

1 UNITED STATES PATENT AND TRADEMARK OFFICE

2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4
5 ERICSSON INC., NOKIA OF AMERICA CORP. AT&T SERVICES,
6 INC., CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS,
7 GOOGLE LLC AND T-MOBILE USA, INC.,
8 Petitioners,

9 vs

10 PEGASUS WIRELESS INNOVATION LLC,
11 Patent Owner.

12
13 Case IPR2025-00083

14 U.S. Patent No. 10,638,463

15
16 Oral deposition of

17 SUMIT ROY, Ph.D.

18 ALEXANDRIA, VA

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1 Oral deposition of SUMIT ROY, Ph.D., held at
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A P P E A R A N C E S

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P R O C E E D I N G S

SUMIT ROY, Ph.D.,

having been first duly sworn, was examined and
testified as follows:

EXAMINATION

BY MR. HELGE:

Q Good morning, Dr. Roy.

A Good morning.

Q My name is Wayne Helge. I am
representing Pegasus, the patent owner in this case.
And we're here to talk about IPR 2025-00083, and in
particular, your declaration that you submitted in
that case.

Do you recall that declaration?

A Yes, I do.

Q Okay. Dr. Roy, have you been deposed
before?

A Yes.

Q How many times, do you think?

A Approximately 20.

Q Okay. Sometimes I'm a fast speaker. I'm
going to try my very, very best to not speak over

1 you, and I'm going to ask you to wait for my
2 question to be finished before you answer so the
3 reporter can get everybody's words down.

4 I'm sure there are a number of other
5 rules, but it sounds like you've gone through this
6 before, and I think you probably understand how
7 depositions generally run.

8 A Yes.

9 (Previously marked Petitioners' Exhibits
10 1001, 1002, 1007, 1010, 1011 and 1012 presented to
11 the witness.)

12 BY MR. HELGE:

13 Q So Dr. Roy, I'm going to hand you and a
14 copy to your counsel here a stack of exhibits that
15 we have available today. And Doctor, feel free --
16 with any question I have, feel free to refer to any
17 of these. But I'm going to run through what I've
18 handed you just for a moment here.

19 The top paper was Exhibit 1001, which is
20 the '463 patent at issue here.

21 Do you see that?

22 A Yes.

1 Q And then below that was your declaration,
2 which is Exhibit 1002.

3 Do you see that?

4 A Yes.

5 Q Okay. And then we have what I'm going to
6 refer to today as the Takeda reference,
7 Exhibit 1007.

8 Do you see that?

9 A Yes.

10 Q And then we have -- I believe below that
11 was the Yan reference, Y-A-N, and that is
12 Exhibit 1010.

13 Do you see that?

14 A Yes.

15 Q And below that, we have the reference
16 we're going to refer to today as Marinier or
17 something similar to that, however you want to
18 pronounce it, and that is Exhibit 1011.

19 Do you see that?

20 A Yes.

21 Q And then the last one, Dr. Roy, is -- it
22 should be a landscape copy, and that's Exhibit 1012,

1 and that's entitled, Activation/deactivation of
2 bandwidth part filed by Ericsson. And I think we're
3 going to refer to that today as the R1.

4 Do you see that reference as well?

5 A Yes, I do.

6 Q So Dr. Roy, again, you can refer to any
7 of these with any questions. I'm not trying to hide
8 anything from you.

9 A Thank you.

10 Q Dr. Roy, can you open up your declaration
11 to start, please. And I'd like to go to paragraph
12 38.

13 And actually, for the purposes of this
14 deposition, Dr. Roy, would you rather I give you the
15 page number or the paragraph number when we talk
16 about your declaration?

17 A Paragraph is fine.

18 Q Okay. So paragraph 38, please. And if
19 you see, there's a header VI right above paragraph
20 38 that states, Person of Ordinary Skill in the Art.

21 Do you see that?

22 A Yes.

1 Q Okay. Actually, Doctor, before we get
2 too heavy into these questions, can I ask you,
3 regarding all of the exhibits that I've handed you
4 and that we've run through, did you review all of
5 these in preparation for today's deposition?

6 A Yes, I did.

7 Q And you feel comfortable testifying about
8 all of these documents today?

9 A Yes.

10 Q So Doctor, if I can ask you, can you
11 please read through to yourself what you've said
12 here in paragraph 38 for your statement about your
13 qualifications as a person of ordinary skill in the
14 art. And let me know when you're finished, please.

15 MR. LEE: Objection, form.

16 MR. HELGE: What's the objection to that?

17 MR. LEE: I don't have to explain my
18 objection.

19 MR. HELGE: You do.

20 MR. LEE: No, I don't.

21 MR. HELGE: Because I can correct it
22 here. So tell me your objection, and then I can

1 correct it.

2 MR. LEE: Repeat your question, please.

3 Repeat your question.

4 MR. HELGE: What was your objection?

5 MR. LEE: What was your question? Repeat
6 your question.

7 MR. HELGE: Would you please read the
8 question back for him.

9 (The court reporter read the pending
10 question from the record.)

11 MR. HELGE: So what's the objection,
12 Roger?

13 MR. KEANE: He doesn't have to give you
14 all the explanations.

15 MR. HELGE: He does because I can correct
16 it here.

17 MR. KEANE: Rephrase your question.

18 MR. HELGE: In what way?

19 MR. KEANE: Ask it differently.

20 MR. HELGE: I just asked him to read the
21 paragraph and let me know when he's done.

22 MR. KEANE: Okay. Well, then, say that.

1 MR. HELGE: That's what I said. But
2 Roger, if you're going to be obstructive today and
3 object without actually having a reason for
4 objection, we're going to find out very quickly.

5 MR. LEE: We've been into this for a few
6 minutes. Let's keep going. Let's see how this
7 goes, okay. Is that fair?

8 MR. HELGE: We'll find out.

9 Q Doctor, can you please read through
10 paragraph 38 to yourself and let me know when you're
11 done.

12 A Okay, I'm done.

13 Q So Doctor, do you agree -- about three
14 lines down you say, I was a person of ordinary skill
15 in the art as of September 29th, 2017?

16 Do you agree with that?

17 A Yes. That's what I wrote.

18 Q Can you please look down at paragraph 40,
19 and once again, please read through paragraph 40 and
20 let me know when you've concluded.

21 A Okay.

22 Q So Doctor, it says at the bottom of

1 page 17, which is about halfway through paragraph
2 40, you say that a person of ordinary skill in the
3 art at the time of the alleged invention of the '463
4 patent would have had, and then you list a few
5 things here, but would have had a bachelor's degree
6 in electrical engineering, computer engineering, or
7 a related discipline, knowledge of the relevant 3GPP
8 standards as of this time, and at least two years
9 experience working in a field involving wireless
10 communications.

11 Do you see that?

12 A Yes.

13 Q Can you tell me what were the relevant
14 3GPP standards as of this time that you're referring
15 to in this paragraph?

16 A Can I take a minute to go through my
17 declaration?

18 Q Of course.

19 A So I cannot find an explicit quote in my
20 declaration, but I could refer to one of these --
21 the prior art documents like Takeda. And it's
22 listed there.

1 In 2017, 3GPP, which is the global
2 organization that organizes standardization for
3 cellular standards goes through a sequence of what's
4 called releases, and these are encoded as technical
5 specifications. These are documents marked TS.
6 They also have sets of technical reports called TR.

7 So in Takeda, for example, they call out
8 the release 14 and 15 as being contemporaneous to
9 2017. So I would say the answer to your question,
10 those are the contemporaneous specification releases
11 that would be referred to here. I can point out
12 where in Takeda it talks about that.

13 So for example -- so for example, in
14 Takeda, prior art documents, it says -- it refers to
15 3GPP -- this is paragraph 5 -- TS 36.300, V8.12.0.
16 So that refers to release 12.0. And this is just an
17 example. And I know that somewhere else, Takeda
18 refers to release 14 and 15, which is, as I said,
19 contemporaneous to 2017.

20 Q So you mentioned the technical
21 specifications from 3GPP, and you mentioned
22 technical reports as well.

1 Is it your view that a person of ordinary
2 skill in the art would have been generally familiar
3 with all of the technical specifications and all the
4 technical reports that had been released as of about
5 September 29th, 2017?

6 A So let me read my statement, the one that
7 you pointed me to. So it says besides the degree
8 qualifications, the key point is knowledge of the
9 relevant 3GPP standards. And so, you know, my best
10 answer to your question is, these technical
11 specifications are very long and intricate
12 documents.

13 What is -- my intent in this statement or
14 my -- the statement refers to knowledge of. So I
15 would expect that a POSITA at that time would know
16 the relevant parts of the standard to this case.

17 So if I look at 463, 463 talks about
18 aspects of uplink and downlink communications, and
19 my expectation would be that a POSITA would have
20 knowledge of those relevance parts of the TS.

21 Q Thank you.

22 Now, Exhibit 1012 is not a 3GPP standard.

1 Would you agree with that?

2 A 1012.

3 Q And this is the R1 reference that we
4 talked about earlier.

5 A Right. So let me -- so this is marked --
6 as per 3GPP markings, this is a submission to the
7 RAN1 NR group by the companies listed. So just to,
8 you know, provide context, what happens is at these
9 3GPP meetings, attendees who are normally
10 representing their respective industry
11 organizations, they provide contributions, and this
12 is an example of a contribution to one of the
13 working groups, which is the RAN1 working group.

14 Q And the R-A-N 1, RAN1, is it the radio
15 access network 1 working group?

16 A That's correct.

17 Q And then NR after the RAN1 on the cover
18 of page -- or of Exhibit 1012, page 1, does NR stand
19 for new radio?

20 A That's true.

21 Q Dr. Roy, do you recall the first time you
22 saw Exhibit 1012?

1 A The first time I saw this? Certainly as
2 part of, you know, my involvement in this case, I
3 reviewed this. So couldn't tell you exactly when.

4 Q Did you attend the meeting in China from
5 June 27th to 30th of 2017 where this submission was
6 presented?

7 A No.

8 Q Dr. Roy, is it your view that
9 Exhibit 1012 is specific to 5G new radio technology?

10 A Just reading the title, it's a submission
11 that addresses an aspect of 5G NR, which is
12 activation/deactivation of the bandwidth part.

