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UNITED STATES PATENT AND TRADEMARK OFFICE COURT

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

KT CORPORATION (Patent Owner) and
PEGASUS WIRELESS INNOVATION LLC (Exclusive Licensee)

Case No. IPR2025-00083
Patent 10,638,463

DEPOSITION OF JACOB SHARONY, Ph.D.

Reported By: Debra Stevens, RPR/CRR
Job No. 608556

1 DEPOSITION OF JACOB SHARONY, Ph.D.,
2 the Witness, taken by Petitioner Google LLC
3 pursuant to Notice, at the Hilton Garden Inn,
4 1575 Round Swamp Road, Plainview, New York
5 11803, on Thursday, November 20, 2025, at
6 9:05 a.m., Eastern Standard Time, before
7 DEBRA STEVENS, a Certified Realtime and
8 Registered Professional Reporter and Notary
9 Public within and for the State of New York.

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A P P E A R A N C E S

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BY: WAYNE M. HELGE, ESQ.

Attorneys for Patent Owner

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E X A M I N A T I O N S

Witness	Page
J. Sharony	
By Mr. Koopman	5

E X H I B I T S

Petitioner	Exhibits	Description	Page
	Exhibit 37	Patent Owner Response	110
		IPR Paper 37	
	Exhibit 1001	Patent No. US 10,638,463	(Prior)
	Exhibit 1007	Takeda reference	(Prior)
	Exhibit 1010	Yan reference,	
		Patent No. US 10,736,086	(Prior)
	Exhibit 1011	Marinier reference	(Prior)
	Exhibit 2005	Declaration of Dr. Jacob Sharony	(Prior)

1 Whereupon,

2 J A C O B S H A R O N Y,

3 having been first duly sworn/affirmed, was
4 examined and testified as follows:

5 EXAMINATION BY

6 MR. KOOPMAN:

7 Q. Good morning, Dr. Sharony.

8 A. Good morning.

9 Q. Would you please state your full name
10 for the record?

11 A. Jacob Sharony.

12 Q. Thank you. My name is Andy Koopman.
13 I am an attorney representing Google in connection
14 with this proceeding. Do you understand that I
15 will be taking your deposition today?

16 A. Yes.

17 Q. So I will be asking questions for you
18 to answer. My questions and your answers will be
19 recorded by our court reporter here.

20 A. Yes.

21 Q. The court reporter can only record
22 verbal responses, so please try to remember to

1 avoid any non-verbal responses like nodding or
2 shaking your head. Okay?

3 A. Sure.

4 Q. If at any point you need to take a
5 break, please let me know so that we can finish a
6 question or line of questioning and take a break
7 for you.

8 A. Yes.

9 Q. If for any reason you don't understand
10 one of my questions, please let me know and I will
11 try and clarify that question for you. Otherwise,
12 I am going to presume you understood the question.
13 Okay?

14 A. Sure.

15 Q. During the deposition you may remember
16 something that answers or adds to an earlier
17 question that you did not remember when I
18 originally asked the question. If that happens,
19 please let me know and we can take care of it at
20 that time while it is fresh in your mind. Okay?

21 A. Okay.

22 Q. Are you aware of any reason that would

1 make it difficult for you to understand my
2 questions today or prevent you from testifying
3 truthfully and accurately?

4 A. No.

5 Q. Have you understood my questions and
6 instructions so far?

7 A. Yes.

8 Q. Can you tell me what you did to
9 prepare for your deposition?

10 A. I went through my declaration, all the
11 references cited there, including the prior art,
12 Dr. Roy --

13 (Reporter interruption.)

14 A. Prior art references, documents, as
15 well as Dr. Roy deposition, declaration, and --
16 whatever is cited in my report, declaration.

17 Q. About how much time did you spend
18 reviewing those documents?

19 A. All together, around 20.

20 Q. Around 20 --

21 A. Hours.

22 Q. Twenty hours? Did you speak with

1 anyone as part of preparing for your deposition?

2 A. Yes. With counsel.

3 Q. By counsel, do you mean Mr. Helge
4 here?

5 A. Oh, yes.

6 Q. Anyone else?

7 A. No.

8 Q. Other than the documents you just
9 talked about reviewing and speaking with counsel,
10 did you do anything else to prepare for your
11 deposition?

12 A. Reviewing the documents, the patent,
13 history -- no. That's the documents I reviewed.

14 Q. Dr. Sharony, I believe you have worked
15 as a technical expert before?

16 A. Yes.

17 Q. Approximately how many times?

18 A. Twenty-plus.

19 Q. How many of those 20-plus times were
20 in patent proceedings?

21 A. Most of them.

22 Q. Were those IPRs or District Court

1 litigation?

2 A. Yeah, it was IPRs, District Court,
3 international arbitration, ITC. Yeah. Different.

4 Q. About how many IPRs have you served as
5 an expert in previously?

6 A. Ten, fifteen.

7 Q. In those IPRs were you an expert on
8 behalf of the Patent Owner or Petitioner?

9 A. Both, but it varies. So I did work
10 for plaintiff, I did work for -- on behalf of the
11 defendant. But it varies over time. Like if we
12 take a snapshot now, it is more plaintiff.

13 Q. More on the Patent Owner side?

14 A. Patent Owner, yes.

15 Q. Have you had your deposition taken
16 before in connection with those IPRs?

17 A. Yes.

18 Q. Approximately how many times?

19 A. Almost -- almost every time I wrote a
20 declaration or -- 10 to 15.

21 Q. Have you ever testified in court?

22 A. Yes.

1 Q. About how many times if you know?

2 A. Three or four times.

3 Q. Were those in patent cases?

4 A. Patent cases.

5 Q. In cases --

6 A. Arbitration. Yes, District Court, as
7 well as I was in the Hague, in the Peace Palace.

8 Q. In those cases you were testifying as
9 a technical expert?

10 A. Yes.

11 Q. Have you ever had any portion of an
12 opinion or declaration excluded in a patent case?

13 A. Not that I know of.

14 Q. About how much time would you say you
15 spend working as a technical expert as opposed to
16 any other occupation?

17 A. It varies. So, sometime I was, like
18 in the Bay Area, commuting every week,
19 Monday-Friday so most of the time was consulting
20 to an enterprise or corporation. Sometime it's
21 expert witness work, consulting. Varies, 50/50.

22 Q. About 50 percent of your work is

1 expert witness --

2 A. Yeah. I am also teaching. So, yeah,
3 about.

4 Q. Let me mention now, because it's
5 happened a couple times already, it's difficult
6 for the court reporter if we are talking over each
7 other. So, I will do my best to wait for you to
8 finish an answer.

9 A. Okay.

10 Q. If you could do your best to wait for
11 me to finish a question --

12 A. Okay.

13 Q. -- that will also give your counsel an
14 opportunity to object if he needs to.

15 A. Okay.

16 Q. How did you become aware of this IPR
17 proceeding?

18 A. I was contacted by counsel.

19 MR. HELGE: At this point I will tell
20 the witness not to get into any other
21 substance of communications we have had.

22 THE WITNESS: Sure.

1 A. About a couple of months ago, about.

2 Q. You anticipated my next question. If
3 you recall -- and you can estimate -- around when
4 were you contacted by counsel regarding this IPR?

5 A. A couple of month ago.

6 Q. A couple of months ago. By counsel
7 here, again, you are referring to Mr. Helge?

8 A. Yes.

9 Q. About how long after that were you
10 first engaged to work as an expert in this case?

11 A. What do you mean?

12 Q. So after you learned about the case,
13 about how much time until you officially were
14 engaged to be a technical expert?

15 A. Soon after we spoke on the phone.

16 Q. Do you recall approximately how soon?
17 Within a week? Two weeks?

18 A. Yeah, about. A few days.

19 Q. Before being contacted by counsel, had
20 you heard of this IPR proceeding at all?

21 A. No.

22 Q. Before being contacted by counsel, had

1 you heard of Pegasus Wireless Innovation before?

2 A. Yes.

3 Q. How had you heard of Pegasus?

4 A. I was -- this goes back more than a
5 year ago. I don't remember when I was retained
6 by -- for the District Court case.

7 Q. You were retained by Pegasus for the
8 District Court case?

9 A. Yeah.

10 Q. Do you recall who was the defendant in
11 that case, or defendants?

12 A. Many of them. All the carriers, I
13 think. AT&T, Verizon. Yes.

14 Q. And you were retained by Pegasus as a
15 technical expert in connection with that case?

16 A. Yes.

17 Q. Do you recall whether or not you
18 prepared a report in connection with that case?

19 A. Yeah. Expert report.

20 Q. Were you deposed in connection with
21 the report in that case?

22 A. Yes.

1 Q. Do you recall approximately in what
2 time frame that happened?

3 A. About half a year ago.

4 Q. But at that time you weren't aware of
5 any IPR proceeding involving Pegasus?

6 A. No.

7 Q. How many times have you been engaged
8 as a technical expert on behalf of Pegasus?

9 A. I think these are the only times.

10 Q. So twice, once in connection --

11 A. Yes.

12 Q. -- with that District Court litigation
13 and once in connection with this IPR?

14 A. Yes.

15 Q. Did that District Court case involve
16 the same patents?

17 A. Either different patent -- what do you
18 mean different patent? From what?

19 Q. From the patent involved in the IPR.

20 A. A different patent.

21 Q. Okay. So the District Court case
22 where you worked on behalf of Pegasus was in

1 connection with a different patent?

2 A. Different patent, multiple experts; my
3 understanding, yes.

4 Q. What was the technology of that
5 patent?

6 A. 5G.

7 Q. Do you know if that case is still
8 ongoing?

9 A. I think they -- I just got a couple of
10 days ago a message that I think they settled or
11 something, so...

12 Q. So before this IPR proceeding you had
13 never -- let me ask that better.

14 Before this IPR proceeding, had you
15 ever or were you at all familiar with the '463
16 Patent that is the subject of this IPR?

17 A. No.

18 Q. Do you recall whether you had ever
19 reviewed it before this IPR?

20 A. No.

21 Q. Dr. Sharony, are you being compensated
22 for your work in this matter?

1 A. I do.

2 Q. And who is paying your compensation?

3 A. The client.

4 Q. Pegasus?

5 A. I believe so.

6 Q. Are you being compensated in an hourly
7 rate?

8 A. Yes.

9 Q. What is that rate?

10 A. Six-fifty.

11 Q. Does your compensation depend in any
12 way on the result of this IPR?

13 A. Never, in any case.

14 Q. Do you have any financial interest in
15 Pegasus?

16 A. No.

17 Q. Any ownership interest in Pegasus?

18 A. No.

19 Q. Do you have any financial interest in
20 the outcome of this IPR proceeding?

21 A. No.

22 Q. I would like to ask you a little bit

1 about your educational background and employment
2 history.

3 A. Sure.

4 Q. Where did you attend college?

5 A. Uh...

6 Q. Undergraduate.

7 A. Well, I have five degrees, so let's
8 start. I had a Bachelor in electrical engineering
9 in Tel Aviv University. I also received a Master
10 of Science in Tel Aviv University. I had an MBA
11 also in that university. And then I came to do my
12 Ph.D., starting with Master's, at Columbia
13 University; and then Ph.D. at Columbia University.

14 Q. Approximately when did you receive
15 your Bachelor's degree in electrical engineering?

16 A. The first one?

17 Q. Yes.

18 A. In 1979.

19 Q. Approximately when did you receive
20 your Ph.D.?

21 A. 1993.

22 Q. What was the subject matter of your

1 doctorate?

2 A. Telecommunication networks.

3 Q. Have you ever attended law school?

4 A. Not yet.

5 Q. So you don't have any formal legal
6 training?

7 A. No.

8 Q. You are not a lawyer?

9 A. I am not.

10 Q. Are you a patent examiner?

11 A. No.

12 Q. Do you have any formal training in
13 patent law?

14 A. Not formal training.

15 Q. Where are you currently employed?

16 A. So, I have my own company, a
17 consulting company.

18 Q. What is the name of that company?

19 A. Mobius Consulting. So, owner,
20 self-employed.

21 Q. For how long have you had this
22 company?

1 A. 2004.

2 Q. And your work for this consulting
3 company is your primary occupation?

4 A. Yes. And teaching. But most of the
5 time, yes.

6 Q. What percent of your time would you
7 say is spent teaching?

8 A. Usually it is in the fall semester,
9 so -- so it is a course about 5G and application,
10 millimeter wave communication, wireless sensing.
11 So, it's usually just the fall semester. A day, a
12 couple of days a week.

13 Q. Where do you teach that course?

14 A. Columbia.

15 Q. What is the name of the course?

16 A. Millimeter Wave Communication and
17 Application for 5G.

18 Q. And that is a course you teach once a
19 year?

20 A. Usually once a year. Sometimes they
21 skip a year.

22 Q. So no more than once a year?

1 A. No.

2 Q. How long have you taught that course?

3 A. The 5G, at least four times.

4 Q. And before that, were you teaching
5 other courses at Columbia?

6 A. Wireless Sensing.

7 Q. How long did you teach that Wireless
8 Sensing course?

9 A. A couple of times. Two, three times.

10 Q. Any other courses -- have you taught
11 any other courses?

12 A. Stony Brook University, Auto ID
13 Technology. Like barcode, RFID.

14 Q. Any other courses?

15 A. No.

16 Q. I believe you said the subject matter
17 of your doctorate was in telecommunications. Is
18 that correct?

19 A. Yes.

20 Q. Did you do any work in
21 telecommunications after receiving your doctorate?

22 A. During and after, yes.

1 Q. Where did you do that work?

2 A. IBM Research up in Hawthorne, New
3 York. And then I worked for a company that did
4 work for the U.S. Department of Defense. Then a
5 company, Symbol Technologies, that was acquired by
6 Motorola. So this went until about 2004 or '5,
7 where I basically founded the consulting company.

8 Q. That is when you founded Mobius?

9 A. Yes.

10 Q. What were your responsibilities at
11 Symbol Technologies?

12 A. I was senior director of R&D and
13 senior director technology strategy.

14 Q. What kind of products or services were
15 you working on at that time?

16 A. So, we were the forefather of WiFi at
17 the time, so we designed, manufacture access
18 points, mobile devices and solution to different
19 vertical markets like health care, education,
20 transportation, logistics. This involved also
21 several technologies, including cellular, where
22 you have like a truck in the logistic

1 transportation.

2 So, yeah, we did many first of its
3 kind at the time before it became technology in
4 every home or every enterprise, and many
5 solutions. So, the notion was like capturing data
6 and moving it to information system. To quote our
7 CEO, we connect between atoms and bits.

8 Q. I think you said your work included
9 wireless access points?

10 A. Yes.

11 Q. What WiFi standards were in place at
12 that time if you recall?

13 A. All the way starting from 802.11 and
14 then the standard was amended, we added letters,
15 like 802.11a, 802.11b, 802.11g, 802.11n, ac, et
16 cetera. So, from the beginning, before it was
17 called WiFi. And the reason was that we need,
18 basically, mobility. For example, you can think
19 about, like Macy's. You have to take inventory
20 control. So you have employees walking down the
21 aisles and capturing information.

22 Q. And this was during your time at

1 Symbol Technologies?

2 A. Yes.

3 Q. I think you also said you did some
4 work in the cellular space at Symbol?

5 A. Yes.

6 Q. Do you recall what communication
7 standards were in place for cellular at that time
8 that you worked with?

9 A. At that time it was 3G mainly. LTE
10 came later after I left. So, it was like a
11 gateway inside a truck. So think about, like, UPS
12 or FedEx. They come to your door, they basically
13 scan a package -- basically like a barcode at the
14 time. And then it will communicate through WiFi
15 to the truck that will basically upload the
16 information via cellular.

17 Q. And at that time it would have been
18 3G?

19 A. 3G, 2G. Yes.

20 Q. 2G or 3G at that time?

21 A. Yes.

22 Q. Did you continue doing

1 telecommunications work after founding Mobius?

2 A. Yes. I worked for a company in the
3 Bay Area. We did the first small cell with LTE
4 technology, LTE 4G. Then another company in the
5 Bay Area -- well, the first one was more south of
6 L.A. It was not the Bay Area. It was between
7 L.A. and San Diego.

8 Another company in the Bay Area, a
9 semiconductor company that did work on millimeter
10 wave communication, and we developed solutions for
11 5G.

12 Q. What was the first company? What was
13 the name of the first company?

14 A. Powerwave Technologies.

15 Q. Do you recall around when you
16 consulted with Powerwave Technologies?

17 A. 2011, for about two years until 2013.

18 Q. And specifically what products or
19 services were you consulting with respect to at
20 that time for Powerwave?

21 A. Cellular technology, 4G, small cells.
22 Small cells are equivalent to the big towers of

1 cellular towers that we see, just smaller. And
2 usually you deploy it in train stations, where you
3 cannot put big towers; malls and where people
4 congregate. So, where there are many people, so
5 you provide. So we outfitted it with LTE as well
6 as WiFi. And I got several patents on this also.

7 Q. At this time the communication
8 standard would have been 4G LTE?

9 A. 4G LTE.

10 (Brief reporter clarification.)

11 Q. What does LTE stand for?

12 A. Long-term evolution.

13 Q. And so you consulted for Powerwave
14 with respect to the creation of small cell 4G LTE
15 networks?

16 A. Yes, and WiFi.

17 Q. And WiFi.

18 Any other telecommunications work you
19 did for Powerwave?

20 A. This was the main activity that I was
21 hired for.

22 Q. What was the name of the second Bay

1 Area company you mentioned if you recall?

2 A. It was Lattice Semiconductor, and they
3 acquired a company that came out of Berkeley.
4 Something with Image. Anyway, it involved
5 millimeter wave communication. So the original
6 product of the first company was -- millimeter
7 wave are extremely fast. We are talking about
8 gigahertz of spectrum and speeds. It was mainly
9 for inside a room, for gaming, et cetera. And I
10 was hired to develop solution for 5G for
11 telecommunication. So, we used this technology to
12 develop for 5G.

13 Q. What kind of solution was Lattice
14 looking for?

15 A. Backhaul.

16 (Reporter interruption.)

17 A. Basically connecting base station to
18 the core network.

19 MR. HELGE: B-A-C-K-H-A-U-L.

20 Q. Let me ask again.

21 What kind of solutions were you
22 consulting on for Lattice at that time?

1 A. Creating links, millimeter wave
2 communication -- millimeter waves are north of 30
3 gigahertz, very high in the spectrum -- links
4 between the towers to the core networks, looking
5 also connecting to mobile devices.

6 Q. Was your work for Lattice then more on
7 the hardware side or on the software or protocol
8 side, or something else?

9 A. System. So, it involved also
10 protocol. It's system. It's not like circuit
11 design if you refer to the hardware or something
12 like that.

13 Q. It was more the whole system?

14 A. Yes. Architecture. Yes.

15 Q. Was that work specific to any
16 telecommunication standard during your time at
17 Lattice?

18 A. Yes.

19 Q. What standards were in place at that
20 time?

21 A. Both WiFi as well as 5G. In WiFi, it
22 was 802.11ad. This was the very early days of 5G,

1 so...

2 The technology also of millimeter wave
3 was very relatively new, so we basically tried to
4 fit it into -- there are many challenges because
5 it is a very high frequency. So, how to do the
6 channels and how to use it.

7 Q. Was your work for Lattice more on the
8 millimeter wave side or more on the 5G side?

9 A. Well, millimeter wave is part of 5G.
10 Different carrier. I mentioned very high
11 frequency, very high bandwidth to support very,
12 very high-speed applications. But it was mainly
13 millimeter wave frequencies.

14 Q. Your work for Lattice was mainly
15 focused on millimeter wave frequencies?

16 A. Yes. Different systems. There are
17 big companies that also approached us to design
18 communication in something that goes in the sky,
19 very high in the sky.

20 Q. Did you do any work for those other
21 companies that approached you?

22 A. There were several companies. At that

1 time it was very, I should say, popular to have an
2 unmanned vehicles in the sky to deliver cellular
3 service in remote area. One of them is Google.
4 Google had balloons in the air that were
5 communicating using the technology.

6 Q. The millimeter wave technology you
7 mentioned?

8 A. Yes.

9 Q. Aside from your consulting for
10 Powerwave and Lattice, have you done any other
11 telecommunications work during your time at
12 Mobius?

13 A. Several companies, small -- small --
14 Department of Defense. Small things. Not...

15 Q. Have you done any telecommunications
16 work more recently than during your time at
17 Lattice?

18 A. Mainly teaching, you know, the course
19 of 5G.

20 Q. I see.

21 A. So basically preparing the course.

22 And I have many colleagues in the industry in 5G,

1 and 6G. 6G is coming. So it was kind -- they
2 would come also in order to give the students,
3 expose the students what is going on in the
4 industry. So, yes. So this was the main
5 activity.

