Koskinen, the problem
16 there that Koskinen talk about, it is
17 multi-flow application, and that specific
18 application -- in that specific
19 application, this additional delay has to
20 be considered. So means additional factor,
21 you have to factor in when you -- when the
22 network calculates the timer's expiry
23 value, it has to consider in addition to
24 what other factors, this has to be
25 considered additionally.

1 Q. And those other factors are not
2 listed in Koskinen, correct?

3 A. I don't remember. It may or it
4 may not, okay? I don't remember this or
5 not. So I have to check. I did not pay --
6 I don't remember it says. It may or it may
7 not.

8 Q. You don't recall seeing those
9 other factors -- any other factors --

10 A. I don't recall, but to POSITA
11 it doesn't have to because when you -- this
12 is on top of a system. Basically you're
13 doing some -- adding a feature into a
14 network. So if you write down everything,
15 that would be a long, long thing. So
16 basically it's well understood what kind of
17 factor has to be considered when you're
18 setting a timer. So for example, the RRC
19 timer, there's a delay, there's some kind
20 of delay considers and some other things
21 considered. RRC is only for HARQ purpose,
22 so that's for different configuration.

23 But in this case, using
24 multi-flow delay, additional delay between
25 macro base station and small base station

1 and the user equipment have to be
2 considered. That is what is said here.

3 So my point is -- whether it
4 lists here or not probably is not important
5 or not necessary, right?

6 Q. What is the purpose of the
7 timer?

8 DR. MOULDER: Objection; form.

9 A. So are you talking about the
10 timer in Koskinen or are you talking about
11 the timer in '573?

12 Q. Yes, I'm referring to -- what
13 is the purpose of the timer in Koskinen?

14 A. I believe I said that in my
15 declaration.

16 Q. I believe you mentioned earlier
17 that the gap that triggers the timer is
18 based on a gap in the sequence of PDUs, is
19 that correct?

20 A. Yes. I mentioned the figure 2
21 in Koskinen.

22 Q. And figure 2 is referring to a
23 scenario where there's a gap in the
24 sequence of PDUs and so a timer is started,
25 is that right?

1 A. Right.

2 Q. What happens when one of those
3 missing PDUs arrives while the timer is
4 still running?

5 A. Okay, when the missing PDU
6 arrive within the time of the timer,
7 there's no problem then, right? And then
8 the PDCP will be able to deliver the PDU or
9 SDU to the operator in sequence.

10 Q. I'm trying to find where
11 Koskinen describes the scenario. So can
12 you point me to where in Koskinen it
13 explains what steps are performed when a
14 missing -- an out-of-sequence PDU is
15 received while the timer is still running?

16 A. The Koskinen talks about the
17 operation of the timer, the reordering
18 timer operation by referring to 36.322. So
19 that is way before this multi-flow. So in
20 that operation it have all the scenario
21 there. Before expiry time, what you have
22 and what deliver, and after it expires what
23 to do. Okay, so it's all scenario. It's
24 written in the standard. So that is
25 already there.

1 Now, in my view -- okay, so
2 Koskinen is saying here the purpose of that
3 timer in PDCP, so basically actually define
4 everything. The operation before the
5 missing PDU arrive, there's no problem, you
6 can deliver. And here it talks about when
7 you're going to use a timer when it expire,
8 you're not going to block delivery. You
9 just deliver whatever you have received.
10 And so --

11 Q. Okay, so -- I'm sorry, if you
12 weren't finished.

13 A. No, that's my view. It doesn't
14 have to spell it out to a POSITA. This is
15 what the operation. Basically you can just
16 repurpose the whole thing, repurpose this
17 reordering at the PDCP layer.

18 Q. So Koskinen doesn't describe
19 what to do if the out-of-sequence PDU
20 arrives while the timer is still running;
21 it's not focused on that situation. It's
22 focused on the scenario where the timer has
23 expired, and that's what Koskinen is about,
24 is that correct?

25 DR. MOULDER: Objection; form.

1 A. Okay, to me it is there already
2 because Koskinen -- it already talked about
3 the reference of 36.322 don't have
4 everything there. It actually talked about
5 that. To me. It is to me, it already
6 talks about that.

7 Q. It's relying on TS 36.322 as
8 background and Koskinen is focussing on a
9 specific scenario -- excuse me; specific
10 scenario where the timer has expired, not a
11 scenario where the out-of-sequence PDU
12 arrives before the timer expires, correct?