13 Q And Dr. Roy, one thing that is maybe
14 worth us talking about today, I know we're going to
15 be using the term "bandwidth part" a lot. Do you
16 refer to say the words out "bandwidth part," or do
17 you prefer to abbreviate BWP? What's your
18 reference?

19 A Either one is fine.

20 Q Either one is fine?

21 A Yeah, BWP, just to keep things short.

22 Q Yeah, yeah.

1 So Dr. Roy, this concept of bandwidth
2 parts, would you agree that that concept was adopted
3 specifically for 5G new radio standards?

4 A Could you clarify that question? Is this
5 a more general question, or does it point to a
6 statement in my declaration?

7 Q More general. I think there are, you
8 know, a number of statements where you talk about,
9 in your declaration, Yan and Marinier, for example,
10 being more specific to 4G, and then once you get to
11 5G new radio, there's this adoption of bandwidth
12 parts.

13 Do you want to address that?

14 MR. LEE: Objection, form.

15 A Let me correct you. Marinier does talk
16 about bandwidth parts.

17 So could you repeat the question?

18 Q Well, sure. We're jumping ahead a little
19 bit. But let me ask you this.

20 Can you turn to paragraph 203 of your
21 declaration, which is on page 123.

22 A Sure.

1 Q So first sentence states, Marinier
2 discusses BWPs, but not in the context of 5G NR, and
3 then you have parentheses, which does not exist at
4 the time of Marinier's publication.

5 Do you see that?

6 A Mm-hmm.

7 Q So you would agree that when Marinier
8 came out, it was not directed in the context of 5G
9 new radio, correct?

10 A So let me clarify or let me interpret
11 what I wrote here.

12 So this term did not exist refers to the
13 fact that the 5G NR as a technical specification had
14 not been completed at the time that Marinier was
15 published.

16 So we agree that Marinier clearly talks
17 about bandwidth parts, but since the 5G NR technical
18 specifications was not completed, that's what is
19 meant here, that it did not -- that did not exist.

20 So hence, you know, the direct linking of
21 bandwidth parts to 5G NR as a completed technology,
22 you know, you couldn't draw a direct line. But

1 clearly, bandwidth parts later was adopted as a key
2 feature of 5G NR.

3 Q Do you know when the concept of bandwidth
4 parts was adopted as a key feature of 5G NR?

5 MR. LEE: Objection, scope.

6 A I couldn't answer that because, as I just
7 mentioned, you know, a technical -- a technical
8 specification, as in a final release, and this would
9 be release 15 pertinent to 5G NR, comes at the end
10 of a long sequence of meetings, and the sequence of
11 meetings that includes working groups like RAN1 have
12 multiple such presentations and documents.

13 So to answer your question, one would
14 have to go through a search of that report, and I --
15 I won't be able to answer that here.

16 Q Okay. So Doctor, coming back to
17 Exhibit 1012, prior to the submission of
18 Exhibit 1012 at the 3GPP meeting identified on
19 page 1, are you aware whether there were any other
20 procedures proposed for activation or deactivation
21 of bandwidth parts in new radio technology?

22 MR. LEE: Objection, scope.

1 A By that, do you mean, did I personally
2 review or know of? So, you know, I was -- as I've
3 said, I was not an attendee at that meeting and not
4 an attendee at previous meetings.

5 But over the years, I've had
6 opportunities to look at 3gpp.org, which is their
7 main repo, it is searchable. And given time, I had
8 both the opportunity and, you know, to go back and
9 look at, you know, the RAN1 meetings.

10 So I would say the answer to your
11 question is, I would have expected, based on this,
12 there were prior submissions. But I couldn't tell
13 you exactly when and by whom.

14 Q Dr. Roy, can you tell me a little bit
15 more detail about your last answer. You said that
16 based on your reading of this Exhibit 1012, you
17 would have assumed that there had been prior
18 submissions.

19 Can you tell me how you reached that
20 conclusion?

21 MR. LEE: Objection, scope.

22 A So a couple of reasons. So independent

1 of my work in the case, as a POSITA, I've studied 4G
2 LTE and 5G NR systems. And, you know, specifically
3 with respect to the techniques that are implicated
4 by the '463 patent and the claims which relate to
5 uplink and downlink communications, I have had the
6 opportunity to study bandwidth parts as an expert,
7 you know, in my own domain.

8 So if I look at this language, first of
9 all, DCI, which is the downlink control information,
10 is not unique to 5G. It's a concept that, you know,
11 came and was, you know, borrowed or translated to 5G
12 from 4G LTE.

13 Bandwidth parts is an extension of 5G NR
14 relative to 4G LTE. And I would say that, you know,
15 if I look at this proposal, which talks about
16 activation/deactivation, and it highlights various
17 means to do it, several of these means exist in
18 4G LTE.

19 So it is based on my experience as a
20 POSITA that I would say that, you know, concepts
21 existed before, and this is another submission
22 amongst -- you know, following other such similar

1 submissions.

2 Q Thank you.

3 A Sure.

4 Q Dr. Roy, can we turn to paragraph 105 in
5 your declaration, which can be found -- you may find
6 it faster than me. It can be found on page 70 to 71
7 of your declaration. Paragraph 105, please.

8 A Yes.

9 Q Dr. Roy, the very first sentence of this
10 paragraph reads, A POSITA would have been motivated
11 to modify Takeda with the teachings of Yan to
12 provide Takeda with backwards network compatibility
13 and to incorporate Yan's methods for conserving UE
14 power by strategically allocating UL channel
15 resources into Takeda's methods for transmitting UL
16 signals within BWPs.

17 Do you see that?

18 A Yes.

19 Q I'd like to ask you what you mean in the
20 sentence regarding backwards network compatibility.
21 Can you explain that?

22 A Sure. If you look at the next paragraph,

1 106, I explain what backwards network compatibility
2 means clearly.

3 So I write that 5G NR was being
4 implemented prior to the priority date of the '463
5 patent, which is September 2017, while 4G LTE
6 remained in use. Because these two networks were in
7 simultaneous use, a POSITA would have recognized
8 benefits for 5G capable UEs to continue to connect
9 with 4G LTE base stations. In fact, Takeda states
10 that its teachings are applicable to both 4G and 5G,
11 and that's, you know, for example, Exhibit 1034, a
12 UE may simultaneously connect -- may be
13 simultaneously connected to LTE and NR for
14 non-standalone operation.

15 And again, Exhibit 1033, a wireless
16 communication network may include base stations of
17 different communication technologies, including 5G
18 new radio or 4G LTE, 3G, et cetera, et cetera.

19 A POSITA would know that dual network
20 connectivity requires increased integration between
21 different RATs, shorthand for radio access
22 technologies, with a typical 5G-enabled device

1 having radios capable of supporting not only a
2 potentially new 5G standard but also numerous
3 releases of 4G LTE.

4 Furthermore, a common understanding is
5 that the 5G RAN should allow LTE advanced evolution
6 in novel 5G radio on the RAN level. Likewise, it
7 would have been beneficial to allow a 5G
8 non-standalone operation mode to reuse 4G principles
9 of resource allocation for uplink transmission from
10 a UE having 4G LTE, but not 5G NR capabilities.

11 So for example, Exhibit 1035, proposing a
12 tight integration of LTE and the new 5G air
13 interface to fulfill the 5G requirements, aiming for
14 simultaneous multi-connectivity in order to enable
15 faster mobility and common resource management.

16 To facilitate such backwards
17 compatibility -- so that's precisely called out -- a
18 POSITA would recognize efficiencies in designing and
19 implementing Yan's resource allocation methodology
20 of allocating uplink channel resource sets
21 (encompassing the steps discussed in reference to
22 Yan's Figure 5 [sic]) with Takeda's 5G NR BWPs.

1 By using the same resource allocation
2 methodology in both 4G LTE and 5G NR, UEs and base
3 stations do not need distinction protocols for
4 connecting to each network type. And I emphasize
5 this. Resource allocation methods can then be used
6 for both 4G LTE and 5G NR as networks transition
7 from 4G LTE to 5G NR standalone.

8 So that is -- the amplification of that,
9 a POSITA would have been modified -- would have been
10 motivated to modify Takeda with the teachings of Yan
11 to provide Takeda with backwards network
12 compatibility. And to incorporate Yan's methods for
13 conserving UE power by strategically allocating UL
14 channel resources into Takeda's methods for
15 transmitting uplink signals within BWPs.

16 Q So in this last -- so in this last
17 sentence of paragraph 106, you say, Resource
18 allocation methods can then be used in both 4G LTE
19 and 5G NR.

20 Correct?

21 A Yes.

22 Q But 4G LTE uses the full carrier width,

1 whereas 5G NR uses bandwidth parts, correct?

2 A Correct, yes.

3 Q So there would be some difference in how
4 those resource allocation methods are implemented in
5 both 4G LTE and 5G NR.

6 Would you agree with that?

7 A Yes. And that, you know, is called out
8 in my declaration, and it, you know, pertains to
9 '463 claim elements as well.

10 MR. KEANE: Just to clarify, Dr. Roy,
11 when he's referring to his deposition, he's
12 referring to his declaration.

13 THE WITNESS: Yes, sorry, my declaration.

14 MR. KEANE: We can save the errata sheet
15 for all of those if we just fix it now.

16 THE WITNESS: Thank you.

17 Q So Dr. Roy, in 4G LTE, the uplink channel
18 resources cover the entire bandwidth of the carrier,
19 correct?

20 A If I could, I can refer you to my
21 declaration where we talk about the background of 4G
22 LTE as well as resource allocations, if you'll allow

1 me to find it.

2 Q Please.

3 A So --

4 MR. KEANE: Dr. Roy, declaration.

5 THE WITNESS: Sorry. Apologies. My
6 declaration.

7 A So if you turn to page 23, paragraph 51,
8 I talk about the resources for uplink and downlink
9 transmission. In general, they encompass time. So
10 time is divided into subframes, subframes into
11 slots/OFDM symbols.

12 And in frequency, you have resource
13 blocks which are subdivided into resource element
14 groups or resource elements.

15 And these are assigned to a UE for
16 transmission, reception, and downlink and uplink.

17 So transmission between a UE and base
18 station, we may have both time division duplexing
19 and/or frequency division duplexing. Then I go on
20 to talk about TDD and FDD.