6 Q. Just so I am clear, what was the time
7 frame in which you consulted for Lattice?

8 A. This is around 2013, '15, plus or
9 minus a year maybe.

10 Q. And since then your telecommunications
11 work has involved teaching the course you
12 mentioned at Columbia?

13 A. Teaching and also small things, as I
14 mentioned, with the UAV that came later, maybe in
15 the upper -- between 2015 to '20, 2020.

16 Q. What was between 2015 and 2020?

17 A. What I mentioned with the unmanned
18 aircraft in the stratosphere. At that time, there
19 was also the Google balloons. Facebook also had
20 something there.

21 Q. Other than that, any consulting work
22 in the telecommunications space since your time at

1 Lattice?

2 A. Yes. That is what I mentioned between
3 '15 to 2020.

4 Q. I am just asking, other than what you
5 have mentioned with respect to the unmanned
6 aircraft, have you done any telecommunications
7 consulting since your time at Lattice?

8 A. Mainly in academia, not -- I cannot
9 recall specific companies.

10 Q. Since Lattice, your telecommunications
11 work has been mainly in academia?

12 A. I mentioned Lattice and the previous
13 company because it lasted like at least two years.
14 There was something, something small. I do not
15 even recall. You know, like less than a month or
16 something, an architecture.

17 Q. I am just trying to make sure I
18 understand the timeline.

19 A. Okay.

20 Q. Since your time consulting for
21 Lattice, your telecommunications work has mainly
22 been in academia and not on the consulting side?

1 A. Academia and small gigs with smaller
2 companies after that.

3 Q. The smaller companies were what you
4 mentioned with respect to unmanned vehicles or
5 with Facebook?

6 A. Yes. Department of Defense.

7 Q. So we have talked a little bit already
8 about 5G and 4G LTE. I have a few questions about
9 that just so we are clear on the terms we are
10 using.

11 A. Sure.

12 Q. Let's start basic. What is 5G?

13 A. Okay. So, in telecommunication,
14 basically each standard or technology is basically
15 given a generation. So like the first, we had
16 analog. Later we had digital. It is like a
17 second generation was GSM, the third generation
18 was UMTS, the fourth generation was LTE; and the
19 five generation, it's a completely new radio, new
20 architecture. It's called 5G. And maybe in 2030
21 we'll have 6G.

22 Q. 5G is the fifth generation

1 telecommunication standard?

2 A. Yes.

3 Q. This is for what we would call
4 cellular telecommunications primarily?

5 A. Yes.

6 Q. Do you know around when the 5G
7 standard was formally adopted?

8 A. Adopted, or --
9 About four years ago.

10 Q. Around 2021?

11 A. Well, the standard started way before
12 then, but it takes time until the carriers invest
13 money. It's new infrastructure. And then mobile
14 devices. So now -- well, there are still many
15 places in the world that use 4G. But I would say
16 only in recent years -- about every 10 years we
17 have new generation, about.

18 Q. And to the best of your recollection,
19 5G was formally adopted around 2021?

20 A. Around, yes.

21 Q. I think you answered this already but
22 just so we are clear, what was the

1 telecommunication standard before 5G called?

2 A. 4G LTE.

3 Q. How does 5G differ from 4G LTE?

4 A. Very different. Up until 4G I would
5 say the main focus was give me more speed so I can
6 support all kind of application. 4G was very
7 successful at the time. If you recall, mobile
8 browsing, et cetera.

9 5G is different because now we have
10 other goals like -- we have main three pillars.
11 One is enhanced mobile broadband, which is give me
12 speed, more speed. Two, ultra-reliable low
13 latency. For example, you want to do remote
14 surgery in a different continent or you have
15 surviving cars and have to make decision in
16 subsecond and the like. So, ultra-reliable and
17 very low latency.

18 The third one was machine-type
19 communication. These are for Internet of Things
20 and billions of devices are connected. Each one
21 has its own characteristics. So 5G basically
22 defined completely different numerology, different

1 structure of frames, slots for each one of them
2 depending what the mobile device is doing at the
3 moment.

4 This is a big difference on the
5 architecture and applications that you want to
6 support in 5G, not to mention that also the
7 millimeter wave, which are very high in the
8 spectrum, again, to have lots of very wide
9 spectrum with very high speed, high capacity. We
10 can support many users, billions of Internet of
11 Things, devices. So, you need a lot of capacity.

12 Q. You said with 4G LTE the goal was very
13 high-speed communication?

14 A. Mainly.

15 Q. Mainly the goal for 4G LTE was very
16 high-speed communication?

17 A. Yes.

18 Q. And with 5G, I think you said, that is
19 still one of the goals is high-speed
20 communication?

21 A. Enhanced mobile broadband.

22 Q. And that includes high-speed

1 communication?

2 A. Yes.

3 Q. And 5G has some additional goals in
4 addition to the goal of high-speed communication?

5 A. Yes.

6 Q. But both 4G and 5G share that goal of
7 high-speed telecommunication?

8 A. What do you mean by "share"?

9 Q. They both have the same goal.

10 A. For example, 3G is also high speed
11 but nothing is shared with LTE. High speed, it's
12 a different framework.

13 Q. So I think one of the goals you
14 mentioned for 5G in addition to high speed is
15 capacity. Is that correct?

16 A. Well, I mentioned the three main
17 different solution: Enhanced mobile broadband,
18 which is high speed, high capacity. Then we have
19 ultra-reliable communication with very low
20 latency. And the third one was machine-type
21 communication for Internet of Things, supporting
22 many, many, billions of devices which are very

1 different from each other.

2 Q. Let's talk about the enhanced mobile
3 broadband. That is one of the pillars of 5G?

4 A. Yes.

5 Q. And that goal involves achieving
6 high-speed communication and high-capacity
7 communication?

8 A. Mainly, yes.

9 Q. How does 5G go about achieving
10 high-capacity communication?

11 A. Very large spectrum. We are talking
12 about close to gigahertz compared to, like, 4G
13 which, you know, used the carriers, which are
14 basically -- it could be 5, 10, 20 megahertz. And
15 each one of these carriers means a different
16 radio. In 5G, you have it in one radio.

17 Q. So one way 5G improved on capacity is
18 with a broader spectrum for communication?

19 A. Very, very broad. Yes.

20 Q. Compared to 4G?

21 A. Yes.

22 Q. Are there any other ways you are aware

1 of that 5G improved on the capacity of 4G beyond
2 just using a larger spectrum?

3 A. Yes. So I mentioned before that there
4 are different numerologies -- and I will explain
5 what it means -- when it comes to 5G. So in LTE,
6 they use a technology called OFDM, which consists
7 of many subcarriers that are spaced 15 kilohertz.

8 When we moved to 5G, the different
9 numerology now, it's like 15 kilohertz, if I
10 remember the formula, multiplied by 2 to the power
11 of U. So, it could be 15, 30, 60, 120, 240. And
12 each one of them is catering to different type of
13 deployment scenario. For example, if you want
14 more coverage, if you want to use millimeter wave
15 for high spectrum, if you want to use high
16 capacity.

17 So, each one of them would basically
18 use different frame structure, slots, symbols. So
19 we have basically different -- different framework
20 architecture that supports each one of these goals
21 or solutions. For example, if you want
22 ultra-reliable low-latency communication, you want

1 that the symbols would be very short, the frames,
2 the slots; thereby, you would go with very high
3 spacing of subcarrier, maybe 240 kilohertz instead
4 of 15 in LTE.

5 So -- because the frequency domain is
6 inverse to the time domain. So if you want very
7 short timing, you expend it in the frequency
8 domain. So, that's how it is built.

9 Q. When you say subcarriers, this is a
10 concept that exists in both 4G and 5G, right?

11 A. And WiFi. Basically when you go very
12 high speed it's very hard to create one channel
13 that is very high speed. What we do, we basically
14 make multiple -- it is called subcarrier --
15 multiple subcarriers that are slower. Maybe I can
16 create like a hundred slower parallel streams. I
17 just give a numerical example.

18 Let's say you want to send 1 gigabit
19 per second, 1. It's hard to do because the bits
20 are very close to each other. It would be easier
21 to do a hundred small stream, each one
22 10 megahertz, right -- 10 megabits per second.

1 Ten megabits per second multiplied by a hundred is
2 about a kilobit per second. So that is what we
3 do. It is called OFDM, which uses multiple
4 subcarriers.

5 Q. This was a concept that was in 4G?

6 A. I think we started it even with WiFi
7 in 802.11a.

8 Q. But it was also in 4G?

9 A. Yes.

10 Q. And is still being used in 5G?

11 A. Yes.

12 Q. But in 5G the subcarriers can have
13 different sizes?

14 A. Spacing.

15 Q. Spacing?

16 A. Yes.

17 Q. Are there any other common frameworks
18 between 4G and 5G? And I mean telecommunication
19 framework.

20 A. I think they are incompatible because
21 of the different numerologies.

22 Q. And I am not asking whether the two

1 are compatible. What I am asking is, we talked
2 about this subcarrier framework, which is the
3 framework that existed in 4G and 5G.

4 A. Yes.

5 Q. Are there other common
6 telecommunications frameworks between 4G and 5G?

7 A. There are the 15 kilohertz, which is
8 anchored, fixed in LTE, and they use it also in
9 5G. But 5G added, for the flexibility in the
10 different solutions.

11 Q. 5G provides more flexibility in the
12 spacing between subcarriers?

13 A. Yes. It is 15, 30 -- it's really 15
14 multiplied by 2 to the N or to the U, mu.

15 Q. Who decides what's part of the
16 telecommunication standard like 4G or 5G?

17 A. What do you mean?

18 Q. Where does the standard come from?
19 Who or what creates the standard or propagates the
20 standard?

21 A. So there is a body called 3GPP. Like
22 in WiFi, it's IEEE. So you have many

1 representatives from many companies -- the
2 carrier, the vendors, the semiconductors -- that
3 work together for years to basically design a new
4 standard, a new protocol. And it takes a long
5 time, years. Eventually -- and usually there are
6 multiple proposals, and they have to vote and
7 decide eventually what goes into the standard.

8 They have to do -- these are mainly
9 research scientists that -- because many of the
10 decisions require rigorous analysis, simulations.
11 We have participants from the whole wide industry.

12 Q. It was the 3GPP organization that put
13 out the 4G LTE standard?

14 A. Yes.

15 Q. And later it was the 3GPP organization
16 that put out the 5G standard?

17 A. Yes.

18 Q. Do you know around what time period
19 that 3GPP body was working on or developing the 4G
20 standard?

21 A. The first draft was -- I think they
22 released around 2008 I think. But it was still

1 not, you know, deployed. So the first standard
2 was draft in 2008. We worked on it in 2011, '13,
3 to develop these small cells. It takes several
4 years before it is deployed. It is always like
5 this. When you have a new technology it takes
6 10 years usually.

7 Q. Do you recall then around when 4G was
8 officially adopted by the 3GPP group?

9 A. Around 2008, about.

10 Q. So that -- I think you said that was
11 when the first draft of the 4G standard was
12 introduced. Is that right?

13 A. Or standard, yes. About.

14 Q. And how long after that before it was
15 formally adopted by the 3GPP group or --

16 A. No, no. This is already the standard.

17 Q. Okay. I think you said "we worked on
18 it." Did you work with or work as part of the
19 3GPP group during that time?

20 A. So I am only -- we had a special guy,
21 a standard guy that would go and participate and
22 go to all kind of exotic places around the world,

1 the conferences. But I followed it and monitored
2 it.

3 Q. So --

4 A. But I participate -- actually, I even
5 presented one time. It's somewhere on the
6 internet, a presentation that relates to that, to
7 LTE.

8 Q. So once you presented at the 3GPP, at
9 a meeting of the 3GPP group?

10 A. Yes.

11 Q. When was that, if you recall?

12 A. It was maybe around '13 or '15.

13 Q. 2013 or 2015?

14 A. '15 maybe. We can find it.

15 Q. I am sure of that.

16 During the time the 3GPP group was
17 developing 4G, you said you were monitoring what
18 they were doing but you weren't attending the
19 conferences?

20 A. Yes. They release drafts every now
21 and then.

22 Q. And was it your practice at that time

1 to review the drafts they were releasing?

2 A. Well, as someone in the field, you
3 have to.

4 Q. Now let's jump forward to 5G. When
5 was 3GPP group working on the 5G standard, around
6 what time?

7 A. You know, I said about 10 years after
8 the other one. So --

9 Q. Would that be like 2018?

10 A. Around '15, '18. That time. Starting
11 to work on it, yes.

12 Q. Around that time, between 2015 and
13 2018, in that window is when the 3GPP group
14 started working on the 5G standard?

15 A. Around, yes. Around, if I recall.

16 Q. Did you attend any of the 3GPP
17 conferences relating to the development of the 5G
18 standard?

19 A. Not attending, no. I am just thinking
20 about the presentation that I gave was more 4G or
21 5G.

22 Q. Well, you said that presentation was

1 around 2013 or two thousand --

2 A. '15. Yeah. Anyway, it started around
3 2015 or so.

4 Q. Your presentation was on LTE?

5 A. I believe so, if I recall. Yes.

6 Q. So for the 5G development, you didn't
7 attend any of those conferences?

8 A. Not physically.

9 Q. Do you recall when the first 5G draft
10 was released by the 3GPP group?

11 A. Around -- around -- these are drafts.
12 Around '16, '17, '18. So these are not final.
13 There would be changes, proposals all the time.

14 Q. I understand. As best you recall, the
15 first draft would have been around 2016?

16 A. Maybe. Yeah.

17 Q. Maybe. It was finalized, I think you
18 said, around 2021?

19 A. About -- around '20.

20 Q. So 3GPP group started releasing drafts
21 around 2016 and finalized the 5G standard around
22 2020?

1 A. About. It takes several years to
2 develop the standards, another several years to
3 really deploy it so it is a meaningful
4 penetration.

5 Q. So during that time frame is -- during
6 the 2016 to 2020 time frame is when the 3GPP group
7 was developing the 5G standard and rolling it out.
8 Is that right?

9 A. Around. Yes. That's what I recall.
10 Around 2015 to '20.

11 MR. KOOPMAN: We have been going about
12 an hour. Why don't we take a break.

13 (Recess.)

14 BY MR. KOOPMAN:

15 Q. Dr. Sharony, I am going to be handing
16 you an exhibit that is previously marked in the
17 lower right-hand corner as Exhibit 1001.

18 A. Yes.

19 Q. Do you recognize that document?

20 A. Yes.

21 Q. Can you tell us what it is?

22 A. That is a patent at issue, '463.

1 Q. The patent that is at issue in this
2 IPR?

3 A. Yes.

4 Q. For the record, I will say that patent
5 bears U.S. Patent No. 10,638,463. Is that
6 correct?

7 A. Correct.

8 Q. If I refer to the '463 Patent, you
9 will understand I am referring to Exhibit 1001?

10 A. Yes.

11 Q. I believe it was your testimony that
12 you reviewed the patent in preparation for the
13 deposition today. Is that correct?

14 A. I did.

15 Q. Can you tell us, what is the subject
16 matter of the '463 Patent?

17 A. It is about resource allocation,
18 method, apparatus in the uplink. Uplink control
19 channel resource allocation for new radio. New
20 radio is for 5G.

21 Q. New radio means the same thing as 5G?

22 A. Usually, yes. It is a general phrase,

1 but it is called 5G NR, NR for new radio.

2 Q. What is uplink control channel
3 resource allocation in the context of
4 telecommunication?

5 A. So, we have a base station and we have
6 user equipment, also called UE. And the
7 communication is bidirectional. So the user
8 equipment, or UE, has to send things back to
9 the -- it is like we talk. You talk, I talk.
10 Sometimes I have to acknowledge what you say. So
11 the UE has to basically send feedback to the base
12 station: I didn't receive the packet that you
13 sent or I received it correctly or this is the
14 state of the channel or I want to do a scheduling
15 request.

16 So, there is traffic that goes from
17 the UE upwards, uplink to the base station. And
18 in order to do that you need resources, frequency,
19 time slot. So that's -- that's what it is about
20 in this patent, how we send uplink control
21 information, or UCI -- I am telling you also the
22 acronym -- UCI back to the base station. So, you

1 need resources. So, that is how we basically send
2 it, uplink.

3 Q. And the resources here are time and
4 frequency?

5 A. Yeah. In OFDM you have subcarriers
6 and you have slots. You know, I like to give an
7 example, like in the class. Think about like a
8 chessboard. The horizontal axis is time and the
9 vertical is frequency. So each one of these --
10 this is, of course, simplified. But each one of
11 these squares is a resource that is basically
12 dedicated or assigned to you so you can use it
13 without colliding with others or creating
14 interference.

15 Q. And so the '463 Patent is concerned
16 with how to allocate those resources for uplink
17 control information?

18 A. In general, yes.

19 Q. Let's revisit a few of the terms you
20 said and make sure we're on the same page there.

21 What is a base station?

22 A. Base station is an access device that

1 is connected to the core network of the carrier,
2 like T-Mobile, AT&T. So we, the users, iPhone or
3 android, we communicate through the access device
4 or the base station, then send it to the core
5 network that is connected to the internet. And
6 that is how we browse, for example, or send email.

7 Q. So in the context of cellphones, would
8 a cellphone tower be an example of a base station?

9 A. Yes.

10 Q. Another term you used is user
11 equipment or UE. What is a UE?

12 A. iPhone, android. These are the phones
13 that we use.

14 Q. This is like the end user device?

15 A. Yes.

16 Q. Would a user terminal be a UE?

17 A. Sorry?

18 Q. Would a user terminal be a UE?

19 A. Yeah.

20 Q. And uplink control information, which
21 I think you abbreviated UCI?

22 A. Yes.

1 Q. What is uplink control information?

2 A. So the UE or the phone is sending
3 feedback or information that is useful for the
4 base station. For example, if I didn't receive a
5 packet, so if I send a negative acknowledgement,
6 the base station will send it to me again. If I
7 send a positive acknowledgement, it would
8 continue.

9 So, you have to -- it is like when I
10 talk to you -- "oh, I didn't hear you" -- I will
11 repeat myself. That is the same thing.

12 And sometime you want to send channel
13 state information. This is important, if there is
14 like interference, low signal. The base station
15 has to know it, maybe to up the power a little
16 bit. So, this is important.

17 And sometime you want to -- you have a
18 request to "Give me resources, I need to send
19 something." This falls under UCI, or uplink
20 control information.

21 Q. The word uplink, do I understand
22 correctly that that refers to transmissions from

1 the UE to the base station?

2 A. Correct.

3 Q. Transmissions in the other direction,
4 from the base station to the UE, would those be
5 downlink transmissions?

6 A. Correct.

7 Q. And when we talk about control
8 information, is there another type of information
9 that can be transmitted as an uplink
10 communication?

11 A. Data. So we have control and data.

12 Q. What is the difference between control
13 information and data information?

14 A. Data, for example you browse the
15 internet or you stream video. Control is
16 basically "give me resources," or "the packet that
17 you sent is not -- I didn't receive it correctly."
18 So, these are control. It is not like useful data
19 for the user experience, like streaming video or
20 something like that.

21 Q. And so the '463 Patent is again
22 concerned with resource allocation for this uplink

1 control information. Is that right?

2 A. Yes.

3 Q. If I can refer you to the last page of
4 Exhibit 1001?

5 A. Yes.

6 Q. Do you see in column 21, claim 1 on
7 that page?

8 A. I do.

9 Q. In general, what is the subject matter
10 covered by claim 1 of the '463 Patent?

11 MR. HELGE: Object to form.

12 A. It is a method claim that -- it is a
13 method claim transmitting uplink control
14 information to a UE or user device.

15 Q. Is it your understanding that claim 1
16 is a 5G method?

17 MR. HELGE: Object to form.

18 A. It's a method. It doesn't say 5G.

19 Q. It doesn't say 5G. So, do you have an
20 understanding of whether claim 1 covers a 5G
21 method or not?

22 MR. HELGE: Object to form.

1 A. I didn't do like infringement analysis
2 so I cannot say -- I am not in a position to say
3 that 5G satisfies all the...

4 Q. You are not in a position to say
5 whether the 5G standard practices this method?

6 A. I didn't do this analysis. I never
7 did, also in the previous case, so I cannot
8 comment on that.

9 Q. Okay. I just wanted to be clear. You
10 are not in a position to say whether or not the
11 method of claim 1 is performed according to the 5G
12 standard?

13 MR. HELGE: Object to form.

14 A. I will repeat myself. I didn't do
15 analysis to check that each and every limitation
16 of claim 1 is satisfied by 5G.

17 Q. Let's walk through those limitations
18 then.

19 A. Okay.

20 Q. We see at the top the preamble recites
21 "a method of transmitting uplink (UL) control
22 information by a user equipment, the method

1 comprising." Is that right?