13 DR. MOULDER: Objection; form.

14 A. There's so many statements in
15 your question.

16 Q. I'm just trying to summarize.

17 A. Yeah, I know, I know. Koskinen
18 address the same problem as in '573 patent.

19 Q. I want -- I'm sorry, go ahead.

20 A. Address the same problem and
21 provide the same solution. Basically use
22 timer to address the problem. And Koskinen
23 also say you can just repurpose the timer
24 at RRC into the PDCP layer. And the RRC
25 timer operation has already defined or

1 specified in the standard for RRC layer.

2 So you can just repurpose it.

3 And so to me it's very clear.

4 So I think that is -- I mean, it's obvious
5 to a POSITA.

6 Q. Okay, let's move on to the
7 Sammour reference, which I'm dropping into
8 the chat now. We'll try and get through
9 this rather quickly. This will be Exhibit
10 5, which was previously designated as
11 Exhibit 1006.

12 (Whereupon, Sammour Reference
13 was marked as Lo Exhibit 5 for
14 identification as of this date by the
15 Reporter.)

16 MR. STANFORD: For the record,
17 the Sammour reference is U.S. Patent
18 application publication number
19 2009-0149189.

20 A. Okay.

21 Q. Do you have that open?

22 A. Yes.

23 Q. Sammour is used in the second
24 ground of invalidity in your declaration,
25 correct?

1 A. Right.

2 Q. And it's combined with
3 Koskinen, which we've just been discussing,
4 correct?

5 A. Mm-hmm. Yes.

6 Q. What is missing from Koskinen
7 that you are using Sammour to teach?

8 A. There's nothing missing in
9 Koskinen in terms of -- to me Koskinen has
10 all the elements, that's so obvious in
11 terms of the claim elements.

12 Q. So why are you proposing --
13 sorry.

14 A. So remember in Koskinen
15 paragraph I believe 39 or 38, it talks
16 about the timer is configured by RRC,
17 right? So to a POSITA, obviously control
18 message has to be in information element
19 form. And so to people -- well, Koskinen
20 did not explicitly say using a control
21 information element, although it's
22 actually -- it's very implicit there.
23 There's no other way, by definition of LTE
24 standard, there's no other way to deliver
25 control message other than using

1 information element. So he did not say it.
2 But here we use Sammour to make it actually
3 more obvious.

4 So the question says it's
5 missing. To me there's nothing missing. I
6 used the Sammour here to illustrate the
7 obviousness here, to use the information
8 element to deliver a timer setting.

9 Q. So Sammour is used for the
10 information element aspect of the '573
11 claims, is that right?

12 A. Say that again, please.

13 Q. I'm just trying to understand
14 your testimony just now. You're saying
15 that you needed Sammour to spell out that
16 the information element is used in the RRC
17 messaging to read on elements of claim 1,
18 correct?

19 DR. MOULDER: Objection; form.

20 A. I believe I spelled it out in
21 my declaration why we use Sammour to
22 illustrate.

23 Q. Is Sammour redundant of the
24 teachings of --

25 DR. MOULDER: I don't think he

1 was done with his answer.

2 MR. STANFORD: I apologize.

3 A. If you go to paragraph -- I'm
4 just trying to address your question first
5 why we use Sammour. So if you go to
6 paragraph 190, this is the motivation
7 combined Koskinen and Sammour.

8 Q. Okay, thank you.

9 A. Do you need me to read out?

10 Q. No, that's okay. I can read it
11 from your declaration.

12 Are the teachings of Sammour
13 redundant of the teachings of Koskinen?

14 A. I think to a POSITA it's kind
15 of redundant. But we put it here as
16 probably make it more easier for other
17 people to understand.

18 Q. Well, why don't we take a look
19 at just a couple of the specifics what
20 Sammour is teaching. If you'll jump to
21 paragraph 148 of Sammour, it's a paragraph
22 that's really just a heading. It says
23 "Reordering stop mode IE."

24 A. Sorry, which paragraph?

25 Q. 148. It's given a paragraph

1 number but really it's just a heading. It
2 says "reordering stop mode IE."