21 Now, paragraph 55, Frequency and time
22 division were used in 4G LTE for uplink and

1 downlink. And I cite some exhibits. And then I
2 say, For example, a frequency bandwidth for a UE may
3 be divided into parts for different transmissions.

4 And now, if you move to paragraph 56,
5 which is headlined 5G NR, it says, 5G NR introduced
6 refinements for signaling relative to 4G LTE through
7 the introduction of BWPs for uplink and downlink
8 transmissions.

9 It says, The new degrees of freedom
10 allowed UEs to better manage power when
11 communicating with base stations and allowing UEs --
12 and this is the key point I think that you are
13 referring to -- to use a portion of the total
14 carrier bandwidth.

15 So each portion is a single bandwidth
16 part.

17 Then the entire carrier bandwidth for
18 signaling, which, as you said, characterizes 4G LTE.

19 So then again in 57, I reemphasize this,
20 that, In 5G NR, the total carrier bandwidth of a UE
21 device is subdivided into BWPs, which are a
22 contiguous set of resource blocks, for transmission

1 and reception.

2 So uplink bandwidth parts are used for
3 transmissions to the BS, base station, from the UE,
4 and the downlink bandwidth parts are used for
5 reception from the BS. Each UE may be assigned up
6 to four uplink/downlink BWPs. However, only one
7 uplink/downlink BWP may be activated at a given
8 time.

9 So for a particular UE, different BWPs
10 may be used to support transmissions of different
11 signals or with different base stations. So
12 dividing frequency resources into BWPs reduces UE
13 part consumption since the UE monitors (or transmits
14 using) a narrower bandwidth instead of the entire
15 carrier bandwidth.

16 For UL transmissions from a UE, the DCI,
17 which is the downlink control information, received
18 from a BS (in the form of an uplink grant) schedules
19 the uplink transmission within a particular BWP
20 (using either the parameters defined within the BWP
21 or within a separate RRC signal, as discussed in
22 reference to 4G LTE uplink transmissions), and then

1 the UE transmits the uplink signal.

2 Hopefully that clarifies my response to
3 your question.

4 Q Okay. Doctor, you understand the
5 abbreviation UCI, correct?

6 A Yes.

7 Q And that's uplink control information?

8 A That's uplink control information.

9 Q How is the UCI size determined?

10 MR. LEE: Objection, scope.

11 A Let me refer again to my declaration. I
12 have places where -- I'm sorry -- my declaration
13 where I respond -- where I talk about this issue.

14 (Technical interruption.)

15 A So I was able to find -- if you turn to
16 paragraph 134 in my declaration, page 92. And then
17 I'll read from that and 135 and 136 to respond to
18 your question.

19 So if you go down midway and start with
20 the sentence, Yan further explains that the terminal
21 device determines a channel resource set of the end
22 channel resource sets as the first channel resource

1 set. And specifically, determining the channel
2 resource set of the end resource sets may be
3 according to a type or size of the UCI fed back by
4 the terminal device to the access network.

5 And I quote exhibits.

6 This matches the '463 patent's
7 description of the process for determining an uplink
8 control resource set.

9 And if you continue on to 135, Yan
10 continues by explaining an example in which the
11 terminal device determines a channel resource set
12 based on the size of the UCI. As discussed in Yan,
13 the size of the UCI can be determined using
14 configuration information that is for periodic CSI
15 on each downlink carrier configured by the base
16 station, a quantity of bits for reporting the
17 periodic CSI -- CSI stands for channel state
18 information in the technology -- on each carrier in
19 a uplink subframe and reported content, so as to
20 determine a size K of UCI that needs to be fed back
21 in the current uplink frame.

22 And this is repeated in 136. Not

1 repeated, it's amplified.

2 To determine channel resource set of the
3 N channel resource set and that matches the size K
4 of the UCI as the first channel resource set, Yan
5 explains that the terminal device determines a
6 capacity range according to each of the end channel
7 resource sets and determines a channel resource set
8 off the end channel resource sets as the first
9 channel resource set that satisfies the size
10 criteria based on the determined size K of the UCI.

11 And then I go on to say, Specifically,
12 the criteria is that the size K of the UCI meets the
13 $R_{min} \leq K \leq R_{max}$
14 where min/max are the capacity ranges of the channel
15 resource sets.

16 Hopefully that answers your question.

17 Q It does, Doctor, but let me ask you this.
18 Why does the size of the UCI change from
19 time to time?

20 A So let me read back this important
21 statement that the -- back to paragraph 134.
22 Specifically, determining the channel resource set

1 of the N channel resource sets may be according to a
2 type or size of the UCI.

3 So the client device or the UE is
4 instructed by the base station through the DCI to
5 report certain information. And the reason this may
6 change is because 5G networks relative to 4G are
7 catering to a much wider range of devices which have
8 different capabilities and a much wider range of
9 operating conditions or traffic.

10 So '463 and the prior art and indeed the
11 technology is grappling with the nature of
12 operations in a much more heterogeneous and dynamic,
13 i.e., time varying, scenarios which directly is the
14 basis for my response as to why the UCI, i.e., the
15 information that is sent on the uplink control
16 channel from the UE to the base station, will vary
17 from time to time.

18 Q Well, you told me about different types
19 of devices that 5G new radio is trying to
20 accommodate, right? And so is it that a single
21 device will have a consistent UCI size at all times?

22 MR. LEE: Objection, form.

1 A So yeah, let me -- it says here that the
2 determining of the channel resource set of the end
3 channel resource sets may be according to a type or
4 size of the UCI fed back by the terminal device.

5 And so, you know, that clearly suggests
6 that the variability is both a function of the
7 device type as well as, you know, the device state
8 or condition in the operational scenario that the
9 device is talking to the base station.

10 Q So for one single device, let's say your
11 cell phone, will your cell phone transmit UCI of a
12 consistent size every time it transmits UCI to a
13 base station under 5G new radio?

14 MR. LEE: Objection, scope.

15 A I refer you back -- so the answer is no,
16 that the channel resource that is to be used for the
17 transmitting the UCI will vary, okay, as a function
18 of both the device and the current condition in
19 which the device is operating.

20 Q And where is that decision made of which
21 channel resource to use for UCI transmission?

22 MR. LEE: Objection, scope.

1 A So again, if I could point you back to my
2 declaration. So let me find the right place.

3 So I'm looking for Figure 8. This is
4 page 107 in my declaration. That's Figure 8 from
5 Takeda. And I think it's also referred to -- yes.
6 So there's Figure 8 in two places, page 102, 107.

7 So -- and page -- so anyway, we could
8 look at any one of those.

9 So if you look at Figure 8, it clearly
10 shows on the uplink how the uplink resource, which
11 carries the UCI, is determined. And if you look at
12 Figure 8, there is -- so this is page 102. I'm
13 looking at the annotated figure, which is the same
14 as in page 107, so no difference.

15 It shows the blue hashed, you know,
16 resource sets in the coreset, which is -- you know,
17 the coreset represents the DCI information that is
18 sent on the downlink from the base station to the
19 UE.

20 So the UE will receive and decode the
21 coreset, will be able to find, determine, in the DCI
22 where the uplink grant information is, and that's

1 shown as the blue shaded resource blocks.

2 And the important part is this, that the
3 pointer, the arrow from that uplink grant points to
4 the resource in the uplink transmission that is
5 going to be used for sending the UCI.

6 (Reporter interruption.)

7 A So the answer to your question is, the
8 determination of where the uplink resource is
9 carrying the UCI is done at the UE, but the
10 indication of the information to do that comes from
11 the base station through the coreset or the DCI.

12 Q Doctor, we're going to come back to
13 Figure 8 in a little bit here.

14 I'd like to ask you to turn to page 124
15 of your declaration.

16 A 124. Yes.

17 Q And I'm looking at the very last sentence
18 of paragraph 203, which begins with, Incorporating.

19 Do you see that?

20 A Okay. Incorporating, sure, yes.

21 Q I'm going to read it here. It says,
22 Incorporating 5G NR's effective use of BWPs and

1 methods of activating those BWPs would further
2 support Marinier's stated goal of conserving UE
3 power because 5G NR BWPs allow UEs to transmit only
4 a portion of the carrier frequency band instead of
5 the entire carrier frequency band.

6 Do you see that?

7 A Yes.

8 Q So looking back at Figure 8, if you still
9 have that handy on page 102, you would agree that
10 the green hashed square is not occupying the entire
11 portion of the uplink bandwidth part.

12 Would you agree with that? It's not
13 covering the entire frequency width of that uplink
14 bandwidth part?

15 MR. LEE: Objection, scope.

16 A Are you cross-referencing this to what
17 you just read for me from page 124?

18 Q Well, with the context of what we read on
19 page 124, you would agree that transmitting uplink
20 control information using only a portion of a
21 carrier frequency band saves power relative to
22 transmitting the uplink control information on the

1 entire carrier frequency band, correct?

2 MR. LEE: Objection to form.

3 A So you realize we just discussed that the
4 size of the UCI is dependent on various factors
5 which are sent from the base station to the UE. And
6 as a result, the -- the type and the form of what is
7 being asked for the UE to report determines the
8 bandwidth -- the portion of the bandwidth resources,
9 the frequency resources that set -- that will be
10 used.

11 So this example, you're right, it shows
12 that only a portion of the bandwidth part is used.

13 Q And in 4G LTE, was it possible to
14 transmit uplink control information using only a
15 portion of the carrier bandwidth?

16 MR. LEE: Objection, scope.

17 A Could you point out, again, in my
18 declaration where that is mentioned? I do not
19 believe that I mention in my declaration, you know,
20 the 4G LTE uses, you know, a carrier bandwidth.
21 That's the statement.

22 Q I figured you would understand that. You

1 would -- even if it's not in your declaration, I
2 figured you would understand how a UCI is
3 transmitted using 4G LTE.

4 Do you understand that?

5 MR. LEE: Objection, scope.

6 A As a -- in general as a POSITA, yes. But
7 how is this relevant to my declaration is what I was
8 just hoping to get some clarification on.

9 Q Well, you say in paragraph 203 that
10 conserving UE power occurs in 5G NR by using
11 bandwidth parts and transmitting only a portion --
12 transmitting on only a portion of the carrier
13 frequency band instead of the entire carrier
14 frequency band.