2 A. Yes.

3 Q. And we have already discussed, I
4 think, what is uplink control information, right?

5 A. Yes.

6 Q. We have already talked about what user
7 equipment is, right?

8 A. Yes.

9 Q. Before the '463 Patent, were there
10 methods known for transmitting uplink control
11 information by user equipment?

12 A. What do you mean? That there are
13 other --

14 Q. I can break that down for you. Let's
15 look at the 4G standard, for example. There is
16 user equipment in 4G, right?

17 A. Correct.

18 Q. And that is the phone in one example,
19 right?

20 A. Sorry? There is UE, yes.

21 Q. For example, a cellular phone is an
22 example of UE?

1 A. Yes.

2 Q. Okay. And in the 4G standard there
3 was or is uplink control information, right?

4 A. Yes.

5 Q. So according to 4G, it was possible to
6 transmit uplink control information by a user
7 equipment; is that right?

8 A. Yes. For example, I didn't receive
9 the packet, send it back. Yes.

10 Q. That would be one example of
11 transmitting uplink control information by a user
12 equipment in 4G?

13 A. In that specific example.

14 Q. That is just one example that was
15 practiced according to the 4G standard. Is that
16 right?

17 A. I am just saying that a UE conforming
18 to the LTE standard would send UCI to the base
19 station. This is in general.

20 Q. Dr. Sharony, do you recall whether you
21 provided any opinion in your declaration about
22 whether or not the preamble is limiting of claim

1 1?

2 A. I didn't opine on this.

3 Q. Do you recall whether you provided any
4 opinion as to whether or not any of the prior art
5 references in the petition teach just the
6 preamble?

7 A. I didn't opine on this.

8 Q. Okay. Why don't I -- in case you need
9 to check it, why don't I go ahead and hand you a
10 document that has been previously marked in the
11 lower right-hand corner Exhibit 2005.

12 Dr. Sharony, do you recognize that
13 document?

14 A. Yes. My declaration.

15 Q. That is the declaration you submitted
16 in connection with this IPR proceeding?

17 A. Yes.

18 Q. How long did it take you to prepare
19 this declaration?

20 A. A couple of weeks. It was back and
21 forth. Yeah.

22 Q. Back and forth with whom?

1 A. With counsel.

2 Q. Mr. Helge?

3 A. Yes.

4 Q. Do you recall about how much time
5 during that two weeks it took you to arrive at the
6 final declaration that was filed in the case?

7 A. About 30, 40 hours.

8 Q. Did you review any documents in
9 preparing your declaration?

10 A. Yes. The one that I mentioned.
11 Actually, I listed the material that I used.

12 Q. Would that be in --

13 A. Page 7.

14 Q. Paragraph 12?

15 A. Yes.

16 Q. You reviewed all the materials listed
17 in paragraph 12 in preparing your declaration?

18 A. Yes.

19 Q. As you sit here, can you remember
20 anything else you might have looked at that isn't
21 listed here that you relied on in preparing your
22 declaration?

1 A. Well, there are documents to refresh
2 my mind, like the standards and this. I didn't
3 put it here, but yeah. Like the 5G LTE. So, I
4 may have looked at them.

5 Q. You may have looked at the standards
6 in addition to what you listed here?

7 A. Yes.

8 Q. Anything else?

9 A. Not that I recall. I think this is a
10 complete list.

11 Q. Can I refer you to paragraph 39 of
12 your declaration?

13 A. Thirty-nine.

14 Q. Paragraph 39 of your declaration sets
15 forth claim 1 of the '463 Patent. Is that right?

16 A. Yes.

17 Q. And it looks like you used certain
18 labels for the various limitations of claim 1,
19 such as 1[a], 1[b], et cetera. Do you see that?

20 A. Yes.

21 Q. If I use those same labels, will you
22 understand that I am referring to the limitations

1 as you labeled them in your declaration?

2 A. Yes.

3 Q. We already talked about the preamble,
4 which you labeled 1[pre]. Is that right?

5 A. 1[pre].

6 Q. Let's move to limitation 1[a] of claim
7 1 which recites "receiving, from a base station,
8 UL control channel resource set configuration
9 information for UL control information
10 transmission." Is that right?

11 A. Yes.

12 Q. We already talked about what a base
13 station is, right?

14 A. We did.

15 Q. What is UL control channel resource
16 set configuration information?

17 A. This is basically the configuration
18 that describes the bandwidth parts and resource
19 sets in each bandwidth part and the group of
20 resources in each resource set.

21 Q. Let's take a step back. What is UL
22 control channel -- hang on. First, UL means

1 uplink, correct?

2 A. Correct.

3 Q. So what is an uplink control channel?

4 A. It's a channel where we send uplink
5 control information.

6 Q. Did 4G have uplink control channels?

7 A. We said, every UE has to send control
8 information to the base station.

9 Q. So then --

10 A. But this is -- you chopped the
11 sentence. It is uplink control channel resource
12 set configuration information. And this has a
13 context based on the intrinsic record.

14 Q. I understand. And I am just asking --
15 for now I am just asking how these terms are
16 generally understood in the telecommunications
17 art. I believe it was your testimony that an
18 uplink control channel is a channel where the UE
19 sends uplink control information?

20 A. Yes.

21 Q. And did 4G have uplink control
22 channels?

1 A. Yes.

2 Q. So what is an uplink control channel
3 resource set?

4 A. Here is -- the context that come with
5 5G, it is basically -- the resource set
6 configuration information is comprised of a list
7 of bandwidth parts, again based on the record --
8 of bandwidth parts, BWP. There are several of
9 them. In each one we have multiple resource sets
10 where a set is a group of resources where the UE
11 will send the information, the UCI.

12 Q. So an uplink control channel resource
13 set is a group or set of resources that the UE can
14 use to transmit UCI. Is that right?

15 A. So, we will have to use some acronyms.
16 Think about the hierarchy of we have bandwidth
17 parts, we have several of these. Each one has
18 several sets and each set has several resources
19 that are used by the UE to send the UCI.

20 Q. So I --

21 A. I think picture 3B in the patent
22 basically shows exactly, you know, in a pictorial

1 way, what I said, what I have just said.

2 Q. I am just asking generally what the
3 term means, but let me see if I understood this
4 correctly.

5 A. Okay.

6 Q. An uplink control channel resource set
7 is a set of resources within a bandwidth part that
8 the UE can use to send uplink control information.
9 Is that right?

10 A. This is one of the sets. There are
11 multiple sets. We have to choose one set, and
12 then in that set we have group of resources. We
13 will use one of the resources to send the
14 information, the UCI.

15 Q. So the uplink control channel resource
16 set is one set -- there may be multiple -- but it
17 is one set of resources within a bandwidth part
18 that the UE can use to send uplink control
19 information. Is that right?

20 A. Yes.

21 Q. Were there uplink control channel
22 resource sets in 4G?

1 A. Not in that context.

2 Q. What do you mean "in that context"?

3 A. In 4G, you have certain resources that
4 are located at the edge of the spectrum, the lower
5 part of the spectrum and upper part of the
6 spectrum. And the UE would know, based on certain
7 formula, which one to use to send the uplink
8 information.

9 Q. So let me make sure I am clear on
10 this. I think we established before that 4G had
11 uplink control channels, right?

12 A. Yes. It's called PU -- physical
13 uplink control channel, PUCCH. Yes.

14 Q. So 4G had uplink control channels?

15 A. Yes.

16 Q. And did the uplink control channels in
17 4G have resources?

18 A. It has resources.

19 Q. Okay. So in 4G there were groups or
20 sets of resources in uplink control channels?

21 A. Not set. It is basically located at
22 the bottom and the top of the spectrum.

1 Q. Was there more than one resource in
2 the uplink control channels in 4G?

3 A. Yeah. There are several resources.

4 Q. So there were multiple resources in
5 uplink control channels in 4G?

6 A. Okay. We have to go back to the
7 acronym. A resource is a PUCCH resource. In 4G
8 they are located at the bottom of the spectrum and
9 at the top of the spectrum, also to provide
10 diversity, they are located. In order to send
11 control information uplink, you have to use, the
12 UE has to use one of them; yes. And this is
13 determined based on a formula that is basically
14 assigned from the base station.

15 Q. So 4G had multiple PUCCH resources?

16 A. All the UEs. Yes. And they would
17 have to basically choose the one that is assigned
18 for them.

19 Q. And they would pick one to transmit
20 the UCI?

21 A. Yes.

22 Q. In your declaration, did you provide

1 any opinion on whether or not limitation 1[a] is
2 present in any of the prior art?

3 A. I focused on 1[e] and 1[f].

4 Q. So you didn't provide any opinion on
5 1[a]?

6 A. I didn't opine on that.

7 Q. Let's move on to 1[b]. 1[b] says
8 "determining one of UL control channel resource
9 sets contained in the UL control channel resource
10 set configuration information."

11 A. Yes.

12 Q. So then the UL control channel
13 resource set configuration information includes
14 multiple resource sets. Is that right?

15 A. Correct.

16 Q. And in --

17 A. It is a whole package. You know, the
18 bandwidth parts, resource sets per bandwidth part,
19 and resources within each set. This is the
20 configuration information as it is referred in the
21 specification.

22 Q. Right. So the hierarchy is there

1 are -- in 5G, there are multiple bandwidth parts.

2 Each bandwidth part has uplink control --

3 A. I didn't say in 5G yet. I am --

4 Q. Sorry. In the context of the claim?

5 A. Yes.

6 Q. So in the context of the claim, there
7 are multiple bandwidth parts. Each bandwidth part
8 has multiple uplink control channel resource sets?

9 A. Sets.

10 Q. And in 1[b] we are determining one of
11 the uplink control channel resource sets contained
12 in the uplink control channel resource set
13 configuration information?

14 A. Yeah. You have to choose one of them.
15 So this is the part that you choose one of the
16 uplink control channel resource set. You pick a
17 set from the sets within a bandwidth part.

18 Q. I think what you just told us is you
19 didn't provide any opinion on element 1[b] in your
20 declaration. Right?

21 A. I did not.

22 Q. Let's go to 1[c]. 1[c] says

1 "determining one of UL control channel resources
2 contained in the determined UL control channel
3 resource set." Is that correct?

4 A. Correct.

5 Q. So then talking about our hierarchy
6 again, we have got a bandwidth part which has
7 multiple resource sets?

8 A. Yes.

9 Q. We determine one of those uplink
10 control channel resource sets --

11 A. Set.

12 Q. And then in element 1[c] we are
13 determining one of the resources in the uplink
14 control channel resource set. Is that right?

15 A. The set that we chose. Yes.

16 Q. And I think you said before, an uplink
17 control channel resource is like a PUCCH resource.
18 Is that right?

19 A. Yes. So within a set -- a set is a
20 group -- we have multiple PUCCH. We have to
21 choose one of them.

22 Q. And you didn't provide any opinion

1 regarding element 1[c] in your declaration, did
2 you?

3 A. I did not.

4 Q. Let's go to 1[d]. Element 1[d]
5 recites "transmitting UL control information
6 through the determined UL control channel
7 resource." Is that right?

8 A. Yes.

9 Q. So here is where, once we have
10 selected or determined the PUCCH we want to use,
11 we transmit the UCI through that PUCCH that we
12 have determined. Is that right?

13 A. Correct.

14 Q. And in 4G it was possible to transmit
15 UCI through a PUCCH, right?

16 A. Yes.

17 Q. And you didn't provide any opinion
18 regarding element 1[d] in your declaration?

19 A. I did not.

20 Q. Let's move on to element 1[e]. This
21 recites, "Wherein the UL control channel resource
22 sets are configured for each UL bandwidth part

1 (BWP) configured for the user equipment." Is that
2 right?

3 A. Yes.

4 Q. We talked about bandwidth parts a
5 little bit so let's make sure we are on the same
6 page. What is a bandwidth part?

7 A. Bandwidth part is a part of the
8 bandwidth or the carrier that the base station is
9 using. So as I mentioned, we have in 5G a huge
10 spectrum, very large spectrum, and we are going to
11 use a portion of that carrier. And this portion
12 is called bandwidth part. And this is one of the
13 cornerstones of 5G.

14 Q. This sounds like it has to do with the
15 capacity part we were discussing earlier. Is that
16 right?

17 A. No. It's part of the spectrum of the
18 carrier.

19 Q. A bandwidth part is part of the
20 spectrum of the carrier?

21 A. Yes.

22 Q. There was a carrier in 4G as well,

1 right?

2 A. There was a carrier in 4G.

3 Q. Does 4G have bandwidth parts of that
4 carrier?

5 A. No.

6 Q. So this concept of a bandwidth part
7 was introduced in 5G?

8 A. Correct.

9 Q. And a bandwidth part is some smaller
10 section of the overall frequency band?

11 A. It's part. It is part of it.

12 Q. And 5G can have more than one
13 bandwidth part in the carrier?

14 A. Yes, of course. It has multiples.
15 This is the cornerstone of the architecture. If
16 you recall, it's not about speed; it's about
17 ultra-reliable communication. So, the different
18 numerologies, 15 kilohertz, 70 kilohertz,
19 120 kilohertz, they all fit into different
20 bandwidth parts.

21 Q. The different numerologies of -- what
22 do we call them? Subcarriers?

1 A. Yes.

2 Q. In 5G, the different subcarriers are
3 in different bandwidth parts?

4 A. Can you say it again please?

5 Q. In 5G do I understand correctly that
6 the different subcarriers are in different
7 bandwidth parts?

8 A. Okay. So this is -- this is key. 5G
9 defined different numerologies. If you recall, in
10 4G we have one numerology. And I would refer to
11 the subcarrier spacing. It's, in 4G LTE,
12 15 kilohertz. 5G is more flexible. There are 15,
13 30, going to 240 kilohertz spacing. And these
14 determine what do you want to achieve, the
15 deployment scenario.

16 So you put, preferably, the different
17 numerologies in different bandwidth parts so you
18 can switch between them. Now you have high speed.
19 Now you want to do very low latency,
20 ultra-reliable. Or later you want to support --
21 you want to optimize for large coverage. So this
22 belongs to different numerologies, and they would

1 be placed preferably in different parts. I think
2 this is key to understand because it would have
3 bearing through our discussion later.

4 Q. Just so I understand correctly, the
5 spectrum in 5G is partitioned into these bandwidth
6 parts. In 4G, there is no partitioning. Is that
7 right?

8 A. Yeah. It's the carrier. Yes.

9 Q. 4G just has the carrier. 5G, the
10 carrier -- the cornerstone of 5G is that you are
11 partitioning the carrier into different bandwidth
12 parts?

13 A. Right. And they did it for several
14 reasons. One, it's a huge spectrum. You don't
15 want -- if you look for something and you have to
16 look on the whole spectrum, it's your battery. So
17 it is not -- if you use only part of it, why do
18 you have to look at the other? You look at the
19 active one.

20 But the real thing is that each
21 bandwidth part is dedicated or devoted for a
22 different deployment scenario and, I mentioned,

1 based on the numerologies: High coverage, high
2 capacity, millimeter wave, low latency. So these
3 use different symbol space, symbol duration. So
4 this all boils down to the numerologies that would
5 be placed in different bandwidth parts.

6 Q. So these bandwidth parts cover
7 different frequency bands of the overall carrier
8 spectrum?

9 A. Could you please rephrase?

10 Q. Sure. We have talked about how the
11 spectrum is partitioned into bandwidth parts.
12 These bandwidth parts cover different frequency
13 bands within the overall spectrum?

14 A. Different parts. Yes.

15 Q. Different parts of the frequency?

16 A. Of the spectrum, of the carrier. Yes.

17 Q. Going back to element 1[e] in claim 1,
18 how many bandwidth parts are recited?

19 MR. HELGE: Objection to form.

20 A. Multiple.

21 Q. Where does it say that?

22 A. The context. It says for each

1 bandwidth part, so the context tells us -- and
2 also it is covered in the specification -- that it
3 is a plurality.

4 Q. So your reading of this is that you
5 have to have more than one UL bandwidth part to
6 practice the claim?

7 MR. HELGE: Object to form.

8 A. The context of the claim is plurality.

9 Q. So you need more than one?

10 MR. HELGE: Object to form.

11 Q. I am just making sure I understand
12 what you mean by "plurality." When you say
13 plurality --

14 A. The claim covers a plurality of
15 bandwidth parts so...

16 Q. Does it require a plurality of
17 bandwidth parts?

18 MR. HELGE: Object to form.

19 A. It refers to a plurality. Otherwise,
20 they would use -- let's say it's one. So they
21 would use "configured for the uplink bandwidth
22 parts." Why do you use the word "each"? It tells

1 you it is referring to a plurality.

2 Q. So the use of "each" here tells you
3 that the claim is referring to a plurality of
4 bandwidth parts?

5 A. Yes.

6 Q. More than one?

7 A. Yes.

8 Q. The claim says that the uplink control
9 channel resource sets are configured for each
10 uplink bandwidth part. Is that right?

11 A. Yes.

12 Q. What does it mean to configure an
13 uplink control channel resource set for a
14 bandwidth part?

15 A. So we said, in each bandwidth part we
16 have multiple sets. So these sets, resource sets,
17 are configured for each. It's pair bandwidth
18 part. Each bandwidth part would have these sets,
19 for example.

20 Q. And in element 1[e] you are
21 configuring the uplink control channel resource
22 sets in each bandwidth part?

1 A. In each bandwidth part that is
2 configured to the user equipment.

3 Q. Right. Each bandwidth part of the UE?

4 A. Yes.

5 Q. So does configuring them just mean
6 sort of picking the location, picking where in the
7 bandwidth part the uplink control channel resource
8 sets are?

9 A. So, they are configured so -- in order
10 to send this UCI that we talked about, a bandwidth
11 part has to be active because we have multiple of
12 them. Some of them are configured, but they are
13 ready. We don't want to start from zero and all
14 of a sudden we have to switch to another bandwidth
15 part.

16 So we have a bandwidth part that was
17 activated. We have to select a set, one of the
18 multiple sets inside the bandwidth part, and then
19 select a resource in a set. So these are
20 configured already for the UE. Again, you know,
21 you have to use it so we don't want to start from
22 scratch, you know, from zero. This is

1 basically -- the configuration information
2 referred to includes all this hierarchy that is
3 configured already.

4 Q. So when you are configuring the uplink
5 bandwidth part, you are making sure these uplink
6 control channel resource sets are ready so that
7 when that bandwidth part is activated it can send
8 the UCI?

9 A. Select one of the sets in the
10 bandwidth part and then select a resource within
11 the set that was chosen and then it would send the
12 UCI. Yes.

13 Q. Obviously, you can't select a resource
14 set and then select a resource if the resource
15 sets haven't been configured yet?

16 A. Yeah. It has to -- maybe in a
17 pictorial way it is easier to show. But -- like
18 in Figure 3B, but that was the intent.

19 Q. That is the intent of the claim
20 element 1[e]?

21 A. No. The intent of the configuration.
22 The 1[e] just said that for every bandwidth part

1 that is configured for the UE, for each of these
2 bandwidth part we have also the control channel
3 resource sets that are configured.

4 Q. You mentioned "every" there. Does
5 "each" basically mean the same as "every" here?

6 A. Again?

7 Q. You used the word "every" bandwidth
8 part. The claim says each uplink bandwidth part.
9 I am asking, when you read "each uplink bandwidth
10 part" in the claim, that means every bandwidth
11 part has to be configured?

12 MR. HELGE: Object to form.

13 A. It is per bandwidth part. So, each
14 bandwidth part. It's each and every one.

15 Q. Each and every one has to be
16 configured according to the claim?

17 MR. HELGE: Objection to form.

18 A. Yes.

19 Q. Does the claim require them to be
20 configured at the same time, or can they be
21 configured at different times? Maybe some are
22 configured at one time and another is configured

1 at another time?

2 MR. HELGE: Object to form.

3 A. Well, it says that it sends the
4 configuration information, so it basically seems
5 that it is sent -- it doesn't say that it's -- it
6 didn't break the process. It says receiving from
7 the base station resource set configuration
8 information, in one step.

9 Q. It says that in element 1[a]?

10 A. It is a step. It is a method claim.
11 It is a step.

12 Q. How does element 1[a] relate to
13 element 1[e]?

14 A. So element 1[a] basically says that we
15 send the uplink resource set configuration
16 information. And this is the hierarchy that we
17 talked before. And now in 1[e] it says that each
18 bandwidth part that is configured for the UE would
19 have the resource sets contained inside this
20 bandwidth part.

21 So let's say you have like four
22 bandwidth parts. You have to have the resource

1 sets for each of the four bandwidth parts that is
2 configured to the UE. You cannot do it just for
3 one or two or three.