3 A. Yes.

4 Q. In the paragraph that follows,
5 so paragraph 149, it mentions a flush
6 timer. Do you see that?

7 A. Yes.

8 Q. What is a flush timer?

9 A. Based on here, you use stop
10 timer to stop reordering by its function.

11 Q. And it's saying stop reordering
12 following hand-over, is that right?

13 A. Yes.

14 Q. I don't see anything else in
15 that paragraph or paragraph 150 about the
16 flush timer. Do you?

17 DR. MOULDER: Objection; form.

18 A. Are you asking where do I -- do
19 I see "flush timer" anywhere else or
20 something like that?

21 Q. Sorry, do you see a description
22 of flush timer in paragraphs 149 or 150,
23 or, excuse me, table 33?

24 A. Yeah, it says the timer to stop
25 reordering. I assume that's the function.

1 Q. Is there anywhere, from your
2 recollection of Sammour, where Sammour
3 describes how long to set the flush timer
4 for?

5 A. No, I did not pay attention --
6 I don't have any opinion on what the flush
7 timer, okay? Here it's not -- the point is
8 not what the timer does. To me it's not
9 important here. The important thing is how
10 does Sammour describe the method of deliver
11 the timer information.

12 Q. Okay, thank you, that's
13 helpful.

14 Like I said, we'll quickly get
15 through this one. We'll go to the last
16 reference you relied upon which is the
17 Deenoo reference, which will be Exhibit 6.

18 DR. MOULDER: Do you want to
19 take a break before we get into
20 Deenoo?

21 MR. STANFORD: Sure. Why don't
22 we take a break. Feel free to go
23 ahead and download Exhibit 6.

24 A. Can I have more time for the
25 break? It's 1:00. I'm real hungry. Can I

1 have 15 minutes?

2 Q. I really only have, like, 10,
3 15 minutes worth of questions left. So if
4 you can hang on for a few more minutes, we
5 can just wrap this up and you can be free
6 to eat and not worry about coming back.

7 A. In that case, let's continue.

8 DR. MOULDER: Do you want to
9 take a quick break then?

10 MR. STANFORD: Let's take a
11 quick bathroom break.

12 (Whereupon, a short recess was
13 taken.)

14 (Whereupon, Deenoo Reference
15 was marked as Lo Exhibit 6 for
16 identification as of this date by the
17 Reporter.)

18 BY MR. STANFORD:

19 Q. Okay, Dr. Lo, do you see that I
20 dropped what's now Exhibit 6 into the chat?

21 A. Yes.

22 Q. Which is knew the Deenoo
23 reference. Again, for the record it's U.S.
24 Patent application publication number
25 2016-0021581.

1 Dr. Lo, I'd just like to talk
2 about this reference for a few minutes.

3 A. Okay.

4 Q. And I'll let you get out of
5 here and get some lunch.

6 Let's see, if you jump to
7 paragraph 208 of Deenoo. Let me know when
8 you get there.

9 A. Okay.

10 Q. Paragraph 208 starts out with
11 the phrase "normal case: Reordering
12 algorithm." Do you see that?

13 A. Yes.

14 Q. And then it lays out what
15 appears to be sort of a numbered sequence
16 going from paragraph 208 through to
17 paragraph 210. Do you see that?

18 A. Yes.

19 Q. What is your understanding of a
20 reordering algorithm described in Deenoo?

21 A. I think I describe that in the
22 declaration.

23 Q. So --

24 A. If you go to my declaration,
25 paragraph 203, 204 and 205, basically

1 Deenoo address the same problem as in '573
2 and provide essentially the same method, or
3 same solution. You have the algorithm, you
4 have the timer and address the out-of-order
5 problem.

6 Q. Thank you. The reason I ask
7 is, and maybe I missed it, the reason I ask
8 is I don't see the phrase "reordering
9 algorithm" in those paragraphs you just
10 cited. That's why I'm asking. What's your
11 understanding of what the reordering
12 algorithm is in Deenoo?

13 A. What I heard from your
14 question, you mean -- you're saying I did
15 not quote reordering algorithm in my
16 declaration?

17 Q. I just didn't see it, so I'm
18 just asking you generally. You don't have
19 to read anything from your declaration. If
20 you could just generally explain to me
21 what's the reordering algorithm described
22 in Deenoo?

23 A. Actually, in my declaration I
24 did talk about the reordering algorithm.
25 Paragraph 228. "Additionally, Deenoo

1 discloses reordering algorithm in the PDCP
2 of the UE utilizing a reordering timer."

3 In a sense it's the steps how
4 to address -- step-by-step how to address
5 the missing PDU or SDU, if there's any.
6 And that's how you deal with it. I'm not
7 sure what you're trying to -- what specific
8 you are asking.

9 Q. That's all. I'm just asking at
10 a broad level what is it. If I can just
11 follow up, your explanation is that the
12 reordering algorithm is a series of steps
13 that I guess in this case the device would
14 take or the entity would take when it
15 discovers a missing PDU, is that correct?