15 So if we're truly going to measure apples
16 to apples when talking about 4G LTE and 5G NR, I
17 think we need to understand how much of the carrier
18 frequency band is being used in 4G LTE to transmit
19 uplink control information.

20 So that's my question. I'm trying to
21 understand how much of that carrier frequency band
22 is being used in 4G LTE to transmit uplink control

1 information?

2 MR. LEE: Objection, scope.

3 A So again, I do not discuss 4G LTE's UCI
4 in my declaration. But to respond to your question,
5 in 5G NR, determines the definitions of those
6 bandwidth parts, you know, and again, that's on a --
7 a device type and a device scenario basis in terms
8 of the operational condition, what traffic,
9 et cetera, that is being sent, you know, from the UE
10 on the uplink.

11 And hence, you could -- a POSITA would
12 argue that because a bandwidth part is inherently a
13 subset of the overall carrier, okay, the
14 efficiencies is relative to using the full carrier.

15 I think you will agree, and I should note
16 for the record, that the carrier bandwidth in 5G is
17 greater than the carrier bandwidth in 4G. And so
18 you can't make a direct comparison.

19 But the point that is being made here is
20 that you get efficiencies by doing the two important
21 things; by having the ability, having a knob for a
22 bandwidth part so that, you know, on a case-by-case

1 basis -- for example, if I have IoT or other lower
2 bandwidth devices which don't need the full
3 bandwidth, I only need to transmit using a bandwidth
4 part.

5 And then further, depending on that
6 specific scenario, if I have the UC size determined
7 by the current condition, I may also have -- as in
8 this example, use only a part of the -- a portion of
9 the bandwidth part to send the UCI.

10 So I don't believe you can make a direct,
11 you know, efficiency comparison to 4G LTE because
12 there are various parameters that are different,
13 notably the carrier bandwidths are different.

14 And also, you know, you have this feature
15 in 5G where you have bandwidth parts and the ability
16 to determine the UCI size, you know, as a function
17 of the current situation.

18 Q So Dr. Roy, if I showed you an
19 illustration similar to Takeda's Figure 8, which
20 you've annotated here on page 102 of your
21 declaration --

22 A Sure, yeah.

1 Q If I showed you a similar illustration
2 from 4G LTE and the height of the green square which
3 represents the physical uplink scheduling channel,
4 if the height in 4G LTE were half of the height of
5 this green square in Figure 8 --

6 A I should correct you. That's the uplink
7 shared channel.

8 Q Thank you.

9 A That's the one that is sending data.

10 Q Shared, okay.

11 A Of course, the UCI may be carried in the
12 uplink shared channel, or as I have said elsewhere,
13 it could be sent via the uplink control channel.
14 But this example shows the uplink shared channel
15 carrying both data and UCI.

16 Q So if we compared frequency bandwidths of
17 a UCI transmission in 4G LTE and also the same thing
18 in 5G NR, and we found that less frequency was being
19 used in 4G LTE, would that mean that the UE is using
20 less power in 4G LTE to transmit that uplink control
21 information?

22 MR. LEE: Objection, form, scope.

1 A This is a hypothetical that I couldn't
2 respond to. As I said, my contention is that you
3 cannot make a direct comparison because of, you
4 know, the variabilities that I talked about between
5 4G LTE and 5G NR.

6 The point in my declaration is that
7 having these knobs is important for managing power
8 efficiency. So let me reemphasize that 5G NR was
9 intended to cater to a much larger set of both
10 devices with device respective device capabilities
11 and to operate in much more dynamic operating
12 conditions.

13 So as engineering system designers, I
14 wanted to emphasize that having those capabilities,
15 having those design degrees of freedom was important
16 to obtain the power efficiencies for 5G NR and is
17 not intended as a direct comparison to a 4G LTE
18 case.

19 Q Was there a standard carrier bandwidth
20 under 4G LTE?

21 MR. LEE: Objection, scope.

22 A Again, I have to look into my declaration

1 to see if a number is quoted. But I could tell you
2 as a POSITA, again, the carrier bandwidth is
3 variable, also in 4G LTE, it can go up to
4 20 megahertz. That's the maximum. It can go down
5 to something much smaller.

6 In 5G, the maximum carrier bandwidth is 5
7 of such carriers, up to 100 megahertz.

8 Q In paragraph 95 of Takeda, paragraph 95
9 and 96, does say that the maximum bandwidth under 5G
10 is 100 megahertz --

11 A Right.

12 Q -- and the smallest is 5 megahertz.
13 Do you agree with those numbers.

14 A Let me just read this.

15 The maximum, 100 megahertz is correct,
16 and the minimum is 5 megahertz. I would accept
17 that, yes.

18 Q So Dr. Roy, under your combination of
19 Takeda and Yan, the user equipment has to make a
20 determination of which resource set and which
21 resources to use for UCI transmissions, correct?

22 A Could you point out where you're reading

1 this from in my declaration?

2 Q Well, I'm not reading it from your
3 declaration. But I can point you to a paragraph
4 that probably helps you.

5 So Dr. Roy, take a look -- this might be
6 the simplest place. Take a look at the bottom of
7 page 79 of your declaration.

8 A Sure, yeah.

9 Q There's a comparison between Figure 4 of
10 the '463 patent and Figure 1 from Yan.

11 Do you see that?

12 A Sure.

13 Q And if you look at block S102 from Yan,
14 there's a terminal device determining a channel
15 resource set, and then S103, there's a terminal
16 device determining a channel resource.

17 Do you see those two blocks there?

18 A I do, yes.

19 Q So you'd agree that in your combination
20 of Takeda and Yan, you are asking the terminal
21 device to make a determination about the resource
22 set and also the channel resource that are being

1 used for uplink control information transmissions,
2 correct?

3 A Sure. So let me comment that while this
4 term "determination" was not claim constructed, I
5 want to clarify what is, you know, a POSITA's
6 understanding.

7 So determination by the UE would mean
8 that the UE conducts the processing steps, you know,
9 on device to decide which of the channel sets it's
10 going to use. So it doesn't mean that -- so it is
11 basing this decision based on the information it has
12 received from the downlink control DCI sent from the
13 base station to the UE.

14 So as long as we are clear about, you
15 know, what "determines" means in this context, I
16 agree that the steps for deciding which uplink
17 control resources are going to be used for sending
18 the UCI is conducted -- those steps are conducted on
19 the device.

20 Q There are a couple times in your
21 declaration where you talk about a stated goal of
22 these references and how in certain instances the

1 modifications that you're proposing are consistent
2 with stated goals, for example, of Marinier and
3 Takeda.

4 Do you recall that?

5 A If you could point where I say that, that
6 would be helpful.

7 Q Sure. We said it at the bottom of
8 paragraph 203 a few minutes ago.

9 A Okay.

10 Q We read from that sentence, we talked
11 about the stated goal of Marinier.

12 A I have 203. Okay. Right. Stated goal
13 of conserving UE power. Okay.

14 Q Do you see that?

15 A Yes.

16 Q Can you go back to paragraph 107 on
17 page 72.

18 A Yes.

19 Q If you go down to the second sentence --

20 A Sure.

21 Q -- it says, I'm going to read it here,
22 Using Yan's resource allocation method would further

1 Takeda's stated goal of reducing UE power
2 consumption when transmitting UL signals.

3 Do you see that?

4 A Yes.

5 Q And so is it your view that it's
6 important to consider stated goals of the prior art
7 when considering whether combinations or
8 modifications would have been implemented by a
9 POSITA?

10 MR. LEE: Objection, scope.

11 A I'm not sure what you're asking me, it's
12 not clear, because, you know, it's an engineering,
13 you know, objective that giving these degrees of
14 freedom of having bandwidth parts and determining
15 the size of the uplink control resource is a
16 function of the amount of information or the type of
17 information that's requested. That leads to
18 reducing uplink -- UE power consumption in the
19 uplink.

20 Q You'd agree that Takeda did not propose
21 to reduce UE power consumption by adopting Yan's
22 resource allocation method, correct?

1 A So again, let me read from 107. It says,
2 you know, from the UE's perspective, a POSITA would
3 have been motivated -- so this is in the section
4 Motivation to Combine. So I'm here presenting
5 them -- an argument for the motivation to combine,
6 and a POSITA would have been motivated to modify
7 Takeda's method for transmitting uplink signals to
8 incorporate Yan's resource allocation method to more
9 efficiently use UE power resource.

10 So that's the statement, and that's --

11 Q So at the end of the sentence that I
12 read, you cite to Takeda paragraph 13, right?

13 A Correct, yes.

14 Q So how does paragraph 13 of Takeda
15 disclose that Takeda reduces UE power consumption?
16 In other words, what's Takeda's method for reducing
17 UE power consumption as disclosed in paragraph 13?

18 MR. LEE: Objection, form.

19 A Let me just review paragraph 13, if I
20 may.

21 So reading paragraph 13 from Takeda, and
22 it says, Embodiments of the Invention. It says, In

1 future wireless systems, communication systems (for
2 example, NR, 5G, or 5G+), allocating carriers (also
3 referred to as components carriers, system bands, or
4 the like) having a bandwidth (for example, 100 to
5 400 megahertz) wider than that of existing LTE
6 systems is being considered.

7 And it refers to LTE release 8 through
8 13.

9 When the user terminal always uses the
10 entire carrier, power consumption may be enormous.
11 Therefore, in future wireless communication systems,
12 semi-statically configuring one or more frequency
13 bands within the carrier and user terminals is being
14 considered. Each frequency band in the carrier is
15 referred to as a BWP, a bandwidth part, or a partial
16 band, or the like.

17 Q Okay. So you read paragraph 13 to me.
18 Do you agree that Takeda proposes to reduce user
19 equipment power consumption by adopting bandwidth
20 parts for transmissions?

21 MR. LEE: Objection, form.

22 A So again, you know, I've just read what

1 Takeda says, that in future communication systems,
2 he's talking about configuring one or more of those
3 frequency bands within the carrier, and each
4 frequency band in the carrier is a bandwidth part.

5 Q And so does Takeda do that because Takeda
6 is trying to reduce UE power consumption when
7 transmitting uplink signals?

8 MR. LEE: Objection, scope.

9 A Again, when the user terminal always uses
10 the entire carrier part, consumption may be
11 enormous. So therefore, you know, the stated goal
12 is to reduce the UE power consumption by either
13 using bandwidth parts or a partial band or the like.

14 Q When you were reading Takeda, Dr. Roy,
15 did you believe that Takeda had any other stated
16 goals disclosed within it?

17 MR. LEE: Objection, scope.

18 A I'm sorry. I'm unable to -- is there
19 somewhere in my declaration that there's a reference
20 to Takeda's stated goals -- other stated goals other
21 than --

22 Q Not that I know of. I'm wondering -- you

1 reviewed Takeda in preparation for this deposition.
2 I was wondering if you, through your review, had
3 concluded that Takeda had disclosed any other stated
4 goals.

5 MR. LEE: Objection, scope.

6 A Well, I can read to you, you know,
7 Takeda's -- so Takeda has a very clear summary of
8 the problem to be solved and then the means for
9 solving the problem. And I can read you that.

10 It says, In future wireless systems (for
11 example, NR), a user terminal monitoring, i.e.,
12 users blind decoding a control resource domain, for
13 example, this coreset, okay, which is a candidate
14 domain for the downlink control channel where the
15 DCI is being sent.

16 So furthermore, in future communication
17 systems, you'll be able to use one or more frequency
18 bands, for example, a bandwidth part, which is akin
19 to a component carrier.

20 In this way, when one or more frequency
21 bands or bandwidth parts are used for downlink and
22 uplink communications, in order to reduce the

1 processing load (for example, the processing load
2 due to blind decoding of each frequency band) in the
3 UE, it is desired to control activation or
4 deactivation of the frequency bands.

5 And the present invention has been made
6 in view of such points -- this is paragraph 9 -- and
7 an object thereof -- and I think this answers your
8 question, what are the goals -- is to provide a user
9 terminal and a wireless communication method capable
10 of appropriately controlling activation/deactivation
11 on the BWPs. And then it goes on to talk about the
12 means for solving the problem.

13 One aspect of the user terminal of the
14 present invention is a user terminal comprising a
15 receiving unit for monitoring a control resource
16 domain, okay, of a frequency band for a downlink in
17 a carrier and receiving the DCI and a control unit
18 for controlling transmission of an uplink signal in
19 the frequency band for uplink in the carrier based
20 on the DCI wherein the control unit controls
21 activation or deactivation of the frequency band.

22 Q So Doctor, back when you read

1 paragraph 8 --

2 A 8, okay.

3 Q -- of Takeda, there was a mention of
4 reducing processing load in a user terminal.

5 Did you see that?

6 A Yes.

7 Q Do you believe that one of Takeda's
8 stated goals is reducing a processing load of the
9 user terminal?

10 A So, you know, this -- I don't know what
11 you mean by "stated goals" in this context. It says
12 this is a problem that the invention is addressing.
13 So if your stated goal maps to problem addressed or
14 solved by the invention, yes.

15 MR. HELGE: Doctor, I have to say, you're
16 pretty resilient. We've been going for, like, an
17 hour and a half. Do you want to take a ten-minute
18 break?

19 THE WITNESS: Sure, yes, thank you.

20 (Recess from 11:26 a.m. until 11:38 p.m.)

21 BY MR. HELGE:

22 Q Dr. Roy, can I ask you to pull out the

1 Yan reference, Exhibit 1010. And I'm going to go to
2 page 13 of the document.

3 A Page 13.

4 Q And it's basically columns 1 and 2 of the
5 specification.

6 Do you see that there?

7 A Yep.

8 Q So Dr. Roy, at the bottom of column 1,
9 there's a paragraph, and I want to read this to you
10 here. It begins, As a quantity of uplink channels
11 allocated by the access network device to the
12 terminal device in advance, increases continuously,
13 a quantity of bits of the dynamic indication
14 information delivered by the accessed network device
15 increases continuously, leading to relatively large
16 consumption of downlink channel resources.

17 Here's the important part.

18 In addition, a capacity of the uplink
19 channel specified by the access network device for
20 the terminal device by using the dynamic indication
21 information does not meet a size of the UCI. As a
22 result, utilization of the uplink channel is

1 relatively low or UCI bits are discarded.

2 Do you see that?

3 A Mm-hmm.

4 Q What circumstances would exist where UCI
5 bits would be discarded from the uplink channel
6 information transmission?

7 A Let me just refer to my declaration.

8 So if you turn to my declaration,
9 page 54, paragraph 88, so I say there -- and this
10 refers to step S101 of the Yan Figure 1, okay, which
11 is annotated.

12 It says, The UE or the terminal device
13 may receive channel indication information from an
14 access network on a physical channel, et cetera. As
15 shown in step S102, the terminal device determines a
16 channel resource set with at least two channel
17 resources. Okay.

18 And then, As shown in step S103, the
19 terminal device determines a channel resource in the
20 determined channel resource set.

21 Step S104, the terminal device transmits
22 UCI on the determined channel resource. And, The

1 channel resource, last sentence, is determined to
2 match a size of the UCI to be transmitted.

3 So what is key is to get the used channel
4 resource on the uplink transmission that sends the
5 UCI to match the size, okay.

6 So this is the, you know, the utilization
7 of the uplink channel resource, and mismatches occur
8 on both sides; i.e., that you have allocated
9 resource much larger than what is required, so that
10 refers to the first -- what you just read, the first
11 condition, the utilization is low. Or the
12 allocation is less or smaller than what is required,
13 in which case the UCI bits are discarded.

14 And again, I have further, I think,
15 discussions on this in subsequent paragraphs.

16 So again, in paragraph 89, I again quote
17 that, Yan explains that a channel resource set may
18 be selected based on a size of the UCI as measured
19 by quantity of the UCI bits or the amount of the
20 UCI.

21 And it quotes in Exhibit 1010. And the
22 channel indication information received by the

1 terminal device indicates the channel resources
2 included in the channels resource sets.

3 Q Doctor, can you turn to paragraph 107 on
4 page 72 of your declaration.

5 A Yeah, okay.

6 Q So you may recall that we talked about
7 Takeda's stated goal, the sentence directed to
8 Takeda's stated goal that ended with that citation
9 to Exhibit 1007 in paragraph 113.

10 The next sentence says, Specifically, Yan
11 discusses that the capacity of uplink channels
12 specified by a BS or base station may be
13 underutilized, or UCI bits may be discarded if the
14 size of the UL channel does not match the size of
15 UCI.

16 So what I'm wondering from you is not
17 about how Yan solves this problem but what
18 circumstances would have had to be in place where
19 UCI bits were discarded as a result of the size of
20 the UL channel not matching the size of the UCI.

21 MR. LEE: Objection, form.

22 A So again, if you read the rest of that

1 paragraph, it says, In other words, some uplink
2 transmissions are inefficient, which is, you know,
3 the size of the uplink channel allocation, resources
4 allocated, exceeds the quantity of UCI bits that are
5 required to transmit.

6 And I say, This mismatch -- so
7 essentially it's about the mismatch of UL uplink
8 channel resource allocation, and that this is a risk
9 in transmission using BWPs of 5G.

10 And so therefore, Yan and Takeda discuss
11 efficient use of resources for downlink and uplink.

12 I think specifically you're talking about
13 discarding. As I just stated, discarding occurs if
14 the allocated resources in the uplink is less than
15 the quantity of bits that -- the capacity -- let me
16 be accurate. The capacity of the uplink allocated
17 resources doesn't match; i.e., is less than the
18 amount of bits that's needed to be transmitted.

19 And just to sort of amplify that further,
20 the circumstances are the base station is requesting
21 via the DCI the terminal to send certain type and
22 format of UCI information. So therefore, there's

1 this mismatch which leads to discarding of UCI bits.

2 Q So if the base station is requesting a
3 certain quantity of UCI from the user equipment, why
4 isn't the base station also allocating sufficient
5 resources for that UCI to be transmitted?

6 MR. LEE: Objection, form.

7 A So this is an issue that's not discussed
8 here in my declaration. So my answer as a POSITA is
9 that this mismatch, which is in the declaration,
10 occurs due to various operational circumstances.

11 So for example, that the UE has decided
12 to send traffic on the uplink that the base station,
13 when it sent in the request, was not aware of.

14 So it is essentially for the dynamism in
15 the operating condition at the UE level that is
16 causing some of this -- is a contributing factor --
17 is a factor that contributes to this mismatch.

18 Q So Dr. Roy, in the method of Yan,
19 specifically Figure 1 and its related disclosures,
20 what portion of the carrier bandwidth is Yan using
21 to transmit uplink control information from user
22 equipment?

1 A So you're referring to the annotated
2 Figure 1?

3 Q So I'm referring to Yan in general,
4 specification, figures. I'm trying to understand
5 what Yan is using to transmit UCI and what portion
6 of the available carrier bandwidth Yan is using for
7 that.

8 A So if I may refer you to -- my best
9 answer would be, if you look at Yan, you have
10 Figures 6, 7 through 9. They highlight -- if you
11 look at the y-axis, which is the frequency axis,
12 they refer you to the allocation of the frequency
13 resource in a subframe.

14 So if you look at Figure 6 or 7, they
15 identify each subframe and, you know, within the
16 subframe, the channel resources that are being
17 allocated both for downlink and uplink. These are
18 high-level figures. They don't show the
19 partitioning between downlink and uplink. But
20 that's the general answer.

21 We do know that Yan was written intended
22 to LTE, and we discussed before that LTE's component

1 carriers, their bandwidths are -- typically go
2 maximum to 20 megahertz.

3 So it is some subset of those
4 20 megahertz that is allocated for, say, uplink.

5 Q So you'd agree, Dr. Roy, that the maximum
6 frequency being used for these channel resources in
7 Figures 6 through 9 would be 20 megahertz, right?

8 A 6 through 9 is not specific, you know.
9 They just show generic channel resources.

10 So again, I couldn't say, based on 6
11 through 9, whether it's any particular frequency
12 bandwidth. But whatever be the appropriate carrier
13 bandwidth, that's, you know, in use, it would be
14 some subset of that carrier bandwidth that's being
15 used for the uplink, or some subset of the channel
16 resource that's being used for the uplink.

17 Q So I'm sorry, Dr. Roy. I may be
18 confusing my question, so I apologize.

19 If Yan is dealing with 4G LTE, the
20 maximum carrier bandwidth would be 20 megahertz,
21 right?

22 A Yeah. In LTE, correct, yes. The

1 bandwidth -- the carrier varies, the maximum is
2 20 megahertz.

3 Q So in a 5G new radio transmission, the
4 maximum bandwidth is 100 megahertz, right?

5 A Yes. That's maximum bandwidth. But as
6 you know, '463 and Takeda, Marinier, they talk about
7 bandwidth parts, which is a subset of whatever the
8 maximum bandwidth is.

9 Q So a bandwidth part under 5G NR could be
10 70 megahertz, right?

11 MR. LEE: Objection, scope.

12 A So, you know, let me refer you to --
13 let's see -- my declaration, and there's a diagram
14 which responds to your question. Let me find it.

15 Q Are you thinking of the one at the bottom
16 of page 50?

17 A Yeah, thank you. Yes, thank you. And
18 Figure 1B, which is from Takeda, it shows that you
19 can have a small bandwidth part, the one that's, you
20 know, hashed pink, and you can have a larger
21 bandwidth part. It doesn't show the scale, but the
22 point is taken that it could be.

1 Q So just to be clear, Dr. Roy, would you
2 agree that it's possible to have a bandwidth part
3 under 5G NR that spans 70 megahertz?

4 MR. LEE: Objection, scope.

5 A You know, I couldn't answer your question
6 definitively because I'd have to go back and see if
7 there was an upper bound to the bandwidth part. So
8 modular of that, at least in this figure from
9 Takeda, it suggests that it could be whatever -- it
10 could be a subset of the carrier bandwidth subject
11 to any limitation.

12 Q And you're not aware today of any carrier
13 bandwidth limitation on 5G NR.

14 Is that right?

15 A I couldn't answer that question.

16 Q Dr. Roy, can you turn to Figure 9 of
17 Takeda, please.

18 A Sure. Figure 9, yes.

19 Q And Dr. Roy, I don't think that there is
20 an annotated version of Figure 9 in your
21 declaration. But if you recall one, we can look at
22 that instead if it's in color. I think we just have

1 to look at Figure 9.

2 A Okay. Yeah.

3 Q Okay. So Dr. Roy, referring to Figure 9
4 of Takeda, do you see that there is a hashed box on
5 the upper left labeled UL BWP number 1?

6 A Okay. Figure 9, yes, yes, I'm there.

7 Q So I'll ask the question again.

8 A Sure.

9 Q Dr. Roy, in Figure 9 of Takeda, do you
10 see that there's a hashed box on the upper left
11 labeled UL BWP number 1?

12 A I see that, yes.

13 Q And that's the you think bandwidth part
14 number 1, right?

15 A Correct.

16 Q So the bandwidth representation in
17 Figure 9 is based on the y-axis, right, or the
18 height of UL bandwidth part number 1, right?

19 A Correct, yes.

20 Q And then time is on the x-axis.

21 Do you see that?

22 A Correct.

1 Q And then Dr. Roy, there's an uplink
2 bandwidth part number 2, a second hashed box labeled
3 UL BWP number 2.

4 Do you see that?

5 A Right.

6 Q And you agree that that's uplink
7 bandwidth part number 2?

8 A Correct.

9 Q Can you make any determinations about the
10 relative bandwidth of uplink bandwidth part number 1
11 versus uplink bandwidth part number 2?

12 MR. LEE: Objection, form.

13 A Yes. I mean, modular the fact that there
14 is no numerical scale given to the x-axis or the
15 y-axis, but just looking at it, the uplink bandwidth
16 part to the frequency -- you know, the number of,
17 say, resource blocks allocated in BWP number 2 would
18 appear to be larger than BWP number 1.

19 Q And Dr. Roy, do you have any opinion or
20 an understanding why Takeda changes the size of the
21 bandwidth part from uplink bandwidth part number 1
22 to uplink bandwidth part number 2?

1 A I'd have to look at Takeda. My
2 understanding was, this is just an example that he
3 provides, and, you know, naturally an example using
4 two bandwidth parts would have two different, you
5 know, time and frequency extents.

6 But unless I read Takeda, I wouldn't be
7 able to answer whether -- what may be a -- if you're
8 looking for a causal explanation.

9 Q No, no, I'm just -- do you think it's
10 unusual that you would have different bandwidth
11 parts that encompass different frequency ranges like
12 is shown in Takeda Figure 9?

13 MR. LEE: Objection to form.

14 A Again, I'm not sure, you know, what you
15 mean by "unusual." But I would expect that the
16 bandwidth parts being different subsets of the
17 carrier bandwidth in general would be different.

18 Q Dr. Roy, how does the change in bandwidth
19 from uplink bandwidth part number 1 to uplink
20 bandwidth part number 2 alter the available
21 resources for the control information -- or the
22 uplink control information transmission?

1 MR. LEE: Objection, form.

2 A So I'm not sure I understand your
3 question. Maybe you could rephrase.

4 Q Well, when transmitting uplink control
5 information during uplink bandwidth part number 1
6 being activated, you would agree that that uplink
7 control information is transmitted within the
8 bandwidth of uplink bandwidth part number 1,
9 correct?

10 A Okay. So I'm trying to understand. Did
11 you mean to say that the UCI, the uplink control
12 information, is transmitted on some portion of the
13 uplink bandwidth part? The answer is yes. And in,
14 say, for example, Figure 9 clearly shows the
15 causative steps here.

16 So you have the uplink grant, you know,
17 in my declaration, that's colored for better
18 identification. So the blue hash shows within the
19 DCI, within the coreset where the uplink grant
20 information is contained. And that points to the
21 green hashed uplink.

22 In this case, it's physical uplink shared

1 channel, this is PUSCH, which carries the UCI. If
2 that's the question you were asking.

3 (Reporter interruption.)

4 A PUSCH, the physical uplink shared
5 channel.

6 Q So Dr. Roy, I think we're getting to the
7 same place here. But in the span of time from, you
8 know, the far left of Figure 9 up until the
9 conclusion of uplink bandwidth part number 1 --

10 A Okay.

11 Q -- if there is any UCI being transmitted
12 from the UE to the base station during that first
13 time, it's going to occur within the bandwidth of
14 uplink bandwidth part number 1.

15 Don't you agree?

16 A Are you referring to BWP 1 or BWP 2?
17 Because, you know, there are two different examples.

18 Q 1. My question was about 1.

19 A 1, sure. So in this example, it doesn't
20 show an uplink grant.

21 Q Correct.

22 A It only shows the downlink PDSCH

1 information that is being decoded.

2 So yes, that -- but if I applied your
3 question to bandwidth part 2, it's clear that the
4 uplink grant points to a subset of resources within
5 BWP 2. And that's exemplified in BWP 2.

6 Q And you agree that BWP 2 covers a greater
7 bandwidth relatively speaking than BWP 1, based on
8 this figure, correct?

9 MR. LEE: Objection, form.

10 A Yes. In frequency.

11 Q Sure, sure. In frequency.

12 And relatively speaking, in that regard,
13 uplink bandwidth part number 2 has greater resources
14 available for uplink control information than uplink
15 bandwidth part number 1, correct?

16 MR. LEE: Objection, form.

17 A Again, I couldn't answer that because,
18 you know, the -- as we already established, the
19 amount or the quantity of uplink channel resources
20 required for UCI varies based on all the factors we
21 have discussed, the device type and the kind of
22 information that is being asked to report. And it's

1 a dynamic situation.

2 Q So Dr. Roy, I'm going to state something,
3 and I want you to tell me if you agree with it or if
4 you disagree with it.

5 Would you agree or disagree when I say
6 this, that uplink bandwidth part number 2 has a
7 greater frequency allocated to it than uplink
8 bandwidth part number 1 and therefore has greater
9 resources available for uplink control information
10 to be transmitted?

11 MR. LEE: Objection 403.

12 A So my response is -- I'll respond to the
13 first part, which is that greater frequency
14 resources in uplink bandwidth 2 relative to uplink
15 bandwidth 1. I'm not sure if I understand the
16 second part.

17 And the reason is, I've said that the
18 uplink resources needed to send any uplink
19 information -- and remember, the uplink information
20 is both control and uplink data. So I'm not sure,
21 you know, because, you know, in this case, in the
22 example in BWP 2, this is PUSCH. So that clearly

1 contains both uplink data as the shared channel, and
2 it contains the control information.

3 So I don't think one can make a -- I do
4 not believe one can make a definitive statement as
5 to whether the amount of information on the uplink,
6 you know, is definitively greater or larger.

7 Q So Doctor, I think you have Figure 8
8 annotated open from your declaration, correct?

9 A Sure.

10 Q So let me ask you this. Looking at
11 annotated Figure 8 from Takeda, you have the -- the
12 uplink shared channel is hashed green, and there's
13 also one that's hashed yellow, right?

14 A Yellow or light green, yes.

15 Q So looking at the first block that's
16 shaded green, imagine if we had another uplink
17 bandwidth part in Figure 8 that was narrower in
18 frequency than the uplink bandwidth part being
19 shown, and, in fact, narrower in frequency than the
20 shape of that green block.

21 Do you understand the scenario I'm
22 creating here?

1 MR. LEE: Objection, form.

2 A So just to understand, this is a PUSCH
3 allocation for uplink, and you're asking if it is
4 just smaller in frequency or time or both?

5 Q In frequency. Just frequency.

6 A Okay.

7 Q So if it's smaller in frequency, that
8 would result in this new bandwidth part having
9 insufficient resources for transmitting the entire
10 PUSCH, right?

11 MR. LEE: Objection 403.

12 A I'm not sure if I understand
13 "insufficient resources."

14 Q Well, if you can't fit the entire green
15 box within the bandwidth part that you've been
16 instructed to transmit it in, that's a problem,
17 right?

18 MR. LEE: Objection 403.

19 A So again, I think I could read from my
20 declaration that, you know, matching the uplink
21 resources to -- the capacity of the uplink resources
22 to the amount of information that needs to be

1 transmitted is, you know, a key objective. If your
2 question is referring back to that, then I can refer
3 back to my declaration.

4 Q Dr. Roy, if you had two bandwidth parts
5 in 5G new radio, one bandwidth part is 50 megahertz,
6 one bandwidth part is 10 megahertz, can you make any
7 assumptions about the relative power being consumed
8 by the UE in performing its uplink control
9 information transmission?

10 MR. LEE: Objection, form, scope.

11 A No, not in a prima facie based on the
12 information that you've given.

13 So having said that, let me say this,
14 that if your statement implicates that there is more
15 information sent in one relative to the other and
16 hence it uses more subcarriers or more resource
17 blocks than the other, that would, you know, be a
18 factor in the answer. But that's not the only
19 factor.

20 Q So just knowing the bandwidth of an
21 uplink control information transmission doesn't give
22 you enough information to know whether power is

1 greater or less than another transmission in two
2 different bandwidth parts.

3 Is that right?

4 MR. LEE: Objection to form.

5 A It's certainly a factor. So other things
6 being equal, I would agree that, you know, the
7 greater bandwidth would require greater power. But
8 it would require the things being equal.

9 Q Right. Understood. Thank you.

10 Dr. Roy, do you agree that Takeda
11 requires some undisclosed resource allocation
12 methods for PUSCH resources?

13 MR. LEE: Objection, scope.

14 A Again, I'm sorry, is this somewhere
15 related to my declaration?

16 Q Well, it's a statement from the petition
17 that cites to your declaration for support. I'm
18 curious if you agree with that sentence.

19 MR. LEE: Objection, scope.

20 A So could you point out where you're
21 referring to?

22 Q Well, it's citing to paragraphs 105

1 through 110 of your declaration.

2 A Okay.

3 Q But the sentence is this: The ordinarily
4 skilled artisan would have recognized that 5G NR
5 BWPs in Takeda still require resource allocation of
6 PUCCH and PUSCH resources.

7 Do you agree that Takeda doesn't have
8 that -- those resource allocation methods and needs
9 to be supplemented somehow?

10 MR. LEE: Objection, form.

11 A I'm sorry. Could you point out -- I'm
12 trying to find where that statement is in my
13 declaration.

14 Q It's not in your declaration; it's in the
15 petition. It's in the petition.

16 A Oh, it's in the petition.

17 Q And it cites to paragraphs 105 through
18 110 of your declaration.

19 A Okay.

20 Q But we know, looking at annotated
21 Figure 8 of Takeda, that Takeda has no problem
22 telling you where to transmit PUSCH blocks based on

1 the UL grant in the coreset, right?

2 MR. LEE: Objection to form.

3 A I would just note that this is an
4 example. I mean, so we do know that, you know, in
5 uplink, the UCI can be -- and I'll point out to my
6 declaration, the UCI is carried both within --
7 either within the PUSCH or within a PUCCH. There is
8 no example in Figure 8 which shows just the PUCCH.

9 Q It shows just the PUSCH?

10 A It just shows a PUSCH example.

11 Q If Takeda is transmitting UCI in a PUCCH,
12 how would Takeda figure out where to transmit that
13 information?

14 A So again, in Takeda and, you know, as
15 stated in my declaration, the information for
16 resource allocation in the uplink would come from
17 the appropriate downlink grant. So the same as
18 shown here. It would indicate what resources are
19 allocated, the same as the '463 that would indicate
20 which resources are being allocated for the uplink.
21 And the uplink, you know, for the UCI in this case.
22 And it can be carried in the PUSCH, or it can be

1 carried in a PUCCH.

2 So just to supplement, paragraph 148 of
3 my declaration, I note that, As described in my
4 discussion of Element 1[b] of the '463 patent -- it
5 says, quote, As illustrated in Figure 3B, in a case
6 where the uplink control channel resource set is
7 formed of the first one to four PUCCH resources, the
8 PUCCH resource indication information illustrated in
9 Figure 3C may indicate one of those four resources.

10 Q And then, Dr. Roy, if you look at your
11 next paragraph, you say, Takeda teaches that PUSCH
12 and/or PUCCH can be scheduled for transmission
13 within a particular uplink bandwidth part, correct?

14 A Correct, yes.

15 Q And we know that because the uplink
16 grants in Figure 8 inform the user equipment where
17 to transmit PUSCH or PUCCH, right?

18 A Yes, correct.

19 Q So Dr. Roy, when we talk about bandwidth
20 parts, is it possible to have more than one
21 bandwidth part configured for a user equipment at a
22 given time under 5G NR?

1 A Let me just take a minute.

2 So again, look at paragraph 150, which
3 refers to Figures 9 to 8 of Takeda, and it says,
4 Takeda shows that multiple uplink resources are
5 configured for a single uplink BWP.

6 And as shown in the annotated figure,
7 Figure 8, you have two uplink channels within a
8 single BWP. I'm not sure if that's the question you
9 were asking.

10 Q Well, Figure 8 only shows one uplink
11 bandwidth part, right?

12 A Well, it shows -- okay. Figure 8, you
13 are correct. Figure 9 shows two uplink bandwidth
14 parts.

15 So Figure 8 is missing the uplink
16 bandwidth part number 1, but it's there in Figure 9.

17 So Figure 9 shows both BWP 1 and BWP 2.

18 Q So Dr. Roy, your opinion is that Figure 9
19 illustrates uplink bandwidth part number 1 and
20 uplink bandwidth part number 2 both being configured
21 for the user equipment.

22 Is that right?

1 A That's correct, yes.

2 Q Is that they're both configured at
3 different times, or is it that they're both
4 configured at the same time?

5 A So again, I need to understand your
6 construction of time because you have a time axis.

7 So again, as you know, in 4G, 5G, time
8 is, you know, scaled in terms of subframes and parts
9 thereof, okay. So as a POSITA, we look at these --
10 the time aspects of these diagrams in units of
11 subframes.

12 So if you're talking about in units of
13 subframes, clearly this is the same time. That
14 means a UE for a particular subframe, okay, may have
15 two bandwidth parts configured.

16 Q Okay. I think that's consistent with
17 Takeda.

18 A That's correct, yes. This is -- yeah,
19 this is Takeda's.

20 Q So paragraph 114, if you want to turn to
21 paragraph 114 of Takeda.

22 A Okay. Sure, yes.

1 Q Paragraph 114, and actually 115 as well I
2 think are relevant here. The second sentence of
3 paragraph 114 says, Even when the uplink bandwidth
4 part number 2 is activated, the uplink bandwidth
5 part number 1 may be maintained active.

6 Do you see that?

7 A Right.

8 Q And do you think that active is the same
9 thing or activated is the same thing as being
10 configured for, here?

11 MR. LEE: Objection, scope.

12 A I know that this was not constructed in
13 this case. But in my opinion, if you ask me for a
14 construction, you know, these would be different,
15 okay.

16 Configuration is the information that is
17 sent to the UE to set its parameters, and activation
18 is the use of that configuration for a particular,
19 you know, scenario based on what uplink information
20 has to be sent, okay.

21 So the number of bandwidth parts we have
22 already established that is needed for an uplink

1 transmission is very variable and dynamic. So that
2 leads to using -- so essentially configuration sets,
3 the overall sort of device capabilities and
4 parameters, and activation and deactivation supports
5 its -- a use of those capabilities for a particular
6 uplink transmission.

7 Q How many bandwidth parts can a user
8 equipment be configured to use at a given time?

9 MR. LEE: Objection, scope.

10 A I wouldn't know. I would have to go back
11 and look at the specifications to answer your
12 question.

13 Q So paragraph 115 of Takeda says here, the
14 first sentence, When a plurality of uplink bandwidth
15 parts are configured in a user terminal, the same
16 uplink signal may be able to be transmitted between
17 the plurality of uplink bandwidth parts or different
18 uplink signals may be able to be transmitted.

19 But it does talk about the idea of a
20 plurality of uplink bandwidth parts being configured
21 in a user terminal, right?

22 A That is correct, yes.

1 Q So it could be two or it could be more,
2 right?

3 A Correct, yes.

4 Q Does the user equipment or does a base
5 station configure bandwidth parts for a user
6 equipment? Where does that occur?

7 MR. LEE: Objection to form.

8 A So the configuration information is sent
9 on the downlink from the base station to the user
10 equipment.

11 Q So the base station would know all of the
12 bandwidth parts that a user equipment could be
13 configured to use.

14 Is that right?

15 MR. LEE: Objection to form.

16 A Okay. So again, I'm trying to
17 understand, you know. Your question is related to
18 my declaration.

19 So again, I'll repeat that the
20 information is sent from the base station to the UE,
21 and therefore, you know, as in any 4G or 5G network
22 operation, the base station has the management, you

1 know, picture, management information necessary for
2 all the UEs that it is managing, if that's what
3 you're asking.

4 Q So if the base station sends
5 configuration information for a bandwidth part to a
6 user equipment, does the user equipment have to
7 basically adopt that configuration, or can it say,
8 you've given me five bandwidth parts to pick from;
9 I'm only going to use two, I'm only going to
10 configure the user equipment to use two?

11 MR. LEE: Objection, form, scope.

12 A So again, I'm not sure I understand your
13 question. Configuration is sort of setting the
14 general parameters for a particular UE. And I
15 think, as I've just stated before, that in a
16 particular uplink scenario, a UE may only use a few
17 of those, you know, the configured plurality of
18 bandwidth parts.

19 So it's not a contradiction or it's
20 not --

21 Q I'm not trying to be tricky or anything,
22 Dr. Roy. I'm just -- I'm really not. I'm just

1 trying to wonder, like, if you wanted to know how
2 many bandwidth parts are configured for a particular
3 user terminal, would the base station have that
4 information because it's managing the network or
5 it's managing its zone, or would the user equipment
6 have made decisions and not reported them to the
7 base station?

8 MR. LEE: Objection, form, scope.

9 A Yeah, I'm not sure again I understand all
10 the aspects of your question.

11 But I would say that from a network
12 management perspective, the base station would have
13 that information, but that would be based on
14 messages and information sent back and forth between
15 the base station and the UE.

16 Q Well, and part of the purpose of
17 configuring a user equipment for a particular
18 bandwidth part is that user equipment only has to
19 monitor that bandwidth part for signals from the
20 base station, correct?

21 MR. LEE: Objection to form, scope.

22 A That is correct, yes.

1 Q Dr. Roy, can you take a look at the last
2 page of the '463 patent, please.

3 A Okay. Last page, yes.

4 Q Yes, sir. It's claim 1.

5 A Okay, sure.

6 Q And if you recall the second step of
7 claim 1 reads, determining one of UL control channel
8 resource sets contained in the UL control channel
9 resource set configuration information.

10 Do you see that?

11 A Yes.

12 Q This claim requires -- when it says,
13 determining one of UL control channel resource sets,
14 it requires a plurality of UL control channel
15 resource sets.

16 Don't you agree?

17 A Let me just look at my declaration just
18 for a minute.

19 If you're just saying that the user --
20 the term "resource sets" indicates a plurality, yes,
21 in general, for the uplink control information that
22 you're sending, the control information -- the

1 downlink control, the DCI that is being sent to the
2 UE is used to determine which one of those uplink
3 control sets is going to be used.

4 MR. HELGE: I would say let's take a
5 ten-minute break, go off the record if that's all
6 right.

7 (Recess from 12:31 p.m. until 1:10 p.m.)

8 BY MR. HELGE:

9 Q Dr. Roy, thanks for coming back after
10 lunch here. I wonder if I could ask you to please
11 turn to Figure 9 of Takeda. It's page 69 of 78, all
12 the way in the back.

13 A Yep.

14 Q So Dr. Roy, in Figure 9 of Takeda, as we
15 talked about earlier, the uplink bandwidth part
16 number 1 and uplink bandwidth part number 2, they
17 have different frequency bandwidths.

18 Do you agree with that?

19 A Yes, agree, yes.

20 Q And in your opinion, why would a base
21 station define bandwidth parts as having different
22 frequency bandwidths?

1 MR. LEE: Objection 403.

2 A I'm not sure how to answer your question
3 because I think -- this is not addressed in my
4 declaration, but I will just, you know, try my best.

5 So as I said, the frequency content of
6 the bandwidth part is dictated by the content of
7 uplink information that's going to be sent. And so
8 that's a dynamic quantity. And how it is sent,
9 i.e., how that information is mapped to the uplink
10 control channel resources, is also a function of the
11 device capability.

12 So again, I go back to, you know, the two
13 main contributing factors in the uplink -- resource
14 allocation for uplink, which is a knowledge of the
15 devices and a knowledge of the kind of traffic and
16 the kind of information that needs to be
17 transmitted.

18 Q So if Takeda needs to change the amount
19 of resources available for an uplink control
20 information transmission, why can't Takeda just
21 change the frequency bandwidth of the bandwidth part
22 that is being used for that transmission?

1 MR. LEE: Objection, form.

2 A Again, I'm not sure what you're asking.
3 But you have two examples of two different bandwidth
4 parts, and, you know, say if you look at bandwidth
5 part number 2, depending on what the uplink grant
6 is, you are able to allocate the requisite amount of
7 frequency for -- commensurate to the amount of data
8 that's going to be needed.

9 So I think Takeda discloses principles
10 for how that is done.

11 I don't know if that's what you're
12 asking. The amount of frequency bandwidth and
13 whether you use, you know, a single allocation or
14 multiple, so, you know, multiple sets, you know,
15 within the same bandwidth part to send the
16 information, that's certainly one of the degrees of
17 freedom that's available.

18 Q So would you agree that the mismatch of
19 the UCI information and the uplink channel resources
20 in Takeda could be solved by just using a different
21 bandwidth part for the UCI transmission?

22 MR. LEE: Objection, form.

1 A Again, I'm not sure what you're asking.
2 But the mismatch occurs -- at least, you know, one
3 contributing factor to the mismatch is that this
4 configuration has been set, and there is dynamism
5 on -- at the device for the uplink transmission that
6 it is, you know, asked to do now. So the mismatches
7 occur because of that dynamism.

8 And so if the bandwidth parts are being
9 preconfigured, what you say is not going to solve
10 the problem. The way you address the problem is
11 that you use multiple channel sets for transmitting
12 the requisite information.

13 Q You said just a moment ago, the bandwidth
14 parts are preconfigured.

15 Did I hear that correctly?

16 A So bandwidth parts can also be
17 dynamically configured. But my point is this. And
18 as I said, I don't understand your question. Given
19 what a current bandwidth part configuration is, they
20 can there is can still be a mismatch, all right. So
21 given any bandwidth part configuration, there can be
22 a mismatch because of this dynamic nature, okay, of

1 what is the totality of the uplink information
2 that's going to be sent.

3 So in a future reconfiguration of the
4 bandwidth parts, that can certainly be used to
5 address your problem. But mismatches occur, as I
6 have stated in my declaration, because the amount of
7 information that needs to be sent in the uplink
8 doesn't match.

9 And, you know, again, I want to repeat,
10 the mismatches occur in both ways. It is that the
11 capacity that's allocated could be either too large
12 or it could be too small.

13 Q Looking at uplink bandwidth part number 2
14 in Takeda's Figure 9, assuming that the UCI
15 information is being transmitted in PUSCH, is there
16 a UCI information mismatch shown here?

17 MR. LEE: Objection, form.

18 A I mean, I couldn't answer that. This is
19 just an exemplar. There may be or may not be.

20 Q So there's nothing about Figure 9 that
21 would tell you whether there's a mismatch of the UCI
22 information and uplink resources in uplink bandwidth

1 part number 2.

2 Is that right?

3 MR. LEE: Objection, form.

4 A No, I couldn't tell.

5 Q Dr. Roy, do you know if Yan's solution
6 was ever adopted as a standard within 4G LTE?

7 MR. LEE: Objection, scope.

8 A So if I -- if I'm to interpret, do you
9 mean that this was adopted in one of the subsequent
10 TSs, tech specifications? No, I couldn't tell you
11 that.

12 Q So you don't know if 3GPP ever decided
13 that Yan's solution for UCI resource allocation
14 should be adopted within the industry.

15 Is that right?

16 MR. LEE: Objection, form.

17 A So again, let me be clear. So within
18 3GPP, there is certainly, in the final TS, a
19 sequence of steps for uplink, you know, channel
20 resource allocation. But if you're asking whether
21 the specific steps of Yan ever made it into a TS, I
22 do not know.

1 Q Are you aware whether the specific steps
2 of Yan ever made it into a TS or technical
3 specification for 5G new radio?

4 MR. LEE: Objection, form.

5 A No, I couldn't tell you.

6 MR. HELGE: Dr. Roy, thank you for your
7 time. Subject to your counsel having some rights to
8 redirect and ask you some more questions, in which
9 case I may be able to ask a couple more questions,
10 at this time, I will what they call pass the witness
11 to opposing counsel.

12 MR. LEE: Can we go off the record and
13 take a break.

14 (Recess from 1:18 p.m. until 1:23 p.m.)

15 EXAMINATION

16 BY MR. LEE:

17 Q I just have one question on the record.

18 Dr. Roy, earlier today during the course
19 of your deposition, there were instances where you
20 referred to your deposition, and then turned to
21 portions of your declaration.

22 What did you intend to refer to in those

1 instances where you referred to your deposition?

2 A I meant to refer to my declaration on the
3 record.

4 MR. LEE: Thank you.

5 MR. HELGE: So counsel, what I propose --
6 and I think we're probably all in agreement, and
7 Dr. Roy, it's up to you as well. But I propose that
8 as the reporter prepares the transcript, when
9 Dr. Roy said "deposition" and then turned to his
10 declaration and read from it or, for example, you
11 know, quoted it, that we just have the reporter use
12 "declaration" throughout.

13 Is that acceptable?

14 MR. LEE: We are fine with that.

15 MR. KEANE: If there was an instance
16 where he did refer to the deposition, we'll correct
17 that on the errata sheet because I'm guessing that
18 will be a much less frequent error.

19 MR. HELGE: If at all.

20 COURT REPORTER: Anything else for the
21 record?

22 MR. HELGE: Does the witness want to

1 review and sign the transcript?

2 MR. LEE: We reserve our rights.

3 (Transcript orders discussed.)

4 COURT REPORTER: Thank you. That's all I
5 need.

6 (Off the record at 1:26 p.m.)

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1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

2
3 I, Lisa V. Feissner, RDR, CRR and Notary
4 Public in and for the District of Columbia, do
5 hereby certify:

6
7 That SUMIT ROY, Ph.D., the witness whose
8 deposition is hereinbefore set forth, was duly sworn
9 by me before the commencement of such deposition,
10 and that such deposition was taken before me and is
11 a true record of the testimony given by such
12 witness.

13
14 I further certify that the adverse
15 parties, ERICSSON INC., NOKIA OF AMERICA CORP.
16 AT&T SERVICES, INC., CELLCO PARTNERSHIP D/B/A
17 VERIZON WIRELESS, GOOGLE LLC AND T-MOBILE USA,
18 INC., were represented by counsel at the
19 deposition.

20
21 I further certify that the deposition of
22 SUMIT ROY, Ph.D., occurred at the offices of

1 BUCHANAN INGERSOLL & ROONEY PC on MONDAY,
2 OCTOBER 6, 2025, commencing at 10:12 and concluding
3 at 1:26.

4
5 I further certify that I am not related
6 to any of the parties to this action by blood or
7 marriage, I am not employed by or an attorney to any
8 of the parties to this action, and that I am in no
9 way interested, financially or otherwise, in the
10 outcome of this matter.

11
12 IN WITNESS WHEREOF, I have hereunto set
13 my hand this 9th day of OCTOBER, 2025.

14
15 
16

17 NOTARY PUBLIC IN AND FOR
18 THE DISTRICT OF COLUMBIA
19 MY COMMISSION EXPIRES JUNE 15, 2028
20
21
22

Re: Deposition of **Sumit Roy, Ph.D.**

Date: 10/6/2025

Case: Ericsson Inc., at al. -v- Pegasus Wireless Innovation LLC (PTAB)

Return to: transcripts@planetdepos.com

ACKNOWLEDGMENT OF DEPONENT

I, Sumit Roy, Ph.D., do hereby acknowledge that I have read and examined the foregoing testimony, and the same is a true, correct and complete transcription of the testimony given by me and any corrections appear on the attached Errata sheet signed by me.

10-15-2025

(Date)

Sumit Roy

(Signature)