4 Q. You have to configure all four in this
5 example?

6 A. If they were configured to the UE.

7 Q. But does the claim say they have to
8 be -- they have to all be configured at the same
9 time, or can they be configured at different
10 times?

11 A. There is one step of sending this
12 configuration information.

13 Q. So what does that mean? Do they have
14 to be configured at the same time or not?

15 A. So the configuration information
16 include all this hierarchy, and it says receiving
17 from -- it looks like one step.

18 Q. Can --

19 A. Meaning you -- okay. I see where you
20 are going. Okay. So we have a bandwidth part.
21 The UE is happy using this with the resource sets.
22 Now we have to switch to another bandwidth part.

1 They are not going now to send the configuration
2 information because there is no time. You have to
3 be -- so it has to be kind in one step, in
4 advance. So, you have all the bandwidth part
5 configured even though only one is active.

6 Q. So in your view, the claim requires
7 that all the bandwidth parts are configured at the
8 same time?

9 A. But only one is active.

10 Q. I understand. But they are all
11 configured at the same time?

12 A. They are configured.

13 Q. It doesn't come out and say that,
14 though, but that is how you are reading the claim?

15 A. It is a method claim, and it says that
16 you receive -- it doesn't say receive in part 1
17 or -- sometime you see like "the first
18 configuration information" then "the second
19 configuration information," so you understand
20 different steps. But here it basically refers to
21 it as one shot.

22 Q. And you are referring to element 1[a]

1 there where you are receiving --

2 A. Yes.

3 Q. -- uplink control channel resource set
4 configuration information?

5 A. Yes.

6 Q. It's your understanding that that
7 information is what is used to configure each
8 uplink bandwidth part?

9 A. Yes. Inside and the bandwidth parts
10 themselves.

11 Q. When I am looking at element 1[b] --

12 A. So the configuration information
13 consists of parts, bandwidth parts, sets in each
14 part and resources in each set.

15 Q. And what is the purpose of that
16 configuration information recited in element 1[a]?

17 A. So when we switch to another bandwidth
18 part, different numerology, because now we want to
19 support millimeter wave, let's say, so we switch.
20 It is all ready, happening very fast, and you have
21 to pick the resource within that set, within that
22 new bandwidth part that was activated.

1 Q. So the uplink control channel resource
2 set configuration information is what the UE uses
3 to pick the resource for transmitting the UCI?

4 A. It is activated by the base station,
5 he picks a set, determines a set, and within that
6 set one of the resources will be used to send the
7 UCI.

8 Q. And that is the uplink control channel
9 resource set configuration information that the
10 base station sends to the UE?

11 A. Just to be more orthodox, it is all
12 the bandwidth parts, all the sets within each part
13 and all the resources within each set.

14 Q. That's what is contained in the --

15 A. Configuration information.

16 Q. Okay. But then is that configuration
17 information used to configure the bandwidth parts,
18 or are they already configured?

19 A. No. This is the configuration.

20 Q. So the configuration information that
21 is received in 1[a], that's what's used to
22 configure each uplink bandwidth part in 1[e]?

1 A. 1[e] explains that for each bandwidth
2 part that was configured to the user equipment,
3 the uplink control channel resource sets are
4 configured for each one that was configured for
5 the UE.

6 Q. I understand that. What I am not
7 seeing is the connection between the configuration
8 information in 1[a] and the step that is recited
9 in 1[e] where we are configuring each bandwidth
10 part.

11 You will agree with me that 1[e]
12 doesn't mention the uplink control channel
13 resource set configuration information; right?

14 A. 1[a] basically send the configuration
15 information. And there are many UE's also. You
16 know, you send it. Not necessarily every one
17 would be configured with the same bandwidth parts.
18 You know, it is a different capability. One is a
19 laptop that is very capable, one is a phone, one
20 is, you know, something else. So not necessarily
21 they would all have like the same bandwidth parts.

22 For example, you have a device that

1 doesn't have millimeter wave. So there are
2 different capabilities so you may not need -- so
3 it's not necessarily that every UE would have the
4 very same bandwidth part configured. But every UE
5 is configured with bandwidth parts, and 1[e] says
6 each one of these bandwidth parts that were
7 configured for that UE, you also configure the
8 resource sets.

9 Q. And I believe it's your understanding
10 that 1[e] requires all of the bandwidth parts that
11 are configured for the UE to be configured with
12 uplink control channel resource sets at the same
13 time?

14 A. What do you mean "at the same time"?

15 Q. I will give two examples. You tell me
16 which one is allowed by the claim.

17 In one example all of my bandwidth
18 parts -- let's say I have two bandwidth parts and
19 I have configured both of them at the same time.
20 They are not necessarily active at the same time
21 but they are both configured with uplink control
22 channel resource sets. This example, is this

1 within the claim element 1[e]?

2 A. So you configure that UE with two
3 bandwidth parts, so each bandwidth part would have
4 these uplink control channel resource sets within
5 each bandwidth part.

6 Q. And that would satisfy element 1[e]?

7 A. If you show that each and every
8 bandwidth parts that was configured to the UE has
9 the resource sets configured in it.

10 Q. Yes. So if in this example I have two
11 bandwidth parts and both of those bandwidth parts,
12 which are configured for the UE, have these uplink
13 control channel resource sets configured, this
14 satisfies claim element 1[e]; yes?

15 A. That's what it says. That in each
16 bandwidth part configured for the UE we have also
17 the resource sets configured, which is inside the
18 bandwidth part.

19 Q. I understand. Here is another
20 example: I have a UE and there are two bandwidth
21 parts configured for the UE and only one of them
22 is configured with uplink control channel resource

1 sets at one time and then later the other one is
2 configured with uplink control channel resource
3 sets. So, they are not both configured at the
4 same time. One bandwidth part is configured with
5 uplink control channel resource sets at one time
6 and the other is configured with uplink control
7 channel resource sets at a different time.

8 Would that also fall within the scope
9 of element 1[e], or does 1[e] say that each
10 bandwidth part has to be configured at the same
11 time?

12 MR. HELGE: Object to form.

13 A. Well, 1[a] already says that we send
14 it, all the resource set configuration
15 information. So it doesn't suggest different
16 times. And also the specification doesn't. Can
17 you show it to me?

18 Q. I am just asking your understanding.
19 You have read the '463 Patent, yes?

20 A. But it doesn't talk about different
21 times.

22 Q. So based on your understanding of

1 element 1[a], which only mentions sending this
2 configuration information one time --

3 A. Yes.

4 Q. -- that means that each uplink
5 bandwidth part has to be configured at the same
6 time?

7 A. It's already there. Yes.

8 Q. Before the '463 Patent, was it
9 possible for UE's to have multiple uplink
10 bandwidth parts?

11 A. What do you mean, "possible"?

12 Q. Fair question. Before the '463
13 Patent, were there UE's that were configured with
14 multiple uplink bandwidth parts?

15 MR. HELGE: Object to form.

16 A. So, you are basically asking me were
17 there multiple bandwidth parts for the UE
18 previously, before that?

19 Q. Before the '463 Patent.

20 A. Well, you basically -- your references
21 mention multiple bandwidth parts.

22 Q. So there were UE's with multiple

1 bandwidth parts before the '463 Patent?

2 A. Takeda is talking about activation of
3 one of the bandwidth -- with multiple bandwidth
4 parts. And also the R1 talk about
5 activation/deactivation. So the bandwidth
6 parts -- meaning the word "bandwidth parts" was
7 before it was drafted. So, it is not...

8 Q. It --

9 A. It doesn't have complete ownership on
10 this acronym.

11 Q. The '463 Patent didn't invent
12 bandwidth parts?

13 MR. HELGE: I am not sure if that is a
14 question. Is it a question?

15 MR. KOOPMAN: I will rephrase.

16 Q. Did the '463 Patent invent --

17 A. No -- sorry. I will let you finish.

18 Q. Did the '463 Patent invent bandwidth
19 parts?

20 A. The '463 used an acronym that existed.

21 Q. The acronym "bandwidth part" existed?

22 A. Existed, yes.

1 Q. Because before the '463 Patent there
2 were UE's that had multiple uplink bandwidth
3 parts?

4 MR. HELGE: Again, I am not sure it's
5 a question. If it is a question, I object to
6 form.

7 A. There are references in papers that
8 mention bandwidth parts, so it's...

9 Q. Before the '463 Patent?

10 A. Yeah. I saw it, yes. I mean, the R1,
11 if it's a prior art, has BWP. So...

12 Q. Let's go to element 1[f], which is the
13 last element of claim 1, right?

14 A. Yes.

15 Q. Element 1[f] reads: "Wherein the each
16 UL BWP is activated through downlink (DL) control
17 information." Is that right?

18 A. Yes.

19 Q. What does it mean to activate an
20 uplink bandwidth part?

21 A. So, meaning that the UE is instructed
22 to use this bandwidth part. So, we have multiple

1 of them, let's say four. He has to use one of
2 them. So he receives an indication or downlink
3 control information -- a new acronym, DCI -- that
4 would basically inform him you have to use this to
5 operate now in this bandwidth part. So, this
6 means activated. So, before it was activated it
7 was configured, but now it is activated.

8 Q. And "activated" means that the UE has
9 been told to transmit --

10 A. Use it.

11 Q. Okay. So "activated" means the UE has
12 been told to use this uplink bandwidth part?

13 A. Yes.

14 Q. And that is what activated means; am I
15 correct? That is what "activated" means here?

16 A. Yes. To be active.

17 Q. To use to transmit on the uplink
18 bandwidth part?

19 A. Yes.

20 Q. In element 1[f] the uplink bandwidth
21 part is activated through downlink control
22 information, or DCI. Right?

1 A. Yes.

2 Q. What is DCI?

3 A. Downlink control information.

4 Q. So this is the counterpart to uplink
5 control information?

6 MR. HELGE: Object to form.

7 A. Similar, yes. Something coming from
8 the base station providing information. The UCI,
9 different information but also going in the uplink
10 from the UE to the base station.

11 Q. The uplink is from the UE to the base
12 station?

13 A. Yes.

14 Q. The downlink control information is
15 from the base station to the UE?

16 A. Yes.

17 Q. And the information in the downlink
18 control information is different from, I think,
19 what you called previously data communications or
20 information, right?

21 A. Yes. It is a control.

22 Q. How does the DCI activate an uplink

1 bandwidth part?

2 A. So, there is an identifier that
3 basically tells the UE which one of the bandwidth
4 part to use.

5 Q. There is an identifier in the DCI?

6 A. Yes.

7 Q. And it tells the UE "use that uplink
8 bandwidth part"?

9 A. Yes. It is also -- it tells him also
10 which -- if you remember the hierarchy, which
11 resource to use within a set, so...

12 Q. Is that in the DCI, or is that in the
13 uplink control channel resource set configuration
14 information?

15 A. No. The configuration is the
16 hierarchy, like Figure 3B. But you have to choose
17 at the end of the day a resource in the chosen set
18 in the activated bandwidth part. So, this come
19 from the DCI.

20 Q. Did the 4G standard use downlink
21 control information?

22 A. It does, yes.

1 Q. But not bandwidth parts?

2 A. Not bandwidth parts.

3 Q. Does element 1[f] require that each
4 uplink bandwidth part be activated at the same
5 time?

6 A. Only one is activated.

7 Q. It says "each," right?

8 A. Yes. Each, but you don't have like
9 two bandwidth parts activated together.

10 Q. Does the claim say that?

11 MR. HELGE: Object to form.

12 Q. Where does the claim say that?

13 MR. HELGE: Object to form.

14 A. The claim doesn't say that. It just
15 says that each has to be activated through the
16 DCI. You can...

17 Well, we know based on the
18 specification that we activate one. There is the
19 notion of configured and activated, and not
20 necessarily the configured are all activated.

21 Q. The claim says that each uplink
22 bandwidth part is configured, right?

1 A. It has to.

2 Q. And the claim says that each uplink
3 bandwidth part is activated, right?

4 A. When it is activated, it has to go
5 through the DCI. The DCI will tell you which one
6 to activate. So, remember that we had this
7 identifier. So, it identifies a specific
8 bandwidth part.

9 Q. I think it was your testimony
10 previously that in 1[e] each uplink bandwidth part
11 has to be configured at the same time. Right?

12 A. Yes. It's done. In step 1[a] we send
13 all the configuration. Now in 1[f] we are talking
14 about the activation. So, we have multiple
15 bandwidth parts. We have to activate. So it says
16 that the activation is through the DCI. The DCI
17 has an identifier that would activate a bandwidth
18 part.

19 Q. In element 1[f] when it says, "each
20 uplink bandwidth part is activated," can that mean
21 that they are activated at the same time?

22 A. I just explained that the bandwidth

1 part could have different numerologies, so the UE
2 would be crazy. It would not know what to use,
3 15 kilohertz or 30 kilohertz or 60 kilohertz, so
4 we activate only one.

5 Q. It doesn't say "activate only one" in
6 the claim, though, does it?

7 MR. HELGE: Object to form.

8 A. The claim says that a bandwidth part
9 that is activated, each, is done through the DCI.
10 We know the DCI has an identifier sent, so not
11 multiple identifiers. So, the UE knows to
12 activate this bandwidth part.

13 Q. Only one bandwidth part?

14 A. Only one.

15 Q. And that is your reading of the claim,
16 is that when we say "each uplink bandwidth part"
17 in 1[e], it means all of them; but when we say
18 "each uplink bandwidth part" in 1[f] it means only
19 one at a time?

20 A. 1[a], we have multiple bandwidth part
21 configured. 1[f] basically tell you, from these
22 multiple bandwidth part that were configured to

1 the UE, the activation of a bandwidth part would
2 come through the DCI identifier.

3 Q. Let me make sure I understood what you
4 just said. In 1[e] each uplink bandwidth part is
5 configured, which means they are all configured.
6 But in 1[f] each uplink bandwidth part is
7 activated means you are activating one of them
8 that is identified by the DCI?

9 A. One of them.

10 Q. And that's your understanding of what
11 is meant by 1[e] and 1[f] in claim 1?

12 A. Yes. 1[e] talks for each bandwidth
13 part. Let's say we have four, four bandwidth
14 parts that were configured for the UE. All the
15 resource sets are configured. Let's say there are
16 also four sets per bandwidth part. So, they are
17 configured for each bandwidth part that was
18 configured.

19 So if we have four and there are four
20 sets in a bandwidth part, you basically -- 4
21 multiplied by 4 is 16 -- so you have 16 sets
22 configured. Now there is activation in 1[f] so

1 you have to choose one of the bandwidth parts.
2 Now you are kind of reduced from the 16 to 4. You
3 have 4 sets within that bandwidth part that is
4 activated through the base station with the DCI.

5 Q. So then in 1[f] you are only
6 activating one of the uplink bandwidth parts that
7 is identified by the DCI?

8 A. Yes.

9 MR. KOOPMAN: Let's go ahead and take
10 a break.

11 THE WITNESS: Okay.

12 (Recess.)

13 BY MR. KOOPMAN:

14 Q. A quick follow up on what we were
15 discussing before the break.

16 A. Yes.

17 Q. You said that in 1[f] you are only
18 activating one of the uplink bandwidth parts that
19 is identified by the DCI. Right?

20 A. So what is your question?

21 Q. My question is, why does the DCI
22 identify only one bandwidth part to be activated?

1 A. Okay. So when you read the 1[f], it
2 doesn't say only one, but we are talking about 5G
3 and other numerologies. It would be -- if you
4 activate two, think about it. The UE would be
5 confused. What should I use, this or this? And
6 that's what happened in 5G. By the way, also for
7 the downlink; one is activated, the downlink, one
8 for the uplink.

9 Q. So the claim isn't saying it's only
10 activating one, but you, from 5G, your
11 understanding is the DCI is activating only one
12 uplink bandwidth part?

13 A. Yes. In 5G you have four bandwidth
14 parts usually and four sets in each bandwidth
15 part, 16 all together. That is what they do
16 there.

17 Q. That is a 5G concept?

18 A. Yes.

19 Q. It is just that the claim itself
20 doesn't say the DCI only sends one identifier?

21 A. It says each bandwidth part is
22 activated so, yeah. It is through the DCI. The

1 point here is to be activated by the DCI, each of
2 the bandwidth parts that was configured for the
3 UE.

4 Q. And it's your understanding from 5G
5 that the DCI only activates one?

6 A. Yeah, usually one.

7 Q. So that is how you are reading element
8 1[f] of claim 1. Am I correct?

9 A. What do you mean by that? I am
10 saying --

11 Q. I can --

12 A. Grammatically, it doesn't say only
13 one. We read it. But in 5G they use one.

14 Q. And your understanding is that 1[f] is
15 intended to cover 5G?

16 MR. HELGE: Object to form.

17 A. Or 6G or 7G. I didn't do the
18 analysis.

19 Q. I guess what I am asking is, is 1[f]
20 of claim 1 different from 5G?

21 A. I mean, 5G they use the -- remember,
22 in one of the proposal -- not proposal. One of

1 the references that you brought, the R1, '853, you
2 have several methods. You know, one of them is
3 DCI. There is upper layer communication, RRC. So
4 here they say through the DCI.

5 Q. And your understanding is the DCI can
6 only contain one identifier for one uplink
7 bandwidth part?

8 A. Usually it has one identifier.

9 Q. Well, if usually it has one, does that
10 mean sometimes it has more than one?

11 A. Not in 5G. In 5G we activate one
12 downlink, one uplink.

13 Q. What about in the claim?

14 A. The claim obviously covered this, but
15 if you ask me to show you that only one is
16 activated, I cannot show you in the claim because
17 the claim doesn't say only one. But I explain
18 also why: Because usually, not necessarily, the
19 bandwidth part are populated with different
20 numerologies, and you either talk with millimeter
21 wave or you want an ultra low latency. So, you
22 have to choose one of them. You cannot do it at

1 the same time.

2 Q. So usually that is what happens; and
3 your understanding is the claim is covering what
4 usually happens in 5G?

5 MR. HELGE: Object to form.

6 Q. Or is the claim covering something
7 else?

8 MR. HELGE: Object to form.

9 A. The claim -- I understand your
10 question. You can activate -- what is activation?
11 You have to tell the UE something. There are
12 different channel of communication. You know, it
13 could be RRC, it could be -- the R1 even mentioned
14 there is a timer that expires so you deactivate.

15 Here in this claim they say "through
16 downlink control information." Now, let's say in
17 5G there is another option, to do it with RRC. So
18 RRC is not downlink control information, so I
19 cannot tell you that 5G does this. There are
20 several options.

21 The claim basically said that you have
22 to do it through downlink control information,

1 so -- it's not infringement analysis. It's about
2 what the claim says. You know, you bring
3 references to invalidate it and so we have to do
4 it according to this, not if 5G does this or that.
5 That's my understanding.

6 Q. Right. I am not asking you for any
7 infringement analysis. I am just trying to make
8 sure that I understand your view of what the claim
9 means. We have talked about how in 5G usually the
10 DCI identifies one uplink bandwidth part.

11 My question is, is that what is being
12 claimed here, or is element 1[f] of claim 1
13 claiming something different from what usually
14 happens in 5G?

15 MR. HELGE: Object to form.

16 A. No. They are similar options. Could
17 be several options. It could be RRC, it could be
18 DCI. The claim -- okay. If you want, you have a
19 product. You want to say does it infringe? If it
20 doesn't do DCI, so 1[f] is not -- you understand
21 what I am saying. The claim basically says
22 activated through DCI so...

1 Q. I understand that there are multiple
2 options to activate an uplink bandwidth part. You
3 could use DCI, you could use RRC.

4 A. Could be. Yes.

5 Q. The claim element 1[f] requires using
6 DCI to activate each uplink bandwidth part, right?

7 A. This claim, yes, element 1[f]
8 specifically says activated through DCI.

9 Q. And since it's using DCI, is it your
10 understanding that element 1[f] means that only
11 one uplink bandwidth part is being activated?

12 A. We discussed this. 1[f] doesn't say
13 only one. It could be two so -- yeah. It's more
14 inclusive. It is not basically -- again, an
15 example with infringement even though we don't do
16 it. It's about satisfying a claim.

17 If someone is activating two, does it
18 satisfy the 1[f]? Well, if this bandwidth part
19 was configured for the UE and both of them were
20 activated through DCI, it satisfies.

21 Q. That would satisfy the claim?

22 A. For each bandwidth part that is

1 configured, yes.

2 Q. So the claim doesn't require you to
3 activate only one. The claim covers a situation
4 where you activate only one and a situation where
5 you activate more than one as long as you are
6 using the DCI?

7 MR. HELGE: Object to form.

8 A. You have to use the DCI. We have
9 multiple bandwidth parts. You can activate more
10 than one if you want.

11 Q. I understand you can activate more
12 than one. I guess what I am saying is, does the
13 claim cover a scenario where you activate more
14 than one and also cover a scenario where you
15 activate only one?

16 A. No. The claim -- the claim says more
17 than one. It doesn't...

18 Let me see how we can articulate this.

19 So let me explain it also with the
20 1[e] because they use the word "the each uplink
21 BWP." In 1[e] we need for each -- we need
22 multiple. One will not suffice based on the

1 specification also. Now they say "the each
2 bandwidth part," so each one of these bandwidth
3 parts that we refer to in 1[e] that were
4 configured, a plurality of them, we can activate
5 through the downlink control information one or
6 more.

7 Q. So 1[f] is satisfied if you activate
8 one or more of the each uplink bandwidth parts?

9 MR. HELGE: Object to form.

10 A. But 1[e] not. I wanted to say that
11 1[e], one or more will not suffice because 1 or
12 more is not equal to "each."

13 In 1[f], which basically, using the
14 word "the" referring to 1[e], "the each bandwidth
15 part configured for the user equipment," you can
16 use one or more activated.

17 Q. So 1[e] requires you to -- sorry.

18 Element 1[e] of claim 1 requires you
19 to configure each and every bandwidth part;
20 element 1[f] of claim 1 requires you to activate
21 one or more of those configured bandwidth parts.
22 Is that right?

1 MR. HELGE: Object to form.

2 A. 1[e] requires configuring the
3 plurality of bandwidth parts that were configured
4 for the UE, all of them that were configured for
5 the UE. I think we discussed this before, that it
6 is multiple. Otherwise, they would use the word
7 "the uplink bandwidth part." And there is support
8 in the specification.

9 1[f] is basically using the word "the
10 each uplink bandwidth parts," referring to that
11 bandwidth parts in 1[e] that you can activate --
12 you have multiple there, so you can activate one
13 or more.

14 Q. So 1[f] requires you to activate one
15 or more of the bandwidth parts that are referenced
16 in element 1[e]. Is that correct?

17 A. 1[f] refer to 1[e] through the --
18 through the word "the." So 1[e] has multiple
19 bandwidth parts and 1[f] basically tells you that
20 each one of these bandwidth parts is activated
21 through the downlink control information. So you
22 could have in 1[e] four and in 1[f] you can

1 have -- you can have two, one or two activated.

2 Q. So 1[f] covers a scenario where you
3 activate one or it covers a scenario where you
4 activate two of the bandwidth parts?

5 (Pause.)

6 A. My understanding based on the
7 specification also, that 1[e] refers to multiple
8 bandwidth parts configured and 1[f] tells you that
9 through the DCI you activate the each, each one of
10 the plurality of bandwidth parts. It could be one
11 or more.

12 MR. KOOPMAN: I am going to be placing
13 in front of you a document that I have marked
14 Exhibit 37. I can represent for the record
15 it corresponds to paper 37 in the IPR, just
16 for consistency of numbering.

17 (So marked for identification,
18 Exhibit 37.)

19 Q. Dr. Sharony, do you recognize this
20 document?

21 A. Yes. This is, as it says, the Patent
22 Owner Response.

1 Q. Did you review the Patent Owner's
2 Response in this case in preparation for your
3 deposition?

4 A. I listed...
5 It is not listed in the materials
6 considered.

7 Q. Let --

8 A. Anyway, it is not my opinion, so...
9 I assume usually, you know, when
10 counsel writes the petition -- the response, he
11 basically cites some of my opinions.

12 Q. Do you recall whether you reviewed the
13 Patent Owner's Response before it was filed?

14 A. I don't recall, but usually not.

15 Q. Do you recall whether or not you
16 reviewed the Patent Owner's Response in
17 preparation for the deposition?

18 A. It is not listed. No.

19 Q. You are saying it is not listed in
20 your declaration?

21 A. In materials considered. There is IPR
22 petition, decision, the patents, the experts, the

1 other experts and deposition and the references.

2 Q. Can I direct you to -- go ahead.

3 A. I have my signature on this document
4 so I am responsible for whatever I opined here,
5 so --

6 Q. When you say "this document," you are
7 referring to your declaration, Exhibit 2005?

8 A. Yes.

9 Q. Can I direct you to page 2 of the
10 Patent Owner's Response?

11 A. Yes. 2.

12 Q. Looking at the first full paragraph on
13 that page, do you see, four lines down, there is a
14 sentence that reads, "For example, while Takeda
15 discloses BWP-dependent resource mapping, Takeda
16 does not disclose distinct UE-specific PUCCH
17 (physical uplink control channel) resource sets"?

18 A. Yes, I see that.

19 Q. You see that sentence?

20 A. Yes.

21 Q. Do you have an understanding of what
22 is meant by "Takeda discloses BWP-dependent

1 resource mapping"?

2 A. Takeda is talking about activation,
3 deactivation of BWP, the bandwidth parts. But he
4 is silent on the resource sets for each configured
5 BWP. No mention of resource sets that we
6 discussed before.

7 Q. The resource sets you are referring
8 to --

9 A. Like Figure 3B. I like to go there
10 all the time because it's, you know, giving in a
11 pictorial way what it means.

12 Q. When you say resource sets, you are
13 talking about the uplink control channel resource
14 sets?

15 A. Yes.

16 Q. What does "BWP-dependent resource
17 mapping" mean?

18 A. So if you look at -- if I recall,
19 Figure 8 or 9 in Takeda, it shows you a bandwidth
20 part, parts, and there is a section where he
21 basically map resources, not on the PUCCH. He
22 uses a shared channel, PUSCH -- "S" for

1 "shared" -- control channel. And it shows like
2 resources that the UE can use. I think Figure 8
3 and 9 shows the mapping of the resources within
4 the uplink -- the bandwidth part I wanted to say.

5 Q. I will hand you a document previously
6 marked Petitioner's Exhibit 1007.

7 A. Yes. Okay.

8 Q. Do you recognize that document?

9 A. I do.

10 Q. What is that document?

11 A. That is the Takeda reference.

12 Q. That is the reference you were just
13 referring to, Takeda?

14 A. Yes.

15 Q. I believe you referred to Figures 8 or
16 9 of Takeda. Is that right?

17 A. I think it is 8 or 9. Yes.

18 Q. Then when -- your understanding of the
19 term or phrase "Takeda discloses BWP-dependent
20 resource mapping," that is referring to what is
21 shown in Figures 8 and 9?

22 A. Yeah. We have the bandwidth part, the

1 uplink bandwidth parts, and we have basically the
2 uplink grant, which is the resource for the user
3 to use. It basically points to where in the
4 channel -- and these are the arrows in Figure 8 or
5 9 -- that point into, in this case I said it is
6 the physical uplink share channel. It points
7 there, which one of these resources to use.

8 Just for the record, the PUSCH is a
9 shared channel. It's not -- meaning shared with
10 data, so you can send data and control. We were
11 talking up until now, with the PUCCH, which is
12 strictly control channel, only control would go
13 there, not user data.

14 Q. Let me make sure I understand what you
15 just said. Previously we talked about the PUCCH,
16 the physical uplink control channel. That is --

17 A. Yes.

18 Q. That is for only control information?

19 A. Only control.

20 Q. The PUSCH, the physical uplink signal
21 channel --

22 A. No. "Shared."

1 Q. Shared. Sorry. PUSCH, the physical
2 uplink shared channel, can be for either control
3 information or data information?

4 A. Correct.

5 Q. This BWP-dependent resource mapping,
6 is that also performed according to the 5G
7 standard?

8 A. In the 5G standard we said we have
9 resource sets, and Takeda is silent on resource
10 sets. And we talked about resource set with the
11 PUCCH. Here he refers to the PUSCH. So, I don't
12 see any sets -- in fact, no sets are mentioned
13 here.

14 Q. I am just talking about BWP-dependent
15 resource mapping. Is it correct that Takeda
16 discloses BWP-dependent resource mapping?

17 A. Yeah, a la Figure 8 or 9.

18 Q. Does the 5G standard incorporate
19 BWP-dependent resource mapping as well?

20 A. And so does the '463, the resource
21 mapping. It is how the -- but obviously, they do
22 it in a different way. Here we have a

1 configuration of bandwidth parts and we show
2 exactly the sets and the group of sets and the
3 group of resources within sets.

4 Here he basically points to specific
5 resources in the PUSCH channel, so it is a
6 resource mapping; you know, when I show you where
7 is the resource. But they do it in a different
8 way.

9 Q. When you say "they," you are referring
10 to Takeda does it in a different way?

11 A. Yes. It is different.

12 Q. Different from 5G, or different from
13 the '463 Patent?

14 A. Both.

15 Q. So Takeda does the resource mapping in
16 a different way from the '463 Patent?

17 A. The resource sets, yeah.

18 Q. It is your opinion that Takeda does
19 the resource mapping differently from the 5G
20 standard?

21 A. Sorry? Say it again?

22 Q. The resource mapping in Takeda, is

1 that different from 5G?

2 A. Yes.

3 Q. How are bandwidth parts mapped in 5G?

4 A. Bandwidth parts have -- specifically,
5 they have four bandwidth parts and they use four
6 resource sets in each bandwidth part. So you have
7 like 16 sets of resources and each -- and each set
8 has 4 resources, PUCCH resources. So all together
9 you have 64, 64 mapping of resources. And this is
10 done, as we said, configured for the UE.

11 Q. So they are all configured for the UE,
12 but in 5G only one bandwidth part is active at a
13 time. Is that right, in 5G?

14 A. Yeah. In 5G, one is active -- one
15 bandwidth part is active at a time. At the end
16 you have to choose -- I said the whole bucket has
17 64 resources, 4 multiplied by 4 multiplied by 4,
18 again Figure 3B in the '463.

19 When you activate a bandwidth part,
20 you reduce it to 16 because you have 4 sets and 4
21 resources per set. And then through the DCI, it
22 will tell you also which resource to use within

1 the set. So, yes, one is activated.

2 Q. So the other bandwidth parts are
3 configured but inactive?

4 A. Inactive. In 5G, yes.

5 Q. Right. In 5G.

6 Takeda discloses using bandwidth
7 parts, right?

8 A. Activation, deactivation of bandwidth
9 parts, yes. But no resource sets.

10 Q. But not the resource sets.

11 I will hand you a document that has
12 previously been marked Petitioner's Exhibit 1011.

13 A. Okay.

14 Q. Do you recognize that document?

15 A. I do.

16 Q. What is that document?

17 A. This is a Marinier reference.

18 Q. The Marinier reference is one of the
19 prior art references you reviewed in preparing
20 your declaration?

21 A. Yes.

22 Q. Your understanding is it is one of the

1 prior art references relied on in the petition?

2 A. Yes.

3 Q. Is it correct that Marinier also
4 discloses bandwidth parts?

5 A. No.

6 Q. Marinier does not disclose bandwidth
7 parts?

8 A. No.

9 Q. If I can direct you to page 4 of the
10 Patent Owner's Response? That is paper 37.

11 A. Oh, Patent Owner Response?

12 Q. Page 4.

13 A. I am there.

14 Q. Is it correct that Marinier discloses
15 frequency segregation? Here I am looking at --

16 A. It does.

17 Q. Marinier discloses frequency
18 segregation?

19 A. Yes.

20 Q. Is it your understanding that Marinier
21 discloses 4G LTE technology?

22 A. Refer to it. Yes.

1 Q. But looking at the bottom of page 4,
2 it says, "Marinier and Yan, which are 4G LTE
3 technologies, fail to disclose or suggest this
4 concept, and therefore do not disclose or suggest
5 the '463 Patent's claimed concept of configuring
6 multiple resource sets for every BWP that is
7 configured for a user equipment, regardless of
8 whether those BWPs are active."

9 A. Yes.

10 Q. Is it your understanding that the
11 claim requires configuring every BWP that is
12 configured for the user equipment, regardless of
13 whether that BWP is active?

14 A. Yes. That is what we said. Yes.

15 Q. But the claim doesn't say regardless
16 of whether the BWP is active, right? It just says
17 each U --

18 A. For each BWP that is configured for
19 the UE, we have the configuration that we talked
20 about, the sets and the resources.

21 Q. And your understanding is that the
22 claim means that is done regardless of whether the

1 BWP is active?

2 A. We said, one of them is active. But
3 yeah. So you could have a situation of BWPs that
4 are configured and not active. For example, one
5 of them will be active.

6 Q. I am just asking, the claim doesn't
7 explicitly say that it is configured regardless of
8 whether the BWP is active, right? Those words
9 don't appear in the claim, do they?

10 A. Are you reading from page 4?

11 Q. Yes.

12 A. Where?

13 Q. The last complete sentence on page 4.

14 A. "This is 5G NR concept"?

15 Q. The sentence after that.

16 A. I am reading.

17 Q. Please take your time and read it.

18 (Pause.)

19 A. I read it. So what is your question?

20 Q. My question is, you talk about a
21 claimed concept, and then the -- well, the
22 sentence is referring to a claimed concept. Then

1 at the end it says -- I will just read the second
2 portion of the sentence. "The '463 Patent's
3 claimed concept of configuring multiple resource
4 sets for every BWP that is configured for a user
5 equipment, regardless of whether those BWPs are
6 active."

7 That last part, "regardless of whether
8 those BWPs are active," that isn't expressly
9 recited in the claim, is it?

10 A. Well, we have multiple BWP configured
11 for the UE. For each one of them we have the
12 configuration of the resource sets. And we
13 activate, remember we said, one or more in 1[f].
14 So let's say you had four configured. You
15 activated one or two. So, the configured
16 bandwidth parts stay there. They are not active
17 but they are configured. So, it is a correct
18 sentence.

19 Q. Since we configure all of them but we
20 don't have to activate all of them, then that
21 means that the claim requires configuring every
22 BWP regardless of whether that BWP is active?

1 A. They are configured before someone
2 knows if it's active or activated. First you
3 configure, then you do the activation. Yes.

4 Q. The BWP has to be configured in order
5 to be activated, right?

6 A. Yes.

7 Q. Going to the next page, page 5, I will
8 read the next sentence, which begins on page 4 and
9 goes on to page 5. That sentence says, "Indeed, a
10 POSITA reading Yan would not have a reason to
11 configure multiple resource sets for each BWP that
12 is configured for a user equipment, and instead at
13 best would instruct a POSITA to only configure
14 resource sets for the component carrier (i.e. the
15 active channel)."

16 A. Yes.

17 Q. So in your view, at best Yan teaches
18 that you need to configure resource sets for the
19 active channel?

20 A. Carrier. Yes.

21 Q. And the carrier is the active channel?

22 A. Yes.

1 Q. So Yan teaches you have to configure
2 resource sets for the active channel?

3 A. Not to the bandwidth part.

4 Q. Right. Yan teaches configuring
5 resource sets for the active channel?

6 A. Yes.

7 Q. And in Yan, I think it's your
8 understanding that there is only one active
9 channel?

10 A. Yes. The component carrier. Yan is
11 silent on BWPs.

12 Q. Can we go back to page 3? In the
13 middle of that page do you see the sentence that
14 reads, "Takeda on the other hand is concerned with
15 reducing UE power consumption and blind decoding
16 overhead by activating or deactivating bandwidth
17 parts." Is that correct?

18 A. Yes.

19 Q. That sentence is accurate to the best
20 of your understanding?

21 A. Yes.

22 Q. What is UE power consumption?

1 A. Okay. So, the UE has many components.
2 One of them is the receiver. And if you don't
3 limit the receiver by a filter to look into a
4 specific bandwidth part, it has to look on the
5 whole component carrier. Now he has to look for
6 things there. He has to basically receive it,
7 decode it. This will result in shorter battery
8 life or power -- increased power consumption. The
9 more -- the larger bandwidth, the more power
10 consumed.

11 So, Takeda is basically concerned with
12 that, and he basically limited -- that is why it
13 is called blind decoding. You are looking for
14 something. Where is it? So you have to look at
15 the whole spectrum. Takeda basically has parts
16 so, you know, you have one part which is smaller
17 than the whole spectrum or component carrier.

18 Q. You said the UE has many components
19 and one of them is the receiver. Are there other
20 UE components that contribute to power
21 consumption?

22 A. The processor. Basically you have to

1 decode what you basically receive. So, the
2 processor also.

3 Q. Anything else?

4 A. It is really the processing.

5 Q. How about transmitter? Is there any
6 power consumption associated with transmitting
7 information?

8 A. Transmit also. But in the receive, it
9 is blind. It doesn't know. So let's say I tell
10 you transmit, I give you resource so you know
11 where to look, so you just transmit in that
12 section or part, so you would consume less.

13 Q. So the transmitter also consumes --

14 A. If -- so the receiver -- this was one
15 of the problem back then of Bluetooth, just the
16 beginning, that it consumed more on the receiving
17 part because when we refer now to this, if you
18 have to look at a very wide spectrum, you are
19 blind so you have to decode all this. Let's say
20 you found something that tells you, for example,
21 transmit in this bandwidth part or in this
22 section. So, you are just transmitting in that

1 section so you would consume less power.

2 Q. You'd still consume some power
3 transmitting?

4 A. Yes, of course.

5 Q. The UE consumes power by receiving and
6 processing data. Is that correct?

7 A. Receiving and processing data.

8 Q. And it consumes power by transmitting
9 data?

10 A. Transmitting also, yes.

11 Q. Can I direct you to Takeda, paragraph
12 13?

13 A. Okay.

14 Q. If you can read paragraph 13 and let
15 me know when you are done.

16 (Pause.)

17 A. Yes. I read it.

18 Q. This paragraph, is this one of the
19 areas of Takeda that recognizes the importance of
20 reducing power consumption?

21 A. Yes.

22 Q. And it says, "When the user terminal

1 always uses the entire carrier, power consumption
2 may be enormous." Is that right?

3 A. Yes.

4 Q. "Therefore, in future wireless
5 communication systems, semi-statically configuring
6 (configuring) one or more frequency bands within
7 the carrier in user terminals is being
8 considered." Right?

9 A. Yes.

10 Q. By "frequency bands" it explains it
11 means bandwidth parts?

12 A. Yes.

13 Q. So this concern about power
14 consumption is in the context of how we are
15 configuring bandwidth parts?

16 A. Yes. It is one of the reasons, yes.

17 Q. You can set Takeda aside.

18 If we can go back to the Patent
19 Owner's Response, Number 37?

20 A. Yes.

21 Q. If I can direct you to page 13.

22 A. Okay.

1 Q. You see the sentence that says, in the
2 first full paragraph, "Both Petitioner's expert
3 and Patent Owner's expert agree that there may be
4 many bandwidth parts configured for a user
5 equipment," I will skip the cite, "but under 5G
6 NR, only one bandwidth part may be activated for a
7 user equipment."

8 Do you see that sentence?

9 A. Yes.

10 Q. That's what we've been discussing
11 previously, that under 5G you would configure all
12 of the uplink bandwidth parts at the same time but
13 you only have one activated at the same time. Is
14 that right?

15 MR. HELGE: I will object to form.

16 A. Again, can you rephrase?

17 Q. Yes. With reference to 5G, which is
18 what this sentence says, "under 5G NR," you
19 configure all the bandwidth parts that are
20 configured for the UE, right?

21 A. Yes.

22 Q. You only activate one bandwidth part

1 at a time. Is that right?

2 A. Yes.

3 Q. And it is correct that a bandwidth
4 part has to be configured before it can be
5 activated, right?

6 A. Yeah. It says "many bandwidth parts
7 configured," but in 5G only one may be activated
8 for the user equipment. Yes. So, the
9 configuration comes before the activation.

10 Q. It has to, right?

11 Let me phrase that more clearly: A
12 bandwidth part has to be configured before it can
13 be activated, right?

14 A. That's my understanding. Yes.

15 MR. KOOPMAN: We have been going about
16 an hour. Do you want to take another break?

17 MR. HELGE: We can. Why don't we go
18 off the record.

19 MR. KOOPMAN: Let's go off the record.

20 (Recess.)

21 BY MR. KOOPMAN:

22 Q. Dr. Sharony, if I could direct your

1 attention to page 16 of the Patent Owner Response?

2 That is Paper 37.

3 A. Yes.

4 Q. You see the heading B, toward the
5 bottom of that page?

6 A. Yes.

7 Q. Right before that heading do you see
8 the sentence that reads, "For reasons discussed
9 below, at least the 'each' language in these
10 challenged claims render them patentable over the
11 asserted grounds."

12 You see that?

13 A. Yes.

14 Q. And you agree with that?

15 A. Yes.

16 Q. I think we discussed this earlier, but
17 in your view the word "each" in the claim means
18 each and every, right?

19 A. In 1[e], in the context of using the
20 word "each," it suggests that every -- each one of
21 the bandwidth parts configured for the UE, the
22 bandwidth parts is also configured with the uplink

1 resource sets.

2 Q. So then "each" in that claim element
3 means each and every bandwidth part?

4 A. Yes.

5 Q. Does it mean something different in
6 1[f]?

7 A. In 1[f], so we know, in the context of
8 5G, that we basically activate one of them, one of
9 four, but the language allows more, meaning, yes,
10 one or more.

11 Q. I think we have been over this before.
12 So "each" in 1[f] means it can be one bandwidth
13 part or more than one bandwidth part?

14 A. Again? Sorry.

15 Q. I will repeat.

16 The word "each" in element 1[f] --
17 when element 1[f] refers to each bandwidth part it
18 means it can be one bandwidth or more than one
19 bandwidth part. Is that your understanding?

20 A. The activation.

21 Q. Yes.

22 A. Yes. In 1[e] -- it depends on the

1 context, in the claim also, and based on the
2 specification. And it's logic also because if you
3 are going to activate something, it has to be
4 configured. So, all the bandwidth parts that are
5 configured for the UE are configured also with the
6 resource sets. Now all of them are configured, so
7 if you use the language "the each," so it refers
8 to these previously configured, and you can
9 activate them.

10 Q. According to the claim, you can
11 activate one of them or more than one of them?

12 A. It could be.

13 Q. I mean, is that your understanding?

14 A. We know that practically speaking --
15 and this patent basically quote all the time the
16 5G, we talk about 5G, the context of 5G -- we know
17 that one is activated. But the way the last
18 limitation is written, it doesn't specific use the
19 word "one" activated.

20 Q. It says "each bandwidth part," right?

21 A. "The each." So it refers to --

22 Q. It is referring to the configured

1 bandwidth parts. Is that correct?

2 A. What did you say? To the configured
3 bandwidth parts?

4 Q. In element 1[f], when it refers to
5 "the each bandwidth part" it is referring to the
6 bandwidth parts that are configured in 1[e]. Is
7 that correct?

8 A. Yeah. "The each." Yes.

9 Q. And from 1[e] we know that all of
10 those bandwidth parts are configured?

11 A. If they were configured to the UE.

12 Q. Right. From 1[e] we know that all of
13 the bandwidth parts that are configured for the UE
14 are configured?

15 A. Right. Yes.

16 Q. From 1[f] we know that -- from 1[f] it
17 is your understanding that one or more of those
18 bandwidth parts is activated based on the DCI. Is
19 that correct?

20 A. Yes, through the DCI. And it refers
21 to the configured uplink BWP, bandwidth parts, in
22 the preceding limitation.

1 Q. I think it was your testimony earlier
2 today that it is your understanding that claim 1
3 requires more than one bandwidth part, right?

4 A. Yes.

5 Q. And that that's your understanding
6 because of the "each bandwidth part" language?

7 A. Yes. Otherwise it would just say "the
8 bandwidth part."

9 Q. So since it says "each bandwidth
10 part," it is your view that it has to be more than
11 one. Is that correct?

12 A. Yes. It is a plurality. Yes.

13 Q. Is it possible for a UE to only have
14 one bandwidth part? I am not saying within the
15 scope of the claim. Just generally speaking, is
16 it possible for a UE to have only one bandwidth
17 part configured?

18 A. In what context are you asking if not
19 in the context of the claim?

20 Q. Let's say in 5G. Can a 5G UE have
21 only one configured bandwidth part?

22 A. Then the whole -- the holy grail of 5G

1 is to have multiple bandwidth parts supporting
2 what we discussed, the different deployment
3 scenarios: Enhanced mobile broadband,
4 ultra-reliable low latency, and machine type
5 communication. We spoke about the numerologies
6 that are different.

7 So, if you had only one and you
8 populated it with one, so you are back to LTE. We
9 are moving, we are advancing, right? You'd like
10 to see a robot doing surgery in Africa or
11 something, you know? So, you need something else.

12 Q. So in 5G it is not possible for a UE
13 to have just one configured bandwidth part. Is
14 that correct?

15 A. Right. That would kind of defeat the
16 purpose.

17 Q. So let's go backwards then. For 4G,
18 would it be possible for a UE to have just one
19 bandwidth part?

20 A. There is no bandwidth parts in 4G.

21 Q. There is just a carrier?

22 A. Just a carrier.

1 Q. And you wouldn't call the carrier a
2 bandwidth part?

3 A. No.

4 Q. So in your view, a UE can't have just
5 one bandwidth part?

6 MR. HELGE: Object to form.

7 A. Where? In 5G, or 4G?

8 Q. Either.

9 A. In 4G there is no bandwidth parts.

10 Q. So there can't be one bandwidth part
11 in 4G?

12 A. Right.

13 Q. I think you said you'd never have one
14 bandwidth part in 5G; is that right?

15 A. In 5G you have gigahertz of spectrum.
16 It's inconceivable. That's what Takeda said, and
17 he was right, you know, that you have to focus on,
18 you know, parts.

19 Q. If you had a UE with just one
20 bandwidth part, that would defeat the purpose of
21 5G in your view?

22 A. Yeah, because it's kind limited

1 functionality of supporting all the deployment
2 scenarios.

3 Q. I get it.

4 Would you agree that if there were
5 such a UE with just one bandwidth part, then that
6 bandwidth part would have to be both configured
7 and activated for the UE to work? Right?

8 A. If you have only one? But this
9 hypothetical is not correct.

10 Q. I understand. I understand what you
11 are saying about why you wouldn't do that in 5G.
12 What I am asking is, if a UE had only one
13 bandwidth part, then that bandwidth part would
14 have to be configured and activated for the UE to
15 even work. Is that right?

16 A. But the claim language require a
17 plurality. That's what we said.

18 Q. I understand why you think the claim
19 requires more than one, and that is not what I am
20 asking about, what the claim requires.

21 I am just saying, if you had a UE that
22 only had one bandwidth part, for that UE to work,

1 that one bandwidth part would have to be
2 configured and it would have to be activated. Is
3 that right?

4 A. Yeah. But hypothetical is not
5 correct --

6 Q. I understand. I just wanted to make
7 sure my understanding was --

8 A. -- based on 5G and based on the '463.

9 Q. Right. I know why this hypothetical,
10 you think, would not work with 5G or would not
11 make sense with 5G. I just wanted to make sure my
12 understanding was correct that for this
13 hypothetical one bandwidth part UE, the only way
14 it would work is if that one bandwidth part was
15 configured and activated, right?

16 A. I cannot agree to that because you are
17 taking things out of context. If it has only one
18 bandwidth part and it is configured, so where is
19 5G?

20 Q. It --

21 A. It doesn't make sense.

22 Q. It doesn't have to be a 5G unit.

1 A. And also based on the language here.
2 So I wouldn't consider -- different words: A
3 POSITA would not consider activating the sole or
4 the lone bandwidth part because there are several
5 of them. We understand why, because different
6 deployment scenarios. It is also basically in the
7 vein of 5G.

8 So, I don't agree that there is one
9 configured and activated. It's not according to
10 what a POSITA would learn from the '463 Patent.

11 Q. You are saying that would be
12 inconsistent with 5G?

13 A. Inconsistent with the '463 also.

14 Q. I understand that you think it would
15 be inconsistent with '463. Is it also your
16 opinion that it would be inconsistent with 5G?

17 A. Yes.

18 Q. At the bottom of page 16, the
19 sentence -- it goes on to the next page but I will
20 read the whole thing. It says, "However, it is
21 undisputed that Yan fails to disclose any BWPs and
22 also, therefore, fails to disclose a concept of a

1 BWP that is configured but not activated for a
2 user terminal." Is that correct?

3 A. Yes.

4 Q. Is it your understanding that Takeda
5 discloses the concept of a BWP that is configured
6 but not active?

7 A. Say it again? I was busy...

8 Q. I will start over.

9 It says here, Yan "fails to disclose a
10 concept of a BWP that is configured but not
11 activated for a user terminal." You agree with
12 that?

13 A. Yes.

14 Q. Is it correct that Takeda does
15 disclose that concept; that is, a BWP that is
16 configured but not activated for a user terminal?

17 A. No, because Takeda is silent on the
18 configuration as we know it. Takeda only talks
19 about BWPs. Yan is silent, doesn't talk about
20 BWPs.

21 Q. So Takeda talks about BWPs?

22 A. Yes.

1 Q. And does Takeda talk about activating
2 BWPs?

3 A. Yes. He talks about activation,
4 deactivation.

5 Q. If the BWP is activated, it has to be
6 configured, right?

7 A. Yes. You know, in order to ignite the
8 car, you need it to be configured with a motor.

9 Q. Does Takeda require all the BWPs to be
10 active all the time, or can there be only one
11 active in Takeda?

12 A. I think he uses the language "one or
13 more."

14 Q. So then, if Takeda discloses multiple
15 BWPs and only one active, doesn't Takeda disclose
16 a BWP that is configured but not active?

17 A. No, because Takeda doesn't -- where
18 are the resource sets?

19 Q. I am not asking about resource sets.

20 A. No, it is not configured in the
21 language of the '463 Patent. There are no -- the
22 BWPs in Takeda -- and there are multiple of

1 them -- are not configured with resource sets,
2 each and every one of them. They are not.

3 Q. Are they configured to transmit UCI?

4 A. Yeah, but we saw in figure 8 and 9,
5 it's something else. It is just basically grants
6 that tells the UE what to use, but they are not
7 research sets populated with PUCCH resources.

8 Q. Let me clarify what I'm asking. Does
9 Takeda disclose multiple BWPs?

10 A. Hmm?

11 Q. Does Takeda disclose multiple BWPs?

12 A. It does.

13 Q. Are the BWPs in Takeda configured to
14 transmit UCI?

15 A. They are not configured.

16 Q. How can they be activated if they are
17 not configured?

18 A. Hmm?

19 Q. How can they be activated if they are
20 not configured?

21 A. Because we saw in Figure 8 and 9
22 just -- the mobile basically gets the grant, he

1 looks in the CORESET, in the long strip that goes
2 there, and it tells him where. These can be on
3 the fly. He just looks, so it is basically -- it
4 doesn't disclose the configuration that we see in
5 the '463.

6 Q. I am not asking about the '463 so let
7 me ask again.

8 Does Takeda disclose multiple BWPs
9 that are capable of transmitting UCI?

10 A. It showed physical uplink shared
11 channel and, together with data, you would send
12 control data based on indication that he sees in
13 the CORESET. They call it CORESET, these long
14 strips. There is a grant -- it is called uplink
15 grant -- that tells him where in the uplink shared
16 channel to transmit the UCI, for example.

17 Q. So then the BWP is capable of
18 transmitting the UCI in Takeda?

19 A. He is getting resources on the fly.
20 There is no configuration there. I didn't see the
21 configuration in Takeda. And that's why you bring
22 Yan, to fill the gap. But we will get into it.

1 Q. Does Takeda disclose -- let's look at
2 Takeda.

3 A. Okay.

4 Q. Let's look at paragraph 33 of Takeda.

5 A. 33. Yes. You see it says "monitors."
6 It looks to me on the fly. It looks at the
7 CORESET, on the uplink grant that tells him where
8 in the shared channel -- they are talking about
9 shared channel, not the control channel -- where
10 to -- where to transmit.

11 Q. So it is looking at the DCI to decide
12 where to transmit. Is that correct?

13 A. It says, in Figure 2, when BWP is in
14 the active state the user monitors -- again, blind
15 decodes. What does it mean, blind decodes? He
16 basically look at the whole CORESET for the DCI.
17 He is blind. '463 is not blind, it's configured;
18 you know exactly which to choose and which to --
19 it's almost static. You know, it's configured.

20 Here it blind decodes. Yes, Takeda
21 reduce the blindness. You don't have to look at
22 the whole spectrum but you have still to look

1 within the activated BWP at the CORESET, which
2 tells me that it's on the fly. A different
3 mechanism.

4 It looks for the DCI, for the uplink
5 grant --

6 Q. You are talking about a different
7 mechanism, so I think you are comparing this to
8 the '463 Patent, right? What do you mean by
9 "different mechanism"?

10 A. There is no configuration here.

11 Q. Okay.

12 A. You know, it's like I tell you -- in
13 the '463 and 5G, when you activate a bandwidth
14 part, you know which set, you know which set you
15 are using and you know also the source within the
16 set. There are no surprise -- there is no
17 blindness. I know exactly. Because I get the
18 DCI, I know exactly.

19 Here I don't know even where is the
20 DCI. I have to basically -- it says blind decode
21 for the DCI.

22 Q. Let me --

1 A. And then -- long story short, Takeda
2 is silent on configured resource set for every
3 BWP. It's not there.

4 Q. I just want to understand how
5 activating in Takeda works. Let's jump to
6 paragraph 104 of Takeda.

7 A. Yes.

8 Q. Paragraph 104 starts, "Activation or
9 deactivation of each UL BWP," right?

10 A. 104?

11 Q. Yes.

12 A. Okay.

13 Q. Do you see that?

14 A. "Activation or deactivation of each."
15 Yes.

16 Q. So when Takeda activates a UL BWP,
17 that means it is sending UCI through that UL BWP,
18 right?

19 A. It has to know which resource to use.
20 The BWP is not enough. It's like -- remember
21 Figure 3B in the '463? You have a BWP. So if I
22 tell you, "You operate in the BWP," you tell me,

1 "Where?" I know it is BWP, but it's big.

2 So we said, okay, you use this set,
3 based on the size of how much you want to send, if
4 it's an acknowledgement, a negative
5 acknowledgement, which is short or channel state
6 information. And then the DCI would tell you,
7 "Use resource number 3." You don't have to look
8 or blind decode. It's written. It's already
9 done, the configuration of the resource sets.

10 Q. What --

11 A. Here there is nothing, no mentioning
12 of resource sets.

13 Q. I am not asking you about resource
14 sets.

15 A. Okay.

16 Q. What happens when the UL BWP is
17 activated in Takeda?

18 A. So he is monitoring -- he says that he
19 is monitoring the CORESET at the beginning of a
20 frame or something, Figure 8 or 9, until he finds
21 this uplink grant that tells him where to look in
22 the whole channel, the shared channel, not the

1 control channel.

2 Q. In that sentence it concludes, "the
3 user terminal may activate the UL BWP." Do you
4 see that?

5 A. Yes.

6 Q. And then when the user terminal
7 activates the UL BWP, the user terminal transmits
8 UCI through that UL BWP, right?

9 A. Not before he found -- where is the
10 grant? It says "when a UL grant is detected by
11 monitoring the CORESET." In our case, we don't
12 detect it.

13 Q. What's our case?

14 A. The '463 or 5G.

15 Q. Let me say again --

16 A. I give you three number. The BWP,
17 number two. CORESET, number 3. Resource, number
18 4. So, you know exactly what is it. You don't
19 have to monitor and detect.

20 And then the user terminal -- for
21 example, "when a UL grant is detected by
22 monitoring the CORESET of the downlink BWP, the

1 user terminal may activate --" Ah, this is even
2 before that, not to mention he basically knows
3 which uplink bandwidth part to use. He said "the
4 user terminal may activate."

5 So, after looking into the CORESET and
6 getting the uplink grant, only then he knows that
7 it is uplink number 3. Again, different than 5G
8 or '463.

9 Q. So I want to be very clear. I am
10 worried I am not being clear.

11 A. Okay.

12 Q. I am not asking you about 5G.

13 A. Okay.

14 Q. And I am not asking you about the '463
15 Patent.

16 A. Okay.

17 Q. Let's go right back to the sentence
18 you just read. "For example, when a UL grant is
19 detected by monitoring the CORESET of the UL BWP,
20 the user terminal may activate the UL BWP."

21 Do you have any understanding of what
22 Takeda means by "activate the UL BWP"?

1 A. Yes. The CORESET, after detecting it
2 and monitoring it, blindly decoding it, you find
3 the uplink grant that tells you which BWP to
4 activate.

5 Q. And then you activate that BWP?

6 A. Yes. That's what it says.

7 Q. And then what happens?

8 A. In that uplink grant, it also --
9 "activation or deactivation...may be controlled
10 regardless of presence or absence..."

11 Q. So what does Takeda mean when it says
12 "activate the UL BWP?"

13 A. It tells him to use the BWP number 3.

14 Q. To transmit information?

15 A. No. To operate there. It tells him,
16 you know -- it's basically a swath of a spectrum.
17 It tells him to look, you know -- just from...

18 Q. So this is --

19 A. Like 1220 megahertz until
20 1240 megahertz or something. It tells him where
21 to look. This is the activation. You are going
22 to use this part of the bandwidth.

1 Q. It's activating an uplink BWP, right?

2 A. Yes.

3 Q. So what does the UE do with the uplink
4 BWP?

5 A. So it knows to operate there. What is
6 activation? To operate there.

7 Q. To transmit in that UL BWP?

8 A. Or receive.

9 Q. Well, it doesn't receive in an uplink
10 BWP, does it?

11 A. Hmm?

12 Q. The UE doesn't receive information in
13 an uplink BWP; it transmits information in an
14 uplink BWP?

15 A. Right. But it gets, through the
16 downlink, through the CORESET, through the uplink
17 grant he knows -- that's what we read. "When
18 uplink grant is detected by monitoring the CORESET
19 of the downlink BWP," which could be different
20 than the uplink, "the user terminal may activate
21 the uplink BWP. Activation or deactivation of the
22 DL BWP may be controlled regardless --" that is

1 something else, the downlink.

2 Q. I am just talking about uplink because
3 it is talking about activating the uplink BWP. My
4 understanding of what that means is, activating
5 the uplink BWP means instructing or telling the UE
6 to transmit on that UL BWP. Right?

7 A. Yeah. But it doesn't tell him
8 which -- where is the resource yet. It doesn't.

9 Q. So how does the UE know where in that
10 U --

11 A. Because in the uplink grant --
12 remember in Figure 8 and 9, they point to a
13 specific area of the physical downlink control
14 channel -- shared channel. If we go back, let's
15 take Figure 8 for example. You see the uplink
16 grant. So, the UE basically monitors the CORESET
17 and he sees that there is uplink grant. The
18 uplink grant tell him which bandwidth part to use.

19 Q. And then it uses that bandwidth part
20 to transmit?

21 A. To transmit uplink.

22 Q. To transmit uplink control

1 information?

2 A. It's a shared channel, so you can send
3 also control.

4 Q. Right. So the CORESET or the uplink
5 grant tells the UE which uplink bandwidth part to
6 use, and then the UE uses that bandwidth part to
7 transmit either uplink control information or
8 uplink data information or both?

9 A. This is for the control. We are
10 talking about the control.

11 Q. For the control. Sorry.

12 A. But this has nothing to do with the
13 configuration that we talked about of the control
14 resource sets.

15 Q. Again, I am not asking about the
16 configuration that is described in the patent. I
17 am just asking about Takeda.

18 A. It's very much like the LTE that we
19 know that the resources are at the bottom and at
20 the top of the band, and the UE get indication
21 which one to use. These are not sets of resources
22 that are configured in advance. Here it is kind

1 of on the fly what we see here.

2 Q. Is it correct that Takeda discloses --

3 A. Why should I use -- in 5G and the
4 '463, all what I need is which bandwidth part to
5 use. I look at the size of the UCI, I select a
6 set, and then the DCI tell me which PUCCH to use
7 within that set.

8 Here I have to monitor blindly the
9 CORESET, which will tell me which uplink bandwidth
10 part I have to activate and may tell me also
11 which -- where there I should use -- it's not
12 structured. The '463 is a very defined structure
13 of resource sets, which we don't have here, for
14 each configured BWP. Missing. Not here.

15 MR. KOOPMAN: I am going to object and
16 move to strike that as non-responsive.

17 Q. Coming back to the question, is it
18 correct that Takeda discloses more than one BWP?

19 A. Yes.

20 Q. Is it correct Takeda discloses
21 activating more than one uplink BWP?

22 A. He mention activation and

1 deactivation. But remember 1[e] and 1[f]. We
2 need the resource sets per BWP configured for the
3 UE. It's missing here. We don't have it here.

4 Q. So referring to paragraph 113 of
5 Takeda --

6 A. Okay. Figure 9?

7 Q. Yes, describing Figure 9. And you can
8 go to the top of page 25, which is where I will
9 start. On that page it says, "In Figure 9 BWP
10 index number 2 is included in the UL grant
11 detected in this CORESET --"

12 A. Just one second.

13 "In Figure 9 BWP index 2 is included
14 in the uplink grant detected in the CORESET and
15 thus the user terminal may deactivate uplink BWP 1
16 and activate 2."

17 Q. So if I understand correctly, what is
18 happening here is that uplink BWP 1 was active but
19 when the UE received this new UL grant it
20 deactivated uplink BWP number 1 and activated
21 uplink BWP number 2. Is that correct?

22 A. Sounds right. But not in the -- I

1 repeat myself. Not in the context of the
2 resource -- control resource sets. It is
3 basically doing some monitoring, detecting
4 something in the CORESET in the downlink and...

5 Q. If I understand your concern
6 correctly, it's that when you look at Takeda it
7 doesn't say which resource -- which uplink control
8 channel resource set or which uplink control
9 channel resource you should use in your uplink
10 BWP?

11 A. That's a requirement of the limitation
12 1[e] and 1[f].

13 Q. And you are saying that when you look
14 at the uplink grant in Takeda, it's not talking
15 about here is -- maybe it tells you what uplink
16 BWP to use, but it doesn't tell you what --

17 A. There are no sets.

18 Q. Well, let me finish.

19 Maybe it tells you -- I mean, it does
20 tell you what uplink BWP to use, but you are
21 saying it doesn't tell you which uplink control
22 channel resource set or which uplink control

1 channel resource to use in that uplink BWT.

2 Right?

3 A. No, no, no. No one tells the UE which
4 resource set to use.

5 Q. In Takeda?

6 A. In the '463. Takeda is silent. There
7 is no resource set. In the '463 -- I jump to '463
8 to explain.

9 Q. Go ahead.

10 A. Someone tells you to activate BWP 2,
11 okay? Okay, take this example. You deactivate 1
12 and you activate 2. So you go to this map in 3B,
13 Figure 3B in '463, and you see the sets, okay?
14 The sets are not just sets. They are -- they have
15 different formats that cater to if you have a few
16 bits to send, acknowledgement or negative
17 acknowledgement, or maybe you need more to send
18 CSI, the channel state information.

19 The UE knows the size. He knows what
20 he is going to send. He selects a set, determines
21 the sets, and he gets, through the DCI, the
22 resource in that set. There is nothing here in

1 Takeda.

2 Q. In the '463 Patent, in claim 1 it is
3 telling you which resource in the resource set in
4 the uplink bandwidth part to use to transmit your
5 UCI?

6 A. Once the bandwidth part was activated
7 and a set within that bandwidth part was selected,
8 determined.

9 Q. That's how '463 Patent works. In
10 Takeda you are not seeing anywhere where it tells
11 the UE which control channel resource to use?

12 A. Set.

13 Q. Which control channel resource -- you
14 are not seeing anywhere in Takeda where it tells
15 you which control channel resource set to use?

16 A. Right. There are no resource sets.

17 Q. Right. So to decide what resource you
18 want to use in your uplink bandwidth part, you
19 need to look somewhere else?

20 A. The claim limitation says, you know,
21 clearly, resource sets. There are no resource
22 sets here. It is silent.

1 Q. Right. And I am just talking about
2 Takeda again. Takeda is silent on the resource
3 set is your understanding, right?

4 A. Correct.

5 Q. So if I wanted to know what resource
6 set to use for my UCI in my activated UL BWP, I
7 need more information?

8 A. But there are no resource sets here.
9 It describes something else. You look at the
10 CORESET and, based on that, it tells you which
11 bandwidth part. The arrow there shows you the
12 resource also to use.

13 Q. So it does tell you what resource to
14 use?

15 A. Yeah. The uplink grant basically
16 tells you --

17 Q. -- which resource in the activated UL
18 BWP to use?

19 A. Yeah. The UE cannot just decide to
20 transmit because someone else -- someone has to
21 tell him to use that resource. But the whole
22 structure of the resource sets as part of the

1 claim limitation, is missing.

2 Q. So if I --

3 A. It's like Takeda said, "Don't worry,
4 we'll tell you what to use." You know, but this
5 is a whole different -- it's a different method.

6 Q. Well, something in Takeda tells you
7 what resource to use in your uplink bandwidth part
8 for transmission, right? That is what we see --

9 A. Not resource sets.

10 Q. That is not what I am asking. That is
11 not what I am asking.

12 What I am saying is, the UL grant in
13 Takeda tells you what bandwidth part, what uplink
14 bandwidth part to activate and what resource in
15 that uplink bandwidth part to use. Is that
16 correct?

17 A. Show it to me. Where is it?

18 Q. I am asking if that is your
19 understanding of Takeda, so let me ask again.

20 The uplink grant --

21 A. Well, we saw that the uplink grant
22 tells you which one to activate.

1 Q. Does it also tell you what resource to
2 use in the activated uplink BWP?

3 A. It says in paragraph 112, "the index
4 of the BWP of the uplink BWP in which --" here
5 they use the shared channel, not the control
6 channel that we were talking -- "is scheduled may
7 be included in the uplink grant." So, the uplink
8 grant give you the index of the BWP.

9 Q. So the uplink grant is telling you
10 which --

11 A. Bandwidth part.

12 Q. Which bandwidth part to use to
13 transmit your UCI?

14 A. Yes.

15 Q. Is it also telling you which channel
16 in the uplink bandwidth part to use?

17 A. There is no channel mentioned here.

18 Q. Well, there is a PUSCH mentioned.
19 That is a channel, right?

20 A. This is the shared, the shared
21 channel.

22 Q. I understand.

1 A. But it's big. You have to look for
2 the resource in that -- this is, in the figure,
3 you know, the whole shaded area, which is -- it is
4 a square or rectangular. It is time and
5 frequency. So, the grant tells you, so we
6 activated the BWP.

7 Q. And how --

8 A. And then it says the terminal monitors
9 the CORESET in the downlink. BWP index is
10 included in the uplink grant. So that's why you
11 switch from 1 to 2, you deactivate 1, activate 2.
12 So, you know the BWP.

13 Q. So then the next question logically
14 is, how do you know what resource in the BWP to
15 use in Takeda?

16 A. In the uplink grant...

17 We have to find where it is. So far
18 we activated. I don't see that specific. Maybe
19 you see it but -- all what we found, it can
20 activate or deactivate bandwidth parts based on
21 the uplink grant.

22 Q. And once the uplink bandwidth part is

1 activated the UE will transmit UCI on some
2 resource within that uplink bandwidth part?

3 A. Yeah. This is very general. It's
4 not...

5 Q. But as you sit here right now, you
6 don't know how Takeda selects that specific
7 resource?

8 A. Right. Not to mention, you know, this
9 is a discussion on Takeda. Not to mention --

10 Q. You are exactly right there.

11 A. There is no mentioning of resource
12 sets here. I don't know. Maybe you can find it,
13 that it shows which resource to use on that
14 activated bandwidth part.

15 Q. Let's go to Yan. I am going to hand
16 you a document previously marked as Exhibit 1010.
17 Is it correct that Yan discloses control channel
18 resource sets?

19 A. Not in the context of bandwidth parts.

20 Q. That is not what I asked.

21 A. The word "resource sets" appears
22 there.

1 Q. In Yan?

2 A. In Yan.

3 Q. And Yan discloses determining a
4 control channel resource in the control channel
5 resource set?

6 A. Okay, so what is Yan? Yan is a
7 component carrier and Yan discloses resource sets.

8 Q. For the component carrier?

9 A. Yeah, of the component carrier. Yes.

10 Q. And those resource sets have
11 resources?

12 A. They would have resources. And
13 because it is directed to LTE, we know the
14 resources there. I am just jumping, but it is
15 15 kilohertz. Continue, please.

16 Q. Can I direct you to Figure 1 of Yan?

17 A. Yes.

18 Q. So in Step 102 in Figure 1 Yan
19 determines a particular channel resource set out
20 of N channel resource sets?

21 A. Correct.

22 Q. And then in the next step it

1 determines a resource in that first channel
2 resource set. Is that correct?

3 A. Yes. Basically, determine a channel
4 resource in the first channel resource set that
5 was selected from N resource sets.

6 Q. Yes. There are N resource sets. It
7 determines one of those resource sets?

8 A. Yes.

9 Q. And then it determines a resource in
10 that one resource set. Is that correct?

11 A. As indicated by the channel indication
12 information. We selected a set and we determine a
13 channel resource in that first set. Yes.

14 Q. And then we transmit UCI on that
15 determined channel resource in Step 504?

16 A. On the channel resource in the
17 determined set.

18 Q. Yes. We determined -- in order, we
19 determine a set, we determine a resource in the
20 set, and then we send UCI on that determined
21 resource, right, in Yan?

22 A. Yes.

1 Q. When we are sending the UCI, that is
2 like activating that --

3 A. We send the UCI on a resource.

4 Q. Right. That means we have activated
5 that resource in the component carrier?

6 A. Not a bandwidth part. Component
7 carrier. And after we select the set we
8 basically, based on indication, we send the UCI on
9 the resource within that set.

10 Q. Right. We have activated that
11 resource?

12 A. Yes.

13 Q. But --

14 A. Not activated the resource. There is
15 no activation here.

16 Q. Why not?

17 A. Because it is always -- it is always
18 activated. It is the only component carrier. Why
19 do you have to activate something that if you
20 don't use it will not work?

21 Q. So there is only one carrier in Yan?

22 A. Correct.

1 Q. And that carrier is always active?

2 A. Always. If you want to, you know, to
3 participate in the LTE network, yes.

4 Q. Thus, I think it probably goes without
5 saying that it must be configured if it's also
6 active, right?

7 A. We can check that. We can assume for
8 the moment that it is configured.

9 Q. Well, we know it has these channel
10 resource sets?

11 A. There is no need for activation. It's
12 active.

13 Q. And I am saying --

14 A. But you have all this structure of
15 resource sets.

16 Q. So the component carrier is configured
17 and it is active?

18 A. It's always active, yes. But it is
19 only one.

20 Q. I understand. It is just the one. It
21 is 4G.

22 A. Right.

1 Q. And it's always active?

2 A. It is always active and 15 kilohertz.

3 Q. And of course it is configured because
4 it wouldn't transmit if it wasn't configured. It
5 can't being be active if it's not configured,
6 right?

7 A. It has to -- the component carrier has
8 channel resource sets, yes.

9 Q. Which means it's configured?

10 A. For the component carrier.

11 Q. Yes.

12 A. Configured and activated at the
13 same -- so we don't have a situation of configured
14 but not activated. The configuration -- the
15 configured sets in Yan -- Yan is teaching us
16 configured set for an activated component carrier.
17 Takeda teaches us that there are configured -- not
18 configured even with the resources. That's why we
19 bring Yan. That one or more can be activated,
20 multiple BWPs.

21 Q. If I can direct you to page 23 of the
22 Patent Owner Response?

1 A. 23?

2 Q. Yes.

3 A. Yes. Okay.

4 Q. You see the last paragraph on that
5 page begins, "Additionally, Yan's scheme also
6 adjusts resources capacity to match the UCI size"?

7 A. Correct.

8 Q. What does that mean?

9 A. That doesn't mean good. Remember the
10 resource sets and the resources that are
11 configured?

12 Q. Yes.

13 A. They are configured. You don't have
14 to mess with them. The UE sees oh, I have just
15 acknowledgement, negative acknowledgement. It is
16 only one or two bits. I know that I select
17 resource at 2 because it fits there. You know,
18 you have multiple of them that would fit the type
19 or size of the UCI.

20 Mr. Yan says, you know what? We will
21 adjust the size of the resource. How they do it?
22 If we go to -- this is one of the deficiencies of

1 Yan that a POSITA would recognize right away. He
2 basically increase the number of subcarriers --
3 the more subcarriers, the longer the capacity as
4 this resource -- or he reduce it to match the size
5 of the resource to fit the UCI because he
6 doesn't -- this was the mismatch UCI.

7 He doesn't want to use a big resource
8 for a small UCI because then it is underutilized.
9 And he doesn't want to use a small resource for a
10 big UCI like channel state information because
11 then it will not fit, bits will be discarded.

12 So he said, you know what? Let's --
13 instead of messing with all this configuration of
14 the '463 and the 5G, let's have the UE work a
15 little bit and he will add or subtract subcarriers
16 to fit it. Completely different method of
17 adjusting dynamically. There, it's preconfigured.
18 I don't know why we are discussing Yan.

19 Q. If I understand what you said
20 correctly, Yan is selecting the resource it uses
21 for uplink based on the size of the UCI?

22 A. No. It adjusts. It adjusts the size

1 of the resource by -- if you see like Figure 6 or
2 7, he plays with the number of -- you see there is
3 a vertical axis of F, which is frequency. He
4 plays with the number of subcarriers; thereby he
5 can fit more or less bits.

6 This is something completely different
7 than what we have in the '463. We know each set,
8 what it is capable, the format that it is capable
9 of. And here he basically want to play
10 dynamically adjusting the size of the resource.

11 Q. The size of the uplink resource that
12 is used to transmit the UCI?

13 A. Correct. And it is fixed in the '463
14 and in 5G.

15 Q. So let's talk about that. The size of
16 the resource in the UL BWP is fixed in 5G?

17 A. You have multiple sets, resource sets.
18 Each resource set is, you know, for one or two
19 bits or sixteen bits. You know, depends what you
20 want to send to the base station. You can send
21 acknowledgement, negative acknowledgement,
22 scheduling request, and the channel state

1 information that takes lots of bits; it could be
2 16, not 1 or 2.

3 So, you choose the set. Once the BWP
4 Was activated, you choose the set that would fit
5 it. You don't have to play with it like Yan. You
6 know, let add subcarriers -- Yan is basically
7 saying let's off load all this headache to the UE
8 that would basically run more processing, runtime
9 processing to figure out and match the UCI that we
10 want to send.

11 Q. Whereas in 5G we have static,
12 differently sized resources and we just pick
13 whichever resource has the right size --

14 A. Yes. In the '463 also.

15 Q. So let me finish.

16 In 5G and in '463 we have differently
17 sized uplink resources and we pick the right sized
18 resource based on the size of the UCI we want to
19 transmit?

20 A. The set is chosen based on the UCI
21 size, and then the base station will tell you
22 there which resource to use.

1 Q. And that is how it is done in 5G?

2 A. Yes.

3 Q. Is that how it is done in Takeda, or
4 is Takeda different from 5G?

5 A. Takeda is silent. We didn't see the
6 resource sets in Takeda. That is why you brought
7 Yan, which is incompatible completely with Takeda.

8 Let me say it out loud again. 4G,
9 incompatible with 5G, and a POSITA will never
10 bring it to 5G unless he is tainted by hindsight.

11 Q. And I wasn't asking about Takeda and
12 Yan --

13 A. No, I have to say it because it's
14 clear.

15 Q. Does Takeda handle this UCI size issue
16 the same as is done in 5G, or does Takeda do
17 something different, or can you just not tell from
18 Takeda?

19 A. Takeda is silent on the -- we know
20 that -- the '463 and the 5G, they have the
21 resource sets. So, we know that. We don't know
22 that from Takeda.

1 Q. So we don't know -- reading Takeda, we
2 don't know how Takeda handles UCI of different
3 sizes?

4 A. He just mention, you know, the
5 activation/deactivation of BWPs and, you know,
6 avoid the blind decoding to not spend too much
7 power. But he is just bringing -- if you recall
8 Figure 8 and 9, the uplink grant to activate a
9 certain BWP. But from there it's not clear what's
10 happening. But no mentioning of the resource sets
11 per BWP configure.

12 Q. And no mention of how Takeda deals
13 with UCI of different sizes?

14 A. No mention.

15 Q. Actually, stay in the same paragraph.
16 The last sentence of page 23 and we'll go to the
17 next, the top of page 24. It says, "Yan also aims
18 to minimize signalling overhead and simplify
19 control channel configuration."

20 Do you see that?

21 A. Yes.

22 Q. What does "minimize signalling

1 overhead" mean?

2 A. Now we basically task the UE to crunch
3 numbers and do like -- he is complaining about a
4 mismatch problem between the resource and the UCI,
5 so he adds -- like Figure 7 in Yan, he adds/
6 subtracts subcarriers to fit the UCI there. So --

7 Q. So it --

8 A. Sorry. So this saves signalling --
9 you know, he mentioned downlink signalling that
10 would come to the UE, would tell him what to do.
11 The UE kind of takes care of itself. It would fit
12 the UCI perfectly to the size of the resource.
13 Yes.

14 Q. So this part here about minimizing
15 signalling overhead relates to the UCI size issue
16 and that, in Yan, the UE decides on its own how it
17 is going to handle UCI of different sizes?

18 A. Yeah. He adjust it dynamically. Yes.

19 Q. And in 5G we have static, different
20 sized resource sets and you just pair the UCI with
21 the resource set that is the right size?

22 A. Yes. It is set and forget. Here, it

1 is...

2 Q. In Yan it's dynamic?

3 A. Yes.

4 Q. In Takeda, we don't know how it deals
5 with different sizes of UCI?

6 A. Right.

7 Q. Let's go to page -- actually, let's go
8 to page 26 of the Patent Owner Response.

9 A. Yes.

10 Q. In the middle of page you see the
11 sentence that reads, "Backwards compatibility is
12 achieved by having a user equipment that is able
13 to comply with multiple standards, such as both 5G
14 NR and 4G LTE"?

15 A. Yes.

16 Q. What does backwards compatibility
17 mean?

18 A. That you would be able to talk two
19 languages.

20 Q. In the case of a UE, that means it
21 could communicate according to a 5G standard and a
22 4G LTE standard?

1 A. Correct.

2 Q. Is that useful?

3 A. Very.

4 Q. Why?

5 A. First, not everywhere you have 5G,
6 certain area. This is one. Two, originally when
7 the 5G came out, there were two architecture -- I
8 don't know if you heard of them -- standalone and
9 non-standalone. The non-standalone, the UE
10 connect through LTE for the control, and the data
11 would come from the 5G. The standalone is
12 basically pure 5G, control and data. Again,
13 non-standalone was first, control via LTE, data
14 through 5G.

15 If I recall, T-Mobile was the first
16 that used standalone. I remember -- I have a
17 T-Mobile. So you have a standalone -- I switched
18 from AT&T a few years ago to T-Mobile. I had AT&T
19 before so it was grayed out, the SA, standalone,
20 which means you have to talk 4G and 5G. Now
21 probably all of them using standalone.

22 So, it's important because you don't

1 know what is the infrastructure. Like even in the
2 mobile phone, if I go to a company, maybe they
3 didn't put the latest and greatest, you know.
4 Maybe they are still -- I don't know -- 802.11n.
5 So, you want to be able to talk.

6 So you ask if it is useful. It is
7 very useful. It is like coming to a new place and
8 you know only English and you don't know French.
9 So, it would be useful.

10 Q. It would be useful to have your UE
11 able to communicate according to both the 5G
12 protocol and the 4G protocol?

13 A. Yes.

14 Q. It sounds like in the non-standalone
15 days you had the same UE that would do both; it
16 would handle control information using the 4G
17 protocol --

18 A. Yes. It is called non-standalone.
19 This was, by the way, the standard of 5G. This
20 was first released. And after a year or couple of
21 years, the standalone was released, maybe in 2019
22 or something like that.

1 So, it's important. Sometime you can
2 see also on your android or iPhone, you are on 5G
3 all the time and all of a sudden you go to a
4 certain area, it says LTE. So, it depends on the
5 infrastructure also.

6 Q. Do I understand correctly in the
7 non-standalone, the data communication was done
8 under the 5G standard and the control
9 communication was done under the 4G standard?

10 A. It would use -- all the mobility
11 management was done through -- okay. So when
12 you -- it goes like this. When you attach to the
13 network, you need to attach to certain gateways
14 and there is mobility management, also when you do
15 handover. So you have to go through the LTE core
16 and then you establish the data bearer, and this
17 would go through the 5G core. But it's different.
18 We are not mixing between themselves.

19 It's mainly for establishing the
20 connection. But obviously, there should be also
21 control on the 5G because you have to acknowledge
22 or negative acknowledge packets. If you send it

1 on the LTE somewhere -- you know, you have to,
2 with the base station that you talk to, to tell it
3 to retransmit or something like that. All the
4 mobility management was there.

5 Anyway, this was a long story to tell
6 you that it's important to keep the 4G and 5G.

7 Q. It is important -- it can be important
8 for a UE to have the ability to communicate under
9 both standards?

10 A. They do. Sometime even it goes to 3G
11 in like -- god knows what area. But I have seen
12 even sometime -- I don't know. Maybe you go to in
13 a national park, I saw even the letter E, which
14 is, you know, like 2G. You know, you still see
15 them. You know, they can go through the different
16 standards.

17 Q. Let's jump to page 27. Do you see the
18 heading towards the bottom that says "Neither
19 Takeda nor Yan discloses or suggests UL control
20 channel resource sets for each UL BWP," right?

21 A. Correct.

22 Q. And you agree with that?

1 A. I do.

2 Q. We discussed this already a little bit
3 but I want to make sure I understand correctly.

4 Takeda discloses multiple BWPs?

5 A. Exactly.

6 Q. But it doesn't disclose UL control
7 channel resource sets for each BWP. Is that
8 correct?

9 A. Yes.

10 Q. I think that is why you said you need
11 Yan, because Yan discloses UL control channel
12 resource set for a common carrier?

13 A. Component carrier.

14 Q. Yes. So Yan discloses a UL control
15 channel resource set for a component carrier. Is
16 that correct?

17 A. For a component carrier.

18 Q. But in Yan it is just one carrier, it
19 is not multiple BWPs?

20 A. Right. And a POSITA would never take
21 Yan and populate it to the BWP of Takeda because
22 all morning we spent to explain the different

1 deployment of low latency, millimeter wave. So we
2 need different BWP with different numerology.

3 Yan is anchored in LTE, only
4 15 megahertz. So to bring Yan -- it has other
5 deficiency, but hypothetically if you take Yan and
6 plug it into Takeda and each BWP would have
7 15 kilohertz, you really kill the vision of 5G.
8 So, a POSITA would not combine Yan with Takeda.

9 MR. KOOPMAN: I will object as
10 non-responsive again.

11 THE WITNESS: It is just part of the
12 education.

13 MR. KOOPMAN: And I do appreciate
14 that. Let me ask one more question or two
15 and then we can take a break.

16 Q. Can you turn to page 28 of the Patent
17 Owner Response, please?

18 A. Yes.

19 Q. The main paragraph on page 28, first
20 sentence reads, "Further, Takeda discloses
21 activation switching only, such that there is only
22 one active uplink BWP at a time." Is that

1 correct?

2 A. Yes. This is the example that we saw
3 with bandwidth part 1 and 2.

4 Q. That's the example we were talking
5 about with respect to Figure 9?

6 A. I think so. He gave this example,
7 that you get the uplink grant, you deactivate 1
8 and activate 2.

9 Q. What happens to that BWP when it's
10 deactivated?

11 A. It's not operational.

12 Q. It's just not being used?

13 A. Not being used.

14 Q. But it might be used again sometime in
15 the future if the UL grant tells the UE to use it?

16 A. Yes.

17 Q. Do you think a POSITA reading Takeda
18 would recognize any need for sort of a static
19 configuration of these different bandwidth parts?

20 MR. HELGE: Object to form.

21 A. I don't understand. Could you
22 rephrase, please?

1 Q. So, we have got two bandwidth parts in
2 Takeda, only one is active at a time. Is that
3 correct so far?

4 A. Based on the example, yes.

5 Q. When you deactivate one, would you
6 still want to make sure it's configured to be
7 activated at some point in the future?

8 A. Yeah. You know, in the first place,
9 we activated it. We want to make sure. Yes.

10 Q. I mean, we don't want to get rid of
11 the 1 when we deactivate it. We want it to be
12 configured for use if the UL grant tells us to use
13 it sometime in the future, right?

14 A. Right. And it would be nice if it's
15 configured and we don't have to guess which set
16 and this, rather than Takeda is teaching us
17 monitoring a CORESET and finding. But it is what
18 it is. That's how Takeda does it.

19 Q. It would be nicer if it was configured
20 with the control channel resources that we have
21 been talking about?

22 A. Resource set.

1 Q. And the resource set?

2 A. Per configured BWP, yes.

3 MR. KOOPMAN: Let's take a break.

4 (Recess.)

5 BY MR. KOOPMAN:

6 Q. If I could direct your attention to
7 page 29 of Patent Owner's Response? There is a
8 heading at top of 29 that starts "Ground 2"?

9 A. Yes.

10 Q. The second sentence under the heading
11 says, "While Petitioners propose to combine
12 Marinier with Yan, Marinier also fails to disclose
13 a concept of a BWP that is configured but not
14 activated for a user terminal."

15 Do you see that?

16 A. The first sentence?

17 Q. Second sentence. I'm sorry.

18 A. Oh.

19 Q. You see the sentence? I will read
20 again. "While Petitioners propose to combine
21 Marinier with Yan, Marinier also fails to disclose
22 a concept of a BWP that is configured but not

1 activated for a user terminal."

2 A. Yes.

3 Q. You see that sentence?

4 A. Yes.

5 Q. You agree with that?

6 A. Yes -- well, let me add that Marinier
7 doesn't -- both Marinier and Yan don't talk about
8 BWP. Marinier plus Yan, zero BWP. No one mention
9 this in the context of the '463 or what we know
10 from 5G. So -- yes.

11 Q. Let me make sure I understand what you
12 just said. Does Marinier not disclose BWPs at
13 all, or does it just not disclose BWPs in the
14 context of the '463 Patent?

15 A. There is a word "bandwidth part." Not
16 BWP; bandwidth part. But it's not -- bandwidth
17 part, you know, later came. This is LTE time. He
18 was referring to, you know, the component carrier.

19 MR. KOOPMAN: Off the record real
20 quick?

21 (Discussion held off the record.)

22 BY MR. KOOPMAN:

1 Q. When you say there is the word
2 "bandwidth part," in Marinier there is the words
3 "bandwidth part"?

4 A. Yes, but not in the context of what we
5 have discussed so far.

6 Q. So what you are saying is Marinier
7 discloses bandwidth parts but those are different
8 from the bandwidth parts of the '463 Patent. Is
9 that your understanding?

10 A. Right. Talking about component
11 carriers. Different concept that they are --
12 completely different problem of mobile device
13 talking to multiple base stations.

14 Q. So --

15 A. And usually they are on different
16 carriers. This means three radios or three RF
17 chains. In the case we have in the '463, it's the
18 same spectrum but we just have different swaths of
19 parts or spectrum.

20 Q. Is that what the claim says, or are
21 you just getting that from the specification of
22 the '463 Patent?

1 A. No. It does say that you use parts of
2 that component carrier, the '463.

3 Q. In the claim? In claim 1?

4 A. No. In the specification it explains
5 what bandwidth parts are.

6 Q. And in Marinier, it's your
7 understanding that bandwidth parts are different
8 component carriers?

9 A. Yes.

10 Q. And they are aggregated into one
11 carrier?

12 A. No. He talks, you know, with multiple
13 sites. Each sites talk on a carrier. The mobile
14 device talks to multiple sites.

15 Q. Are you familiar with the term carrier
16 aggregation?

17 A. I do.

18 Q. What does that mean?

19 A. It is similar to what we have here,
20 but let me think.

21 Anyway, carrier aggregation -- there
22 are different carrier in LTE. I said 5, 10, 15,

1 20. Twenty was the bigger one. But if you want
2 more speed, more spectrum, the mobile device would
3 be able to basically talk on multiple carriers.
4 Like two carriers, twenty each, thereby you double
5 the spectrum, you can have more speed or even talk
6 to a WiFi access point.

7 So these are carrier aggregation, but
8 again each carrier may have a different center of
9 frequency. Like this could be in the
10 700 megahertz and this would be in the
11 2,100 megahertz, so different radio or different
12 RF chain. Different than what we have in the
13 '463, where you have a component carrier, one
14 radio, but we have different parts of that
15 spectrum.

16 So here you have parts of the
17 spectrum, different parts, but they are on a
18 different carrier. This didn't exist in 4G.
19 That's why it is called carrier aggregation,
20 because you talk on multiple carrier.

21 Q. Each carrier in Marinier is a
22 frequency band or spectrum?

1 A. Yeah. A carrier or a component
2 carrier is a spectrum.

3 Q. And Marinier discloses multiple
4 component carriers?

5 A. Yes.

6 Q. And is it correct that Marinier
7 discloses that these multiple component carriers
8 can be aggregated?

9 A. He talks talking to two sites on
10 different component carriers. So, it is sort of a
11 carrier aggregation.

12 Q. So it is aggregating multiple
13 different bandwidth parts?

14 A. Not bandwidth parts.

15 Q. Marinier uses that term, right?

16 A. He use -- yeah. It is not in the
17 context of what we discussed so far of 5G and
18 '463.

19 Q. And you are saying the bandwidth parts
20 in Marinier are different from the bandwidth parts
21 in the '463 Patent because in the '463 Patent you
22 are just looking at one radio?

1 A. Yeah. Usually it's a spectrum that is
2 chopped into multiple parts. Here it's different
3 component carrier. Component carrier is, for
4 example, 20 megahertz. I mentioned like in the
5 700 megahertz spectrum or in the 1,900 megahertz
6 spectrum. So, you have a chunk of 20 in the
7 19 megahertz and 20 in the 700 megahertz. The 700
8 and the 19 are the center frequency of the
9 carrier.

10 Q. Of the component carrier in Marinier?

11 A. Yes.

12 Q. So it's not one large carrier that is
13 chopped into pieces; it's separate carriers that
14 Marinier teaches can be aggregated together?

15 A. Yes. So -- it's important because in
16 the '463 you work on the activated carrier, you
17 get a DCI, they tell you now -- or another message
18 or RRC, you have to switch to a different carrier.

19 Here they are self sufficient. This
20 component carrier, they are self sufficient. They
21 are independent from each other, so it is another
22 RF chain or another radio.

1 Q. And just to be clear, when you are
2 talking about the '463 Patent requiring one
3 spectrum that is chopped into bandwidth parts, you
4 are getting that understanding from the
5 specification of the '463 Patent?

6 A. Yes. It is a component carrier. He
7 said -- I think also Takeda said that you have a
8 component carrier, you don't want to look on
9 everything. You know, you have parts.

10 Q. And what I am asking is, when I am
11 looking at claim 1 of the '463 Patent, it doesn't
12 talk about the spectrum or the component carrier;
13 it's just talking about bandwidth parts. But you
14 understand that the bandwidth parts in claim 1
15 have to be from the same spectrum or the same
16 component carrier because that's what it says in
17 the specification of the '463 Patent?

18 A. Did you look at Figure 3B? It shows
19 you exactly, you know, one component carrier and
20 you have multiple bandwidth parts kind of adjacent
21 to each other.

22 Q. But it doesn't say one component

1 carrier in claim 1, right?

2 A. In the lingo? No. It's not there.

3 Q. And it doesn't say adjacent bandwidth
4 parts in claim 1?

5 A. These words as you use them do not
6 appear, but based on the specification and the 5G,
7 we understand what it is.

8 Q. You are getting this understanding
9 that you have adjacent bandwidth parts from one
10 component carrier from the specification?

11 A. It shows that, at least in a few of
12 the figures.

13 Q. So you are getting that understanding
14 from the figures that you mentioned and from
15 reading the patent?

16 A. Yes. And the 5G.

17 Q. And your knowledge of 5G?

18 A. Yes.

19 Let me explain also what is behind it.
20 5G, huge, huge spectrum. The 4G, each carrier is
21 up to 20 megahertz. Twenty megahertz is not
22 enough so they take another twenty megahertz and

1 another twenty megahertz. So, they are multiple
2 component carriers.

3 Here we have hundreds of megahertz so
4 why to go and entertain multiple component
5 carriers? You can just chop the 100 megahertz
6 into several bandwidth parts of 20 megahertz,
7 let's say. That's why the bandwidth parts came
8 here in '463 and 5G.

9 Q. Can I direct you to page 31 of the
10 Patent Owner Response?

11 A. 31.

12 Q. Do you see at the start of the
13 paragraph at the bottom of that page it says,
14 "Further, Marinier's DCI controls UL scheduling
15 but never activates a BWP entity." Is that right?

16 A. Right.

17 Q. And you agree with that?

18 A. Yes.

19 Q. And is that because Marinier doesn't
20 have a BWP entity as you described it?

21 A. He talks on a component carrier with
22 different multiple sites. So this is the site

1 that used. So if you want to talk to all of them,
2 let's say three of them or two of them, they are
3 activated. They are not sitting idle.

4 Q. Right. The DCI controls activation of
5 the different component carriers in Marinier; is
6 that correct?

7 A. The component carriers that correspond
8 to the multiple sites.

9 Q. The multiple sites being the different
10 frequency bands?

11 A. No. The different towers. Remember
12 the figures with the towers? So you see this --
13 they call it a WTRU, wireless transmit receive
14 unit, that talks to multiple serving sites. So
15 each site is a component carrier.

16 Q. So the DCI of Marinier activates each
17 component carrier to transmit the UCI to its
18 associated site, its associated base station?

19 MR. HELGE: Object to form.

20 A. So, this is the old way. It doesn't
21 matter that you have multiple sites or one site.
22 In LTE, you send UCI over the component carrier.

1 Now you have multiple sites. So, in each site you
2 do what you knew how to do in LTE. You send UCI
3 here, you send UCI here for different sites.

4 Q. I just want to be sure I am
5 understanding what Marinier is saying. Marinier
6 has -- the UE has multiple component carriers; is
7 that right?

8 A. Yes.

9 Q. And --

10 A. Each site is a component carrier.

11 Q. And the DCI in Marinier activates each
12 component carrier. Is that correct?

13 A. It activated already. There is no
14 idle component carrier. If you talk to a site,
15 it's activated. Like think about multiple LTE
16 sites. So there are no like multiple bandwidth
17 parts that some are configured and not activated
18 or you can deactivate and activate. Here you want
19 to talk, you activate.

20 Q. So when you say here Marinier's DCI
21 controls UL scheduling, what does "controls UL
22 scheduling" mean?

1 A. Where?

2 Q. On page 31 at the top of that
3 paragraph. It says, "Further, Marinier's DCI
4 controls UL scheduling but never activates a BWP
5 entity." Do you see that sentence?

6 A. Right, because they are all activated
7 already. The DCI -- remember, always the DCI, you
8 get something in the downlink that tells you the
9 scheduling. Every base station has a scheduler.
10 You know, it cannot be the wild west. You know,
11 you have to tell the UE when to transmit.
12 Otherwise, you know, they would collide with each
13 other.

14 So, there is a scheduler. It sends
15 something down, tell the UE with the scheduling.
16 But they are active. In LTE it's always active.

17 Q. So let me make sure I understand. Am
18 I correct that Marinier's DCI tells each of the
19 component carriers when to send the UCI?

20 A. Or transmit at all.

21 Q. Okay. So the DCI tells each component
22 carrier in Marinier when to transmit either the

1 UCI or --

2 A. Or whatever. Yes.

3 Q. Whatever needs to be transmitted, the
4 DCI is telling each component carrier in Marinier
5 when to transmit that information. Is that
6 correct?

7 A. Yes.

8 Q. If I can direct you to page 32 of the
9 Patent Owner Response?

10 A. Yes.

11 Q. Jumping down to the paragraph that
12 begins on the bottom of page 32?

13 A. Yes.

14 Q. The first sentence of that paragraph
15 says, "However, as discussed above, ensuring that
16 UL resources are used efficiently by UE's is only
17 relevant for the BWPs that are actually used for
18 transmissions."

19 Did I read that correctly?

20 A. Yes.

21 Q. And you agree with that?

22 A. Yes.

1 Q. I guess I am having trouble
2 understanding what you mean by that. Are you
3 saying that ensuring UL resources are used
4 efficiently is not relevant when you are not
5 transmitting on a particular resource? Is that
6 what you mean?

7 A. It refers to the BWP that are
8 activated, that are actually used for
9 transmission.

10 Q. So when a BWP is used for
11 transmission --

12 A. Meaning they are activated.

13 Q. Then making sure those resources are
14 used efficiently is relevant?

15 A. Yeah, because, based on the UCI size,
16 you choose the right set and resource. Again,
17 remember the mismatch problem in Yan that he tried
18 to fix by himself the UE. Here, depending on the
19 type, size of the UCI, he will choose efficiently.
20 If you just have to transmit one or two bits, why
21 would you take a set, you know, which has a high
22 capacity? Doesn't make sense. Underutilization.

1 So, these that are activated, you want
2 to use the resources efficiently.

3 Q. I think that is just logical, right?

4 A. Yes.

5 Q. When a BWP is activated to send UCI,
6 you want to be sure it is transmitting that UCI
7 efficiently?

8 A. Yes.

9 Q. Jumping down that paragraph, the last
10 sentence reads -- I am going it read the first
11 part of it. "Marinier does not use BWPs in a 5G
12 NR context, and instead selects uplink resources
13 to avoid uplink collisions."

14 A. Yes.

15 Q. My question is, what do you mean when
16 you say Marinier selects uplink resources to avoid
17 uplink collisions?

18 A. So, you talk to two different sites,
19 okay? The component carrier may be different.
20 You might be okay. But he does mention, if I
21 recall, some of them are overlap. So, you have to
22 make sure that they don't transmit on the same

1 frequency at the same time.

2 Q. Some of the component carriers of
3 Marinier can overlap?

4 A. Could be, yes.

5 Q. Go ahead.

6 A. That is why, remember the word time
7 segregation or frequency segregation? You have to
8 make sure -- you cannot transmit at the same time,
9 same frequency. There would be a collision.

10 Q. So Marinier is concerned with making
11 sure that you are transmitting the UCI in these
12 component carriers in a way that is not going to
13 conflict?

14 A. Not only UCI. Whatever. If you
15 transmit same time, same frequency, you are bound
16 to create collisions and retransmission.

17 Q. So it's looking to make sure that the
18 uplink resources that are used for transmitting --
19 not just UCI but including UCI -- don't conflict
20 or overlap?

21 A. Yes. Don't conflict. Yes.

22 Q. Obviously, that would be a problem

1 because you would potentially lose portions of the
2 data being transmitted?

3 A. Yes. Not only that. Then you start
4 retransmission, you know, and then you collide
5 again. Just a storm created. Not good.

6 Q. Right. So Marinier wants to make sure
7 that when it is transmitting on these overlapping
8 component carriers, that it is not losing any
9 information as part of the transmission?

10 A. That's fair.

11 Q. That is your understanding of
12 Marinier?

13 A. Yeah. To avoid collisions and
14 conflicts. Yes.

15 Q. I think you can set the Patent Owner's
16 Response aside.

17 Dr. Sharony, were you instructed by
18 anyone as to what positions you should take in
19 your declaration as to the grounds in the
20 petition?

21 A. No.

22 Q. Were you instructed by anyone as to

1 what positions you should take with respect to any
2 of the prior art identified in the petition?

3 A. No.

4 Q. At any time during your work in this
5 matter, did you take a different position
6 regarding the grounds or the prior art than what
7 is in your declaration right now?

8 A. No.

9 Q. Are you aware of any errors in your
10 declaration that need to be fixed?

11 A. No.

12 Q. Anything that needs correction?

13 A. No.

14 Q. Did you confer with counsel today
15 regarding the substance of your testimony during
16 any of the breaks in the deposition today?

17 A. No.

18 MR. KOOPMAN: I have no further
19 questions.

20 MR. HELGE: We are concluded. The
21 only thing I would like to put on the record
22 is the witness would like to review and sign

1 the transcript.

2 COURT REPORTER: May I ask for your
3 transcript orders on the record?

4 MR. KOOPMAN: Whatever Amy sent you is
5 what's correct.

6 MR. HELGE: No rough, just whatever
7 the final standard process is.

8 [TIME NOTED: 3:50 p.m. EST]

9

10

11 JACOB SHARONY, PH.D.

12

13

14 Subscribed and sworn to

15

16 Before me this _____

17

18 Day of _____, 20__.

19

20

21 Notary Public

22

CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

I, DEBRA STEVENS, Certified Reporter and
Notary Public within and for the State of New
York, do hereby certify:

That JACOB SHARONY, the witness whose
deposition is hereinbefore set forth, was duly
sworn by me before the commencement of such
deposition and that such deposition was taken
before me and is a true record of the testimony
given by such witness.

I further certify that the adverse party,
Petitioner Google LLC, was represented by counsel
at the deposition.

I further certify that the deposition of JACOB
SHARONY occurred at Hilton Garden Inn, 1575 Round
Swamp Road, Plainview, New York on Thursday,
November 20, 2025, commencing at 9:05 a.m. EST to
3:50 p.m. EST.

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

7
8 IN WITNESS WHEREOF, I have hereunto set my
9 hand this 30th day of November, 2025.

10
11
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13 _____

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15 STATE OF NEW YORK
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Conducted on November 20, 2025

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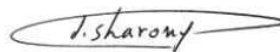
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Page	Line	Correction/Change and Reason
34	15	surviving --> self-driving / typo
40	2	kilobit --> gigabit / typo
72	18	70 --> 60 / typo
74	1; 18	parts --> bandwidth parts; other --> others / typo
75	3	space --> spacing / typo
76	22	parts --> part / typo
77	17	pair --> per / typo
80	2	part --> parts / typo
83	4	part --> parts / typo
150	16; 17	number --> numbers; CORESET --> resource set / typo
170	16	set --> sets / typo
186	22	set --> sets / typo
191	1	20 --> 20 megahertz / typo
193	7	19 --> 1900 / typo
193	8	19 --> 1900 / typo
193	16	carrier --> BWP / typo
193	18	carrier --> BWP / typo
193	19	here (in Marinier) / clarification

December 12, 2025

(Date)



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ACKNOWLEDGMENT OF DEPONENT

I, Jacob Sharony, 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.

December 12, 2025

(Date)



(Signature)