16 A. Yes, when a missing PDU and
17 stop timer. And when the timer expire you
18 go to next step. So that is basically what
19 it is.

20 Q. That's great. You anticipated
21 my next question which was going to be
22 about the timer.

23 So the algorithm here in
24 paragraphs 208 through 210 of Deenoo
25 discusses this reordering timer and

1 different -- basically what's new in
2 different scenarios, whether or not the
3 timer is running, whether or not it's
4 expired. But what I don't see in here is
5 information about how you set the length of
6 the timer, so if you could help me out.
7 What does Deenoo explain how you set the
8 length of the reordering timer?

9 A. Well, okay, the algorithm here
10 operate at the user equipment. So that's
11 the mobile station. When you talk about
12 setting the timer, how long and how to
13 calculate the time, that operation is at
14 the network itself.

15 So the algorithm here basically
16 is for the user equipment. So that's why
17 you don't see the timer setting here.

18 Q. This algorithm is for the UE,
19 correct?

20 A. Correct.

21 Q. And how does Deenoo describe
22 receiving the value of the timer?

23 A. In Deenoo it talks about
24 sending the information. So basically, it
25 says the same thing. When the base station

1 is sending information, you can interpret
2 that the user equipment receive the
3 information. So in Deenoo it does talk
4 about sending the RRC configuration to the
5 UE. So I actually talk about that in the
6 declaration in paragraph 227. "In Deenoo
7 it describes the macro cell may send an RRC
8 connection reconfiguration to the UE with
9 the macro and/or the small cell
10 configuration. Additionally, macro eNB may
11 configure the measurement
12 parameters/events/triggers for the UE in an
13 RRC connected mode."

14 So that basically describes the
15 transmission of configuration to the UE by
16 the base station.

17 Q. Looking at paragraph 227 of
18 your declaration, the part that you just
19 read off, the measurement
20 parameters/events/triggers, that quoted
21 phrase from Deenoo is what you're relying
22 on as the network providing the value of
23 the timer to the UE, correct?

24 DR. MOULDER: Objection; form.

25 A. No, actually both. The first

1 sentence describes -- Deenoo states that
2 the macro cell may send an RRC connection
3 configuration to the UE. So the RRC
4 connection configuration basically consists
5 of the control information regarding the
6 setup of the connection configuration. So
7 contains all the parameters or information
8 elements in the configuration message.

9 Q. In your opinion it would
10 include the value of the timer that the
11 network has calculated.

12 A. Yes.

13 Q. And to come to that conclusion
14 you're relying on the quoted statement in
15 paragraph 227 of your declaration, correct?

16 DR. MOULDER: Objection; form.

17 A. I'm just -- probably even have
18 more in the declaration saying -- it's not
19 just these two quotations. I couldn't find
20 it. Okay, yeah, essentially these two
21 statements by Deenoo basically have all the
22 informations for a POSITA to go on and set
23 up the timer information.

24 Q. Thank you for confirming.

25 That's all the questions I have

1 for you today. I really appreciate your
2 time.

3 A. Thank you.

4 MR. STANFORD: Chris, do you
5 have any?

6 DR. MOULDER: I don't have any
7 questions.

8 (Whereupon, at 4:23 p.m. the
9 examination of this witness was
10 concluded.)

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D E C L A R A T I O N

I hereby certify that having been
first duly sworn to testify to the truth, I
gave the above testimony.

I FURTHER CERTIFY that the foregoing
transcript is a true and correct transcript
of the testimony given by me at the time
and place specified hereinbefore.

TITUS LO, Ph.D.

Subscribed and sworn to before me

this ____ day of _____ 20____.

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E X H I B I T S

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Exhibit 6	Deenoo Reference	103

(Exhibits accompany the transcript.)

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Mr. Stanford	4

INFORMATION AND/OR DOCUMENTS REQUESTED

(None)

C E R T I F I C A T E

STATE OF NEW YORK)
 : SS.:
COUNTY OF DELAWARE)

I, SUZANNE PASTOR, a Notary Public
for and within the State of New York, do
hereby certify:

That the witness whose examination is
hereinbefore set forth was duly sworn and
that such examination is a true record of
the testimony given by that witness.

I further certify that I am not
related to any of the parties to this
action by blood or by marriage and that I
am in no way interested in the outcome of
this matter.

IN WITNESS WHEREOF, I have hereunto
set my hand this day, January 2, 2026.

Suzanne Pastor

SUZANNE PASTOR